A NEW PHYSICAL THERAPY PRODUCT DESIGN THAT INTEGRATES WITH WATER (AQUATIC THERAPY) IN ORDER TO MEET NEEDS FOR PATIENTS WITH MULTIPLE SCLEROSIS (MS)

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ABSTRACT

A NEW PHYSICAL THERAPY PRODUCT DESIGN THAT INTEGRATES WITH WATER (AQUATIC THERAPY) IN ORDER TO MEET NEEDS FOR PATIENTS WITH MULTIPLE SCLEROSIS (MS)

This thesis investigates the convenience for Multiple Sclerosis (MS) patients to create a new physical therapy product that integrated with water. It will provide an easier treatment process by reducing the time, effort and financial difficulties caused by physical therapy during the treatment process.

MS is a chronic illness that affects the function of the brain such as seeing, speaking, walking and feeling in negative ways. Most patients suffer from especially walking on land. However, the situation changes when they contact with water. They start moving their muscles which they cannot move; because the water has a lifting force which reduces the weight of the patient. In addition, it prevents the force of the joints and it helps to facilitate active exercise without forcing the joint.

Physical therapy is a method that applied to people who are a congenital disability, injured for any reason or who have a chronic illness. There are many types of physical therapy, but the most effective and the easiest way for patients is the therapies applied with water.

As a result of this knowledge that has been learned and observed; the designed product is integrated water while all requirements are taken into account to ensure ease of use when designing. Following the product to be produced, patients will be able to continue their treatment freely in their living areas instead of going to a hospital or treatment center. At this point, they will not have to pay for expensive treatment sessions, waste time on the roads and will get a more comfortable treatment process.

Keywords: Physical Therapy Hydrotherapy, Aquatic Therapy, Multiple Sclerosis (MS), Design

ÖZET

MULTIPL SKLEROZ (MS) HASTALARININ İHTİYAÇLARINI KARŞILAMAK İÇİN SU İLE ENTEGRE EDİLMİŞ (SULU TERAPİ) YENİ BİR FİZİKSEL TERAPİ ÜRÜNÜ TASARIMI

Bu tez, Multipl Skleroz (MS) hastalarına su ile bütünleşmiş yeni bir fizik tedavi ürünü yaratma kolaylığını araştırmaktadır. Tedavi sürecinde suda tedavinin neden olduğu zaman, gayret ve finansal zorlukları azaltarak hastalara daha kolay bir tedavi süreci sağlayacaktır.

MS beyinin görme, konuşma, yürüme gibi işlevlerini olumsuz yönde etkileyen kronik bir hastalıktır. Hastaların çoğu özellikle karada yürümekte zorlanmaktadır. Ancak, su ile temas ettiklerinde durum değişir. Hareket ettiremedikleri kaslarını hareket ettirmeye başlarlar; çünkü suyun hastanın ağırlığını azaltan bir kaldırma kuvveti vardır. Ek olarak, eklemlere binen kuvveti önler ve eklemi zorlamadan aktif egzersizin kolaylaştırılmasına yardımcı olur.

Suda tedavi, doğuştan sakatlığı olan, herhangi bir nedenle yaralanan veya kronik bir hastalığı olan kişilere uygulanan bir yöntemdir. Pek çok fizik tedavi çeşidi vardır, ancak hastalar için en etkili ve en kolay yol suyla uygulanan tedavilerdir.

Öğrenilen ve gözlemlenen bu bilgiler sonucunda; tasarım sırasında kullanım kolaylığı sağlamak için tüm gereksinimler göz önünde bulundurulur. Üretilecek ürünün ardından hastalar, hastaneye veya tedavi merkezine gitmek yerine yaşam alanlarında tedavilerini serbestçe sürdürebilecekler. Bu noktada, pahalı tedavi seansları, yollarda boşa harcadıkları zaman için para ödemek zorunda kalmayacaklar ve daha rahat bir tedavi süreci geçireceklerdir.

Anahtar Kelimeler: Fizik Tedavi, Hidroterapi, Su Terapisi, Multipl Skleroz (MS), Tasarım

To my mother
Nermin GÜNDOĞAN,
who is a MS patient.

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

Figure **Page**

Figure **Page**

LIST OF TABLES

Table **Page**

Table **Page**

CHAPTER 1

INTRODUCTION

At the present time, the number of patients struggling with Multiple Sclerosis (MS) in the world has reached approximately 2.5 million (‘’Home’’ (n.d.) 2019). Multiple Sclerosis, which is a chronic disease, has many negative effects on patients. These symptoms affect the patient's daily life and decrease their quality of life.

The cause and treatment of the disease have not yet been found. However, there are many support treatment options in the medical world. With these supportive treatments, patients can prevent the onset of attacks, stop the progression of the disease and reduce the symptoms. One of the most effective methods among these support therapies is aquatic therapy. Thanks to this method, patients can exercise safely and freely by using the properties of water.

Therapies have some difficulties as well as benefits for patients. The most important of these difficulties come from the financial difficulties caused by the treatments. Then, having to go to treatment has both physical and psychological problems on the patient.

Taking into account all of these, we aimed to design an aqua therapy product that patients can use in their homes, save them from treatment costs, do not have to go to treatment every time, can exercise regularly in accordance with the research.

1.1. Problem Definition

Today's physical therapy tools help people to regain body functions that are necessary to maintain their daily life; because of any illness or accident. Physical therapy methods, especially applied to MS patients, are very effective in strengthening the weakened and melted muscles of the body. However, this process is difficult for patients in several ways. One of the biggest nuisances is the cost of physical therapy. For example, session prices between 100-150 ₺ (Turkish Liras) on average in Turkey and a patient needs at least 230 sessions in a year to recover which leads to financial difficulties to the patients. Secondly, transportation expenses such as road tolls, gasoline,

etc. cause an increase in the total disbursement considerably. Thirdly, MS patients suffer from walking due to weakness in their muscles and hand-arm movements. Therefore, it is an extra difficulty for them to get in the car, to get out of the car, to go to the treatment, etc. Last but not least, the time loss caused by the physical therapy process would be a correct determination.

We can understand that the physical treatment process of MS patients is difficult when considering the financial and physical difficulties, the preparation of the treatment, the time spent in the traffic, the waiting time, etc. As a result of this thesis, it is planned that these problems will be overcome and provide a higher life quality to MS patients.

1.2. Aim of the Study

MS is a chronic disease. The symptoms of the disease vary from person to person. Some lose to ability to see, some cannot talk, and some have constant dizziness. This thesis focuses on the most severe symptom that who are having trouble walking or moving because of the loss of power on leg and arm. These people face too much difficulty in their daily lives. They cannot fulfil their needs without help, they cannot go to work and go outside by their selves. Living with all these difficulties also affects the psychology of the patients. Although there have been many types of research so far, no treatment for the disease has yet been found. However, many methods are applied to improve the quality of life of the patient and to prevent the progression of the disease. The first of these is physical therapy. The aim is to ensure that weakened muscles gain their strength. This method provides much more convenience to the patient when applied in water, because, patients are having difficulty moving their legs on land. Some even cannot move at all. But this situation is changing while in the water. The movement of the patient is achieved by utilizing the lifting force of the water.

Physical therapy is a difficult process for the patient. It causes financial and emotional damage. The aim of this thesis is to reduce all the difficulties that physical therapy creates and to make it easier for the patient to continue their lives by increasing the quality of life in a psychological and financial way.

1.3. Research Question

There is a main research question in the research. In addition there are sub-questions that support research question.

Research Question: How to design ‘’Physical Therapy Products" that integrates with water in order to meet needs for patients with Multiple Sclerosis (MS)?

Sub-Questions:

Is physical therapy necessary for MS?

What is the difference between physical therapy and aquatic therapy?

What are the needs of MS patients?

Does Aquatic therapy increase the quality of life?

What are the advantages and disadvantages of aquatic therapy?

What should be considered when treating patients with MS?

Why should aquatic therapy be applied to patients with MS?

How much does the application of aquatic therapy increase the recovery rate in MS Patients?

What should be considered when applying physical therapy products?

Is there any harm to the human health of the therapy products?

Can Aquatic therapy be applied in the home environment?

Would physical therapy be harmful to the human budget?

How should be the environment that aquatic therapy be applied?

What materials should be used for physical therapy products?

Should the physical conditions of water be considered in Aquatic therapy?

Are there any special cases that MS Patients should pay attention to when they are exposed to water?

What are the difficulties faced by MS Patients?

Is Aquatic Therapy the right method for the treatment of MS patients?

1.4. Outline of the Study

This study is divided into six main parts. In Chapter One, (Introduction), the structure and aim of the study is mentioned. In Chapter Two, (Literature Review), a summary of literature about the research's topic is written. In Chapter Three,

(Methodology) the process of the research which has traced is stated. In Chapter Four, (Case Study), design process, hypotheses and taxonomy about the research results are presented. In Chapter Five, (Findings) discovery is showed. In Chapter Six, (Conclusion) meanings of our discovery are explained.

CHAPTER 2

LITERATURE REVIEW

2.1. General and Scientific Information about Multiple Sclerosis (MS)

This chapter is divided into five parts. These parts give detailed information about Multiple Sclerosis (MS). It is possible to see the extensive research about history of the disease, its definition, and the reasons for its occurrence, the syndrome and effects, the difficulties that patients have suffered and treatment methods.

Multiple Sclerosis (MS) is one of the common diseases in the nervous system, which is seen in many parts of the world, preferably involving women, young people and northern latitudes (Rolak 2003).

Neurologists agree that patients may be grouped into four major categories based on the course of disease:

Relapsing–remitting MS (RRMS): It is the most common category characterized by unpredictable acute episodes and subsequent periods of remission, affecting about 85% of MS patients. It causes tingling, visual disturbances, numbness, fatigue seizures, bowel and urinary system disorders, learning and memory disorder symptoms and spasticity (Ghasemi, et al. 2017 - Goldenberg 2012).

Secondary progressive MS (SPMS): It is considered to be the second stage of RRMS. For many patients, treatments help to delay progression. Patients have fatigue, weakness, bowel and urinary system disorders, stiffness, mental and psychological disorders (Ghasemi, et al. 2017 - Goldenberg 2012).

Primary progressive MS (PPMS): It affects 15% of MS patients. It greatly affects the nerves of the spinal cord. Symptoms continue to deteriorate from the beginning. This category is more resistant to drugs used in the treatment of the disease. There are fewer brain lesions. Stimulated symptoms include problems with walking, weakness, stiffness and balance (Ghasemi, et al. 2017 - Goldenberg 2012).

Progressive-relapsing MS (PRMS): It is a rare category. It affects 5% of patients. Symptoms persist from the beginning. Eye pain and double vision are

associated with intestinal and urinary system dysfunction, dizziness and depression. It is between 20 and 40 years of age (Ghasemi, et al. 2017 - Goldenberg 2012).

MS patients usually have one or more symptoms (Figure 2.1.).

• Sensory Symptoms: Numbness, tingling, felting, pain in the face.

• Symptoms related to vision: Blurred vision, diplopia, blindness,

• Immobility: Loss of leg strength, loss of skill in fine movements,

• Urinary / intestinal problems: Urinary incontinence, constipation.

• Dizziness, balance problems, chills,

• Fatigue: Difficulty in daily activity, low quality of life.

• Bladder problems: Thamuria, İnability to empty the bladder.

• Pain: Cramps and spasms, muscle stiffness, muscle change, Pain, burning sensation, needles sinking.

• Cognitive changes: Difficulty in learning new information, inability to perceive the environment correctly, inability to focus, distractibility, inability to use language, inability to calculate.

• Depression: Loss of interest, sadness, fears of death, irritability, feeling worthless.

• Sexual problems

• Hormonal effects

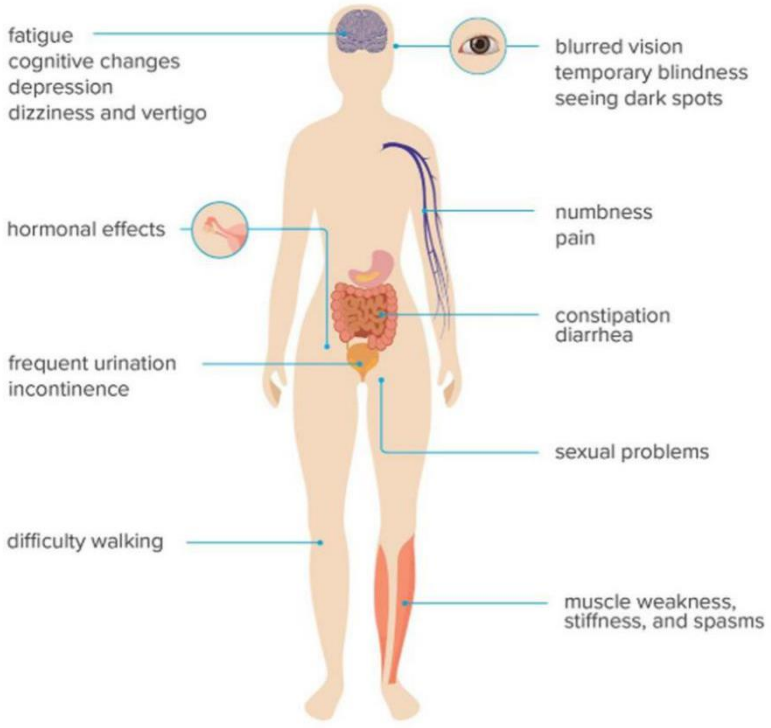


Figure 2.1. The effects of multiple sclerosis on human body (Source: Huizen 2019)

According to researches, MS patients have a lower quality of life than other patients with chronic illness. Evidence of lack of treatment of MS, lack of treatment methods, intense physical effects, and disability are convincing about the negative impact on patients' quality of life. As MS progresses from day to day, patients experience new symptoms of the disease with difficulty in their ability to move and restrictions in their daily activities. As these symptoms increase, they remain dependent on their families in order to perform their daily activities. In this case, it affects them negatively (Rezapour, et al. 2017).

2.1.1. History of Multiple Sclerosis (MS)

Multiple Sclerosis (MS) was first seen in a woman who is Saint Ludwina from Schiedam in the Netherlands, 1396. When she was skating, she suddenly deteriorates and fell down. This was the first sign of her illness. Then over time, severe headaches, difficulty walking and weakening of the muscles began to be seen. Another patient in history was Augustus d'Este who was grandson of King George III of England and cousin to Queen Victoria. The first symptom of the disease was recorded as blurred vision. With the progression of disease, weakness in his leg, numbness and bladder and bowel problems have developed in over time. He wrote all stages of illness in his diary. Thanks to this diary, doctors were able to diagnosis of Multiple Sclerosis (MS) after he died (Ebringer 2016).

In the next 60 years, ideas about how the disease has occurred have not been fully determined. Over the past 50 years, strategies have been developed about the cause of the disease, the occurrence of the damage, the limitation and repair of the damage (Compston, and McAlpine 2006).

Robert Carswell in Scotland gave a first mention of disseminated plaques (Figure 2.2.) in the nervous system which he released in his Pathological Anatomy in 1838. The disease was defined as a unique illness of cap and pons Varolii, followed by atrophy of the discoloured part but not given a clinical overview of the situation saying that I could not ascertain that anything had been calculated to clarify the nature of the lesion by the personality of the disease or the background. Jean Croveilhier, who had established a permanent weaker limb connected with differences in breathing and

visually disturbing, attributed to tumours of the upper part of the spinal cord in four Autopsy series, and produced comparable findings in France at about the same moment and given a clinical overview of one such case (Murray 2009).

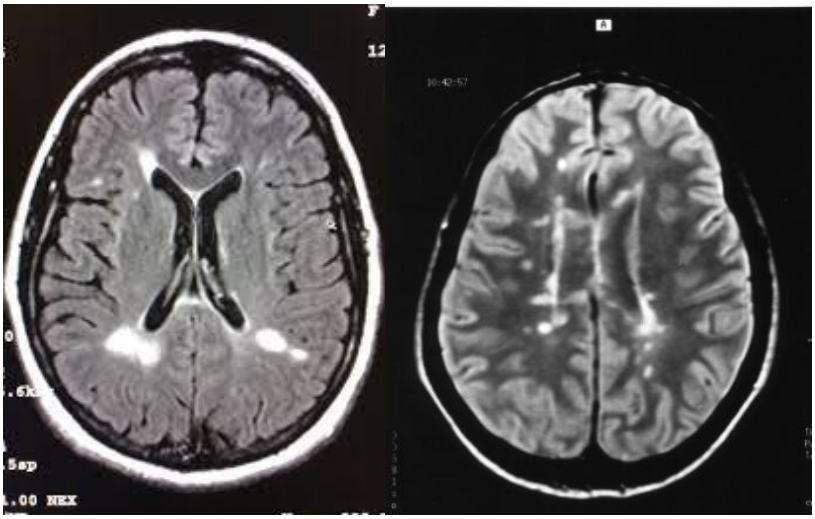


Figure 2.2. Figure shows the Patches (plaques) MR (Source: Murray 2009)

The first individual to diagnose MS on a live patient was Jean Martin Charcot. He was a young French neurologist. While the first depiction of multiple sclerosis (MS) dates back to the fourteenth century, the first correlation between clinical characteristics of MS and the pathological modifications observed after mortem was the Charcot technique and the use of the anatomoclinical technique (Kumar, et al. 2010). MS probably was with us for a long time, but it was only in 1868 when a young French neurologist, Jean Martin Charcot, described the features of the diseases and named them. MS probably was with us for a long time, but it was only in 1868 when Charcot described the features of the diseases and named them (Murray, et al. 2015).

According to another literature review finding, Charcot called to this disease as *la sclérose en plaques disseminées, la sclérose multiloculaire or la sclérose generalisée* (Compston, and McAlpine 2006). These names translated to *disseminated (cerebrospinal) sclerosis* in English-speaking world. ‘’*Insular sclerosis or lobular and diffuse sclerosis’’* were more preferred in England, Australia and the New World. In Germany; *multiple inselförmige Sklerose, multiple Hirnsklerose* and *multiple Sklerose des Nervensystems.* In France; *sclérose en plaques.* In Italy; *sclerosi in place*. In 1950, finally, it was decided that the *Multiple Sclerosis* should be named for the disease (Compston, and McAlpine 2006).

2.1.2. What are the causes of Multiple Sclerosis (MS)?

The cause of multiple sclerosis has not been found yet. Multiple Sclerosis is considered to be a disease that changes the myelin in our body with genetic and environmental factors, has immunological effects, and contains risk factors. Myelin leads to the formation of plaque / lesion when it breaks down by the so-called inflammatory process. This leads to complications in the functioning of several organs (Santos, et al. 2019).

The cause of multiple sclerosis is divided into two factors; environmental exposure and genetic susceptibility.

Environmental Exposure

The growth of MS is connected with some environmental variables. Large-scale epidemiologic and migration trials show that these variables influence the immune system and include EpsteineBarr Virus, smoking and a deficit in sunlight exposure (Raffel, et al. 2016).

The spread of Multiple Sclerosis is affected by migration involving big amounts of individuals (Compston, Coles 2008). The danger of multiple sclerosis correlates with inhabitation of immigrants from South Africa, Israel, Hawaii and UK citizens in childhood. Migration from high-risk to low-risk areas in infancy is connected with a decreased danger and a higher risk of MS in low to high incidence areas of the globe compared to the source population (Compston, Coles 2008). The incidence of MS rises further from the Equator, including in England, where the incidence in Northern Scotland is largest and in Southern England is smallest. Studies of migration have demonstrated that the danger of illness is gained by until age of 15 and does not alter when relocated (Raffel, et al. 2016).

Evidence currently shows that tobacco plays a significant part in MS, because of the manufacturing of nitric oxides (NO) and carbon monoxide (CO). NO is a poisonous soluble gas with a risk of damaging cells and oligodendrocytes in pathologic levels. Lipid peroxidation and NO-causing mitochondrial harm can cause apoptosis, axonal decay and demyelinating oligodendrocytes (Ghasemi, et al. 2017).

The growth of Multiple Sclerosis is considered to play a role in environmental threat variables like vitamin D deficiency, (linked to reduced sun exposures and a

decrease in natural output from sun exposure in dark skin racial communities) (Thompson, et al. 2018). Accumulating proof shows that appropriate vitamin D food helps prevent MS. Vitamin D supplementation, with respect to other risk variables, is more manageable and therefore more relevant in practical terms, although several issues stay unresolved (Ascherio 2013).

In addition, obesity of the childhood was also involved as an MS susceptibility determinant. Although small concentrations of vitamin D could clarify the linkage, there is proof that infant obesity in some nations is an autonomous threat variable to the rise of MS (Ascherio 2013).

Genetic Susceptibility

MS isn't a genetic illness, although MS symptoms are caused by a large number of genetic modifications. However, MS rises in the MS patient relatives while the MS frequency in the non-identical twins rises to 30 percent. In fathers and mothers, the danger of MS is 10 times greater than usual in children (Koriem 2016).

In the previous century, understanding of MS genetics has changed dramatically. The most important genetic danger variables for MS are genes in the HLA (Human Leucocyte Antigen) cluster (Olsson, et al. 2016).

The enhanced patrimony in households and a threat reduction that is immediately proportional to their relationship to the disease show that genetic variables play an important part in multiple sclerosis. Hundreds of human illnesses including most autoimmune illnesses were developed in the HLA area of chromosome 6 (Thompson, et al. 2018).

The locus of HLA includes many genes with crucial immune system features. While some genetic modifications exist, combination surveys show that an HLA Class II haplotype susceptibility to MS exists (Mubeen, et al. 2016).

MS is an extremely varying illness development that will probably rely on complicated genetic and environmental heritage variables.

2.2. Extensive Knowledge about Physical Therapy and Rehabilitation

This chapter is divided into two main parts. The main title contains subheadings which linked to the topic. First part gives brief information about the Physical Therapy

and Rehabilitation. In the following parts, it is possible to see the extensive research about methods of the therapy, what types of physical therapy products are used during therapy and which materials are used for these therapy products in the medical sector.

2.2.1. What is Physical Therapy and Rehabilitation?

Physical therapy provides services for each individual with disability to provide functional ability and maximum freedom of movement, and rehabilitate them. This service is given when any individual is threatened by conditions such as injury, chronic disease, aging, disorder, pain, environmental factors. The aim of physical therapy is to maximize the mobility and quality of life of individuals. This also includes social, emotional, psychological and physical well-being. (‘’World Confederation for Physical Therapy’’ (n.d.) 2019).

Rehabilitation includes identifying issues and requires of an individual, addressing issues in relation to the appropriate personal and environmental variables, identifying treatment objectives, scheduling and applying interventions, and evaluating impacts. Disabled people and their relatives have stronger health and function when they are recovery partners (World Health Organization 2011).

There is no single or ideal manner of working for all patients similarly well in the sector of physical treatment and recovery. Instead, various medications dependent on patients' physical situation, behavioral capacity and motivation can be more or less useful. The level of intensity of treatment and the stop points to the therapy can, on the other hand, be determined by age and living goals (Goodworth, et al. 2019).

Approximately in the last 10 years, research on the relationship between MS and rehabilitation has progressed rapidly. As a result of these studies, it has been proved that the exercises have a beneficial effect on the patients and their symptoms have regressed (Bennet 2009). Physical therapy also had a positive effect on mobility and balance in MS patients (Campbell et al. 2016).

2.2.2. Methods of Physical Therapy Treatment

In the medical world, many methods are applied to the patients during the process of physical therapy. The reason for this is that every illness or disability has different indications, so each of the patients need different treatment methods. These are the most common practice areas; orthopedic, geriatric, neurological, cardiopulmonary and pediatric. The common methods are; exercise, hot therapy, cold therapy, massage, laser, ultrason, hydrotherapy, electric currents, compression therapy, traction etc. On the other hand, **aquatic** physical therapy method is the method that have been researched in accordance with this thesis proposes'.

2.3. Aquatic Therapy / Hydrotherapy

Aquatic physical therapy is the treatment that applied to the patient in the water with the supervision of a therapist himself or his/her assistant. A lot of auxiliary equipment is used during treatment. The equipment to be used is selected according to the treatment duration of each patient.

2.3.1. History of Aquatic Therapy

Hydrotherapy is the outside or inner utilize of water in any of its shapes (water, ice, steam) for wellbeing advancement or treatment of different infections with different temperatures, weight, length, and location. It is one of the naturopathic treatment methodology utilized broadly in old societies counting India, Egypt, China, etc. (Mooventhan, et al. 2014).

Throughout history, aquatic therapy and hydrotherapy started in cold and hot baths that were used to treat chronic and inborn disease around 460 B.C. in Greece. A few hundred years ago, cold water was used for reduce fevers a hot water used for patients who were had a problem on their muscles (Howard K. 2016).

End of the 1700s, cold water experimented on smallpox patients because of its therapeutic and irritant feature. Powerful exercises program and cold water were unified to each other by Vincent Priessntiz who was a Silesian peasant for strengthen patients who were sick in 1830. This program was an inspiration to seminal researches for water temperatures and reaction times to various diseases, in Europe (Howard K. 2016).

In Los Angeles, Charles Leroy Lowman, the originator of the Orthopedic Hospital, started utilizing restorative tubs to treat spastic patients and those with cerebral paralysis after a visit to the Spaulding School for Crippled Children in Chicago, where he watched deadened patients practicing in a wooden tank in 1911. On coming back to California, he changed the clinic's lake into 2 therapy pools. At Warm Springs, Georgia, Leroy Hubbard built up his celebrated tank, and in 1924, Warm Springs received Franklin D. Roosevelt that who was the most renowned aquatic patient. An abundance of data, research, and articles on spa treatment and pool medicines showed up in expert diaries amid the 1930s (Becker 2009).

In the 1920s in United States, pool therapy started to develop with a program for children. Since that time, aquatic therapy has become very useful for the patient who has a neurological dysfunction with the increasing popularity of it (Pagliarulo 2016).

In time, different names options were created for water therapy such as aquatic therapy, aquatic rehabilitation, aqua therapy, pool therapy, therapeutic aquatic exercise or hydrotherapy etc., new treatment methods were found out that vary from disease to disease, therefore new therapy equipment and materials were discovered, however, in general, the principles of water therapy have not largely changed. Nowadays, water therapy is used to help patients improve range of motion of joints, motor control and motor skills, functional activities, co-ordination, balance, posture, exercise tolerance, muscular strength and endurance, spasm and pain management and weight bearing (Howard K. 2016).

2.3.2. Extensive Knowledge about Benefits of Aquatic Therapy

Water therapy has been applied in various populations and exercise programs since the early 1900s. In addition, it is known as aquatic therapy, aqua therapy, pool exercise, pool therapy and hydrotherapy. It has been used in the treatment and

rehabilitation of chronic diseases. Water works as a distinctive method to carry weight without stressing the muscles. Furthermore, motion and stabilization works without the worry of falling. Thirdly, it offers multi-way strength instruction without bands or weights (Plecash, et al. 2014).

Almost all the biological impacts of exposure relate to the basic values of the hydrodynamics. These values must be known to improve the rationalization of the medical implementation method. Density and specific gravity, hydrostatic pressure, buoyancy, viscosity/fluid resistance, thermodynamics, turbulence is the fundamental physical characteristics of water that cause physiological variation (Becker 2009).

Density and Specific Gravity

Although there is water in the body of the patients, the density of the body is less than the density of the water. The human body displaces a volume of water which is slightly higher than the body and forces the body to ascend, as Archimedes found, by a force equal to the volume of water moved (Kauffman, 2014).

Hydrostatic Pressure

Hydrostatic pressures help the blood return to the heart so that under less pressure it works more efficiently. The body's fluid enables circulate the fluid from the legs to your heart which often reduces pain in your knees and feet. Once inflammation has been lowered, it can reduce joint sensitivity and increase the variety of movement. Immersed in water simply gives our bodies a beneficial therapeutic impact (Henley, Wollam 2009).

Buoyancy

Buoyancy has positive effects on the aquatic therapy exercises. Buoyancy is described as a rising flow of water that acts on a body that apparently reduces the body's weight while it is submerged (Levine, Millis, Flocker, MacGuiren 2014). When the depth of the submersion increased, the effects of gravity on body weight decreased. The percentage distribution of how much water reduces body weight as follows: waist deep 50%, chest deep 75%, neck deep 90% of body weight (Kauffman 2014).

Viscosity/Fluid resistance

Viscosity comes from friction during movements in water. Any limb acting against water is subject to the effects of turbulence and drift. This situation plays an important role in the development of the muscles of the patient. It also provides better control of the patient's strengthening activities without disturbing the patient's comfort (Becker 2009).

Thermodynamics

The thermal capability of Water is 1,000 times higher than the equal air quantity. The therapeutic benefit of water is that it has the ability to transfer heat energy as well as to maintain the heat temperature to a great extent. Water is an efficient conductor because it transfers heat up to 25 times faster than air. It makes water used as a therapy method versatile because it protects heat or cold and easily transmits it to the patient in the water (Becker 2009).

Turbulence

Turbulence is a state of agitation or irregular movement of water. Thanks to turbulent water, dynamic and static balance training is given to the patient with the least risk of injury. The level of difficulty can be increased by increasing the patient's water convulsion level (faster movement in water or greater movement) (Hoang, et. al. 2009).

Water provides many benefits to patients during rehabilitation due to its physical properties (Figure 2.3.).

Benefits:

- Increased cardiovascular function
- Reduced stress on joints
- Improved muscle tone and strength
- Increased range of flexibility and motion
- Increased coordination and balance
- Pain modulation
- Decreased edema
- Improved trunk and posture stability
- Promotes relaxation
- Increased circulation (Henley, et. al. 2009).

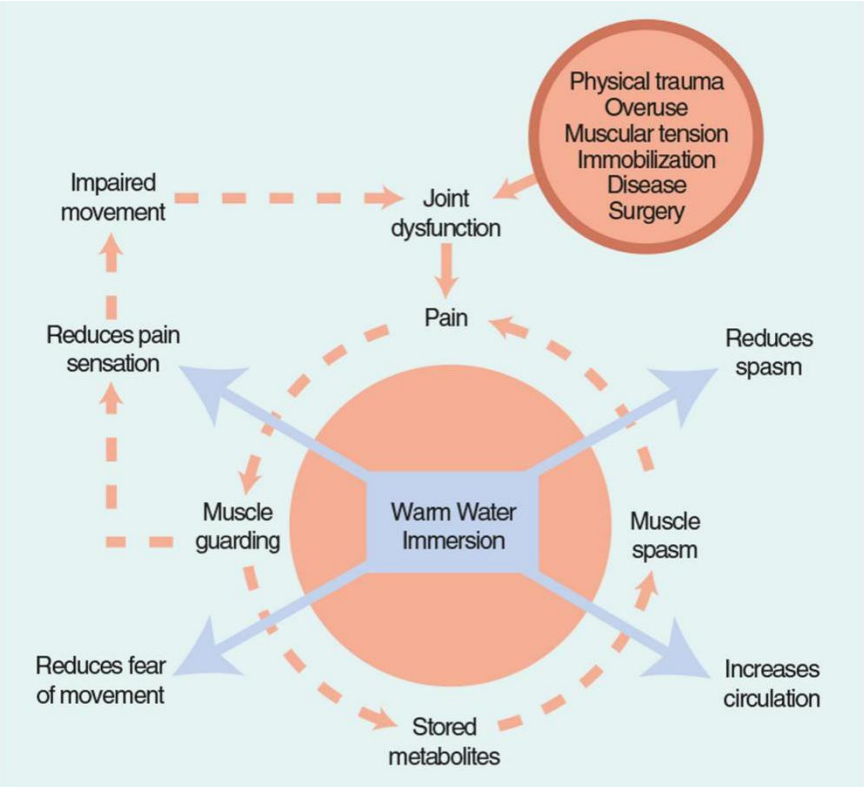


Figure 2.3. Benefits of aqua therapy (Source: Alteneder, et al. 2003)

2.4. Relation between Aquatic Therapy and Multiple Sclerosis (MS)

One of the most effective treatment methods for Multiple Sclerosis (MS) patients is physical therapy. Regular exercise and physical activity are important at all stages of life to prevent illness, to feel good and to support one's quality of life.

The role of physical therapy varies throughout the illness course. In addition, in general interventions are aimed to help the patient achieve and maintain their optimal functional independence.

The multiple sclerosis researches (MS) showed that physical activity is effective to improve the physical health, especially the strength of the muscles and the gait, as well as emotional health, especially by reducing fatigue (Plecash, et al. 2014).

A watery rehabilitation environment is a form of exercise that provides the most appropriate therapeutic environment for individuals with multiple sclerosis. The National Association for Multiple Sclerosis recommends aquatic exercise therapies to patients. The effects of aquatic exercises on multiple sclerosis patients revealed a number of positive effects after investigations (Salem, et al. 2010).

Benefits of Aquatic therapy on MS patients are; toning of muscles, improving flexibility, allowing muscles to relax, reducing pain, improved aerobic capacity, and improved anxiety levels. Viscosity and buoyancy, which are the properties of water, give MS patients a protective environment to exercise their limbs without fear of falling and losing balance. In addition to take advantage of all these benefits the patient does not have to know how to swim (Kargarfard et al. 2018).

The adjustment of the water temperature is very important for aquatic therapy. This issue is very sensitive especially for MS patients. If the water is too hot, this can lead to poor results. Because hot water relaxes the muscles and patients have difficulty in making the movements. Some authors have recommended that water temperature be below 85 ° F (29.4 ° C) for MS patients. In the exercise program, a temperature range of 83 ° F to 85 ° F (28.3 ° C -29.4 ° C) is recommended for low-repeat and low resistance exercises (Peterson 2011). According to Rafeeyan et. al. 2010, water temperature should be around 30°-31° C for allowing the patient to move easier (Rafeeyan, et al. 2010).

For patients with MS treated with aqua therapy, an effective program does not require equipment. However, the use of a set of flotation devices will help them maintain their balance within the pool. For example; noodles, bar bells or kickboards. It is necessary to determine the needs of the participants to find suitable water equipment. Then, it needs to investigate which equipment meets these needs. It is very important to teach how to use after selection. Miss-use can cause injury or reduce effectiveness (Deborah 2003).

Exercises for People with MS;

- Marching/Alternating Knee Lifts,
- Side Steps,
- Static Hamstring Stretch,
- Active Chest Stretch,
- Trunk Twists—Spinal Rotation,
- Leg/Hamstring Curl,
- Walking, Pelvic Tilts,
- Cross Country Ski,
- Rocking Horse,
- Straight Leg Walk,
- Side Tilt/Lateral Weight Shift (Deborah 2003).

2.5. Suitable Materials and Equipment for Aquatic Therapy

There are wide ranges of equipment used during water treatments. All equipment suitable for water therapy is designed to enable the patient to take advantage of the water's characteristics. They include regulated systems to provide impact and expandable resistance. Each piece of equipment provides multiple use options for patients. It also has features that allow patients to select more than one product (Becker, et al. 2004).

Examples of equipment that are commonly used with swim training are survival float, flotation belt, mask and snorkel, weights, fins, kick float, googles, kickboard, personal flotation device, inflatable cervical collar, lumbar corset and taping (Brody, et al. 2009), treadmills, bikes, massage hoses, swim jets, lightweight foam, expandable resistance, or contoured systems (Becker, et al. 2004), inner tubes, rescue tubes, wet vests, webbed gloves, hand paddles, pull-buoys, dumbbells, boots (Dutton 2012).

The choice of materials to be used in water is important. The material to be used in the aqua therapy products should be characteristically suited to the water. In addition, when health is concerned, research should be done with extra care. The materials to be used should appeal to the patients by offering ergonomic, comfortable and aesthetic solutions without limiting the freedom of the patients.

The materials used in Aquatic therapy pools must be water resistant. If the appropriate material is not selected, the equipment used will not last long and will damage the patients over time. Therefore, material selection is very important. The following list contains materials and properties suitable for aquatic therapy.

Acrylic

Acrylics are hard materials. The color passes through the material and provides deeper color tones. It is resistant to high temperature traces, abrasion and sun fading. Acrylic is a scratchable material. But it is easy to repair (Cheever 2015).

Fiberglass

They have useful properties such as stability, transparency, hardness, resistance to chemical attack, and inertness. In addition, it has properties such as stiffness, strength and flexibility (Wallenberger, et al. 2001).

Cast Polymer

Polymers are very resistant. They may have both electrical and thermal insulators. The polymers are light in weight. They can be processed in various ways. They have unlimited color range (Wallenberger, et al. 2001).

Stainless Steel

They do not need additional polish. It is resistant to high pressure, high temperature and abrasive materials (Cheever 2015).

Cast Iron

It has s useful properties such as low tensile strength, high compressive strength, low melting point, resistance to deformation, resistance to oxidation (Wallenberger, et al. 2001).

Copper

Coppers have many useful properties such as: electrical conductivity, thermal conductivity, corrosion resistance (Cheever 2015).

Polyester

Polyesters are extremely strong. Polyester is very durable. Polyesters are resistant to many things. For example, stress, wear, mold, shrinkage, stretch. In addition, polyester retains its shape (Cheever 2015).

2.5.1. Proper Material Selection Criteria

When designing a medical product, much attention should be paid to material selection. Therefore, the material criteria should be considered in order to select the most suitable material. In design, there are many criteria in material selection. For example: performance, impression, size and shape, manufacturability, environmental impact, safety, legislative compliance, durability, reliability, and usability. The criteria to be examined in order to select the most suitable material for medical product design are; safety, reliability, usability and durability.

Safety

It is a fundamental responsibility for any designer to consider and minimize the potential for damaging the product during the use and production of any product. The materials used in the product effectively explain this situation. At this point, chronic and acute effects should be considered. The chronic effect is generally defined by the chemical properties of the materials such as hardness and density. The acute effect is defined by the physics properties of materials such as breakage, distortion and deformation (Hodgson, et al. 2004).

Reliability

It is defined as the reliability of a material that it fulfills its intended function for the intended life time without any error. Reliability does not depend on the natural properties of the material. Therefore, it is difficult to measure. Standard materials have more reliable properties than new materials (Kutz 2005).

Usability

When people start using any product, all their senses are in contact with the materials used in the products. They feel the texture of the materials, they see their colors, they feel the weight, and they hear the sounds. All these senses determine the user's experience and the availability of the product. It is necessary to use materials to ensure that senses are formed. Therefore, the properties of the materials are very important for usability (Kesteren 2010).

Durability

Materials are the most important factor in determining the life and durability of a product. Possible physical disturbances of the product should be considered due to the effects of materials such as wear and fatigue. Corrosion control in metals is an important consideration. The behavior in durability criterion is determined by the interactions and combinations between the materials. Designers try to improve durability by making improvements in materials (Hodgson, et al. 2004).

CHAPTER 3

METHODOLOGY

The intention of this research paper was to answer how to design a new product by using the right techniques, materials and practices about physical therapy. For this, the methods that will be chosen are observation, depth interviews, think aloud study and questionnaire.

One to one observation was made with 1 patient. The patient was observed every day. Exercises that she can do and cannot do the difficulties she faces, the treatments she has applied have been examined. The observation method applied on the patient gave guidance on how the aqua therapy product should be designed.

The interview was consisted of two parts. In the first part, there were questions for the physiotherapist's. In the second part, there were questions for the patients. It was leaded to find the main problem that people frequently encounter. The aim is to find general information about the Multiple Sclerosis (MS), physical therapy methods and treatments.

In the first part of the interview, participant to be selected for the interview was specialist physiotherapist. In the second part of the interview, participants to be selected for the interview were Multiple Sclerosis (MS). Interviewees were answered general and basic questions about disease and treatments. This part was helped to find out the best treatment and relations between Multiple Sclerosis (MS) patients and physical therapy and general problems which people encounter when they are using physical therapy products. This chapter was focused on the most common preferences of participants by looking their underlying reasons of using physical therapy products and the impact of these physical therapy products on participants' sensation.

The think aloud study was made with two patients. It was helped to find out some problems of the product. These problems were determined after the patients' behaviour, idea, movement, and manners. Then, these problems were examined and solutions were found.

The questionnaire consists of 74 questions. 80 people answered the questionnaire. It was delivered to patients via social media. There are 46 different constructs and 73 variables.

Table 3.1. Methods and number of participants of the research.

Methods	Number of Participants	Place	Number of Questions	Date
Observation	1	House	-	Since 18 years
Interview (Physiotherapist)	1	Hospital	17	07.03.2019
Interview Part 1 (Patient)	10	MS Institution	10	10.03.2019-02.04.2019
Interview Part 1 (Patient)	4	MS Institution	6	09.04.2019
Think Aloud Study	2	MS Institution, House	-	01.05.2019-10.05.2019
Questionnaire	80	Social Media	74	08.07.2019

3.1. Observation

The patient who has been observed is my mother. My mother is a Multiple Sclerosis patient around 18 years. Therefore, I have been observing her about 18 years. I have a chance to make one by one observation every day. I observed her every movement that she can do on the land and in the pool. One-to-one examination of the movements of a patient in the pool was important for this study. As a result, a lot of useful information was obtained. All of this information is described in the findings chapter.

3.2. In-Depth Interview (Physiotherapist)

The effects of water therapy on MS patients are theoretically known. However, articles and books are not sufficient to prove this with absolute judgment. Therefore the most accurate method is to ask questions to experts and get information from them. The

most effective way to do this is to interview with the chosen expert. Each interview is a qualitative research method.

Qualitative research method has been applied to benefit from the creative ideas, emotions and perspective of the interviewee or interviewees. The draft of the new design was prepared which was planned before the meeting. After that, the design was developed for specialists to make the most appropriate correction for patients. The following features are available in the proposed new design;

- Therapy cabin,
- Shower cabin which can be used by patient's relatives,
- Manual walking belt,
- Walking belt compartment with sliding cover,
- Manual adjustable foot bike,
- Hand and arm exercise apparatus,
- Ergonomic seating area,
- Water tight door,
- Handling bars for patients to maintain balance.

Table 3.2. Interview questions concerning the water therapy for physician.

1-Is water therapy important for MS patients?
2-What are the benefits to them?
3-What are the treatment methods used in water therapy, what are their names?
4-What are the methods and exercises applied to MS patients?
5-Which exercises strengthen the patient's muscles?
6- How should the water level and temperature be?
7- What should be considered to ensure that the patient is able to use the bicycle mechanism used to strengthen the leg muscles?
8-What should be done to prevent water from making the patient's movements difficult? (Movement direction, sitting position, angle etc.)
9-Is it necessary to use the stages of treatment that are easy to difficult in the product to be designed?
10-Which materials are the most suitable for water therapy?
11-What should be considered for the safety of the patient?
12-What is the average duration of treatment?
13-How the patient's healing process is progressing?
14-Is the patient fully recoverable by water therapy?
15-What is the average duration of return to normal life of the patient?
16-What are the patients' relatives should pay attention to in this process?
17-Which material should be used for handle and seat?

In addition, questions were prepared to be asked to the physiotherapist. At the first stage, 20 questions were prepared as draft. However, the number of questions has

been reduced to 17 after it has been determined that there are repetitive questions in the draft. In this way, time savings have been achieved. In addition, the interview was prepared to be more efficient. Table 3.2. shows the questions that asked to the physiotherapist.

As a result of the questions asked a lot of information has been reached. Findings and results of these analyses will be explained in findings chapter.

Full of the questions and answers are seen in the APPENDIX A.

3.3. In-Depth Interview about General Information with Patients (Part 1)

The other part of the interview was made with multiple sclerosis patients. Interviews were conducted at the MS Association in Narlıdere, İzmir on the recommendation of specialist physiotherapist Barış Gürpınar. Mrs. Gürpınar has been given water therapy and physical therapy to the patients. Mrs. Gürpınar has helped to ensure the negotiations and to obtain the necessary permits. There are many patients at the MS Association. Patients are treated both physically and psychologically. Yoga, pilates, water therapy, hobby activities, cooking activities are practiced. There are also psychologists are came at specific times for patients.

10 individuals were participated in this study. 8 of them were female and 2 of them were male. Table 3.3. shows the profile of interviewees.

Table 3.3. Sample of questionnaire concerning the water therapy for patients.

Health Status	**Gender**	**Number**	**Age**
MS Patient	Women	8	27,36,43,59,60,64,67,69
MS Patient	Men	2	61,62

In the analysis part of qualitative research the following steps have been carried out.

1- The interviews were not recorded. Because the patients wanted to talk about their personal lives, their problems and their joys at the time of the interview. The answers to the questions were written by taking notes from the

keywords. After the interview, all the answers written in a file sentence by sentence.

2- The results were used in case study chapter.
3- Many constructs were conducted from these interviews.
4- These results and constructs were added into the other constructs which would be conducted from articles related with multiple sclerosis, water therapy and draft design.

Full of the questions and answers are seen in the APPENDIX B.

3.4. In-Depth Interview about Aquatic Therapy with Patients (Part 2)

It was determined that there was not enough information about water therapy as a result of the first interview that made with patients. Questions were prepared again to complete the missing information. All of the questions that prepared for the second stage were taken into consideration to get information about water therapy. The number of questions was kept less than the first-stage of the interview in order to not bore the patients. Only 6 basic questions were asked to patients. The interview was conducted in the MS Association as in the first stage. The interview was made with 4 patients with experience in water therapy. Table 3.4. shows the profile of interviewees.

Table 3.4. Participants profile of qualitative research.

Health Status	**Gender**	**Number**	**Age**
MS Patient	Women	4	43,59,64,67

In the analysis part of qualitative research the following steps have been carried out.

1. They allowed voice recording in this part of the interview. Therefore, interviews' audio-records were deciphered and written in a file sentence by sentence.
2. The results were used in framework chapter.
3. Many constructs were conducted from these interviews.
4. These results and constructs were added into the other constructs which would be conducted from articles related with multiple sclerosis, water therapy and draft design.

Full of the questions and answers are seen in the APPENDIX C.

3.5. Think Aloud Study

In the study think aloud protocol were used. It is a method that used to collect data in usability tests. When patient using the product he/she expresses his/her thoughts, motions and causes continuously in an audible way. The purpose of this is to test the functions of the product. These statements play an important role in the assessment of usability. The evaluation test has been applied to determine the facilitating or inhibiting elements of the product. In this way, the users can reach their goals.

3.6. Quantitative Study / Survey

One step before reaching the final design, the video of the final product was prepared and questions were asked to the patients. The questions are designed to understand the daily lives of patients, identify the problems they experience, and learn what they think about the product. The questionnaire was delivered to patients via social media. The responses reached the target number within approximately 3 days. A total of 80 people, 59 of whom were female and 21 were male, completed the questionnaire.

Table 3.5. Participants profile of questionnaire.

Health Status	**Gender**	**Number**	**Age**
MS Patient	Women	59	24 years and under (2)
			25-34 (22)
			35-44 (15)
			45 or higher (20)
MS Patient	Men	21	24 years and under (0)
			25-34 (10)
			35-44 (9)
			45 or higher (2)

CHAPTER 4

CASE STUDY

The new concept product will be designed by using appropriate materials, techniques and methods in light of the information that emerges as a result of the researches. The contribution of the interviews was being a great to the development and the achievement of the product.

4.1. Preliminary Design

The first stage of the problem to be solved will have been fully defined by this point. The conceptual design phase will follow. The steps in this phase include Concept Generation and Concept Evaluation.

4.1.1. Concept Generation

The aim here is to discover the product that can fulfil the targeted solutions, ideas and functions. Then, these emerging concepts will help in determining the design and will contribute to its development. In order to reveal the most accurate design, various tools should be used. These tools include Brainstorming, Analogies, and Morphology.

Individual Brainstorming

Brainstorming is a personal or group approach that seeks to solve a certain issue by collecting a list of thoughts that its participants voluntarily provide (Al-Samarraie, Hurmuzan 2018). The advantages of brainstorming are that it:

- generates the ability to communicate thoughts and alternatives quickly and easily,
- lowers expenses for the use of the technique,

- broadly available,
- builds creativity, spontaneity, self-confidence by a late evaluation process (Litcanua, et al.Ful 2015).

Brainstorming was performed for the intended design (Figure 4.4. and 4.5.). All concepts that come to mind are written one by one. These concepts have always been examined and taken into consideration until the design has reached the final stage in order not to be overlooked.

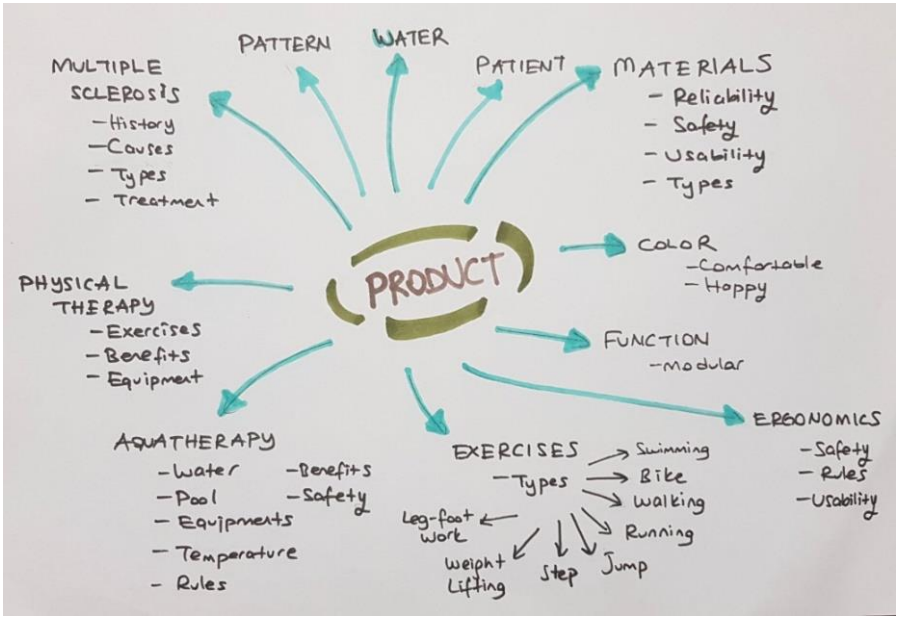


Figure 4.4. First stage of brainstorming.

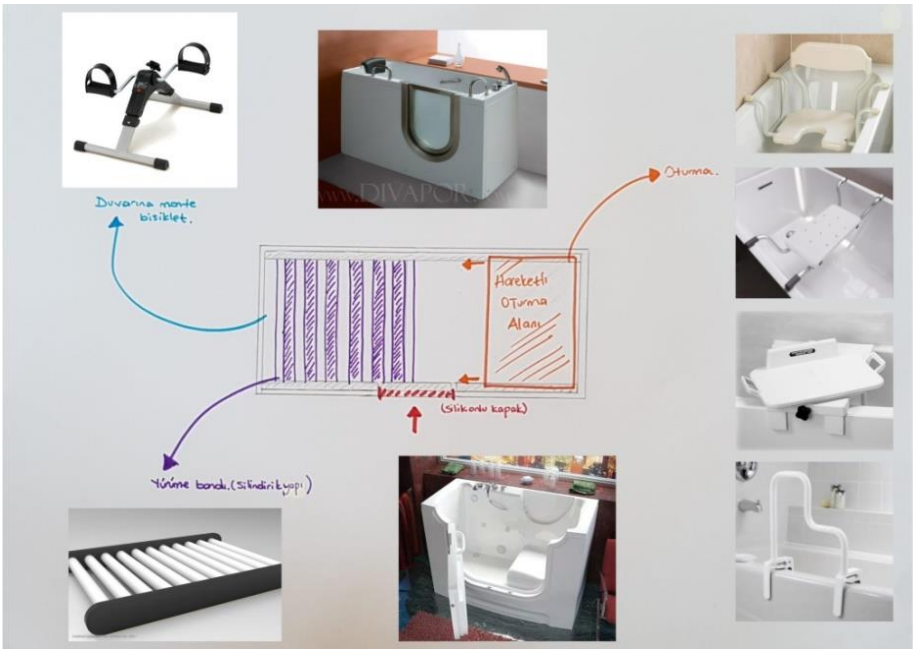


Figure 4.5. Second stage of brainstorming.

Analogies

Analogy is the implementation to another field called the destination domain of organized information from a given domain, called a source or base domain. Analogy can assist to understand or reason a subject, to create fresh goods or thoughts and to learn what should be true about a subject, to communicate thoughts and to persuade others (Ward 2018).

The analogy is usually understood as a method of thinking in terms of a familiar source or a base context about a new destination issue or domain and thus, there are still analogy models which refer to a single source for a single objective. Multiple origin and destination analogs can of course be used to induce a particular scheme from several instances or to learn a fresh relationship (Hummel, et al. 2014).

Thanks to the analogue tool, other products that are similar to the product to be designed which can perform almost the same function have been found (Figure 4.6.) and examined how these products are solved the problems.

Figure 4.6. Other products those are similar to the product to be designed.

Morphology

The morphological technique focuses on the individual features. The concepts for each feature are brainstormed and concepts from individual feature classifications are then mixed until an optimal general solution is recognized (Yang, et al. 2018).

The developer utilizes the semanticized morphological phrase on request and lastly offers society with the item type. The object morphology generates pictures in the user's retina and goods are visually encountered when it used (Yang, et al. 2018).

The knowledge and creativity of the design engineer is very important in the morphological method because the ideas created form the basis of the rest of the design. The resulting table is also called ‘’form or structure work’’ in other words (Ullman 2018).

Thanks to Design Morphology, how to create consistent knowledge for design, how to make pattern and form work, how to identify areas where patients want to be, how to contribute to an innovative and sustainable future is examined. For this, the design project has gone through several times (Figure 4.7.). These stages were taken into consideration when designing.

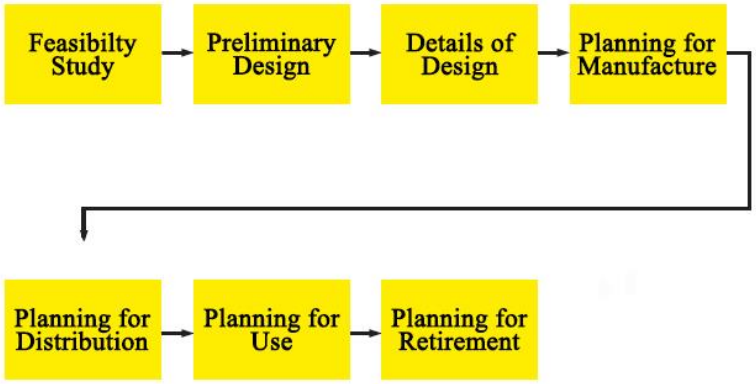


Figure 4.7. Morphology scheme of the design process.

4.1.2. Concept Evaluation

The stage of concept generation will be carried out in two stages. The brainstorming method will mainly be used to provide alternatives to the issue during the first stage. These ideas are then reduced to three ideas, and in the second stage they are

further formed into more full concepts. During this stage the analogy and morphology method is used.

The three results will be assessed to determine how well they meet the necessary requirements. For further growth, the idea that best meets the demands will be selected. Pugh's technique is used to assess the ideas (Table 3.6.). The Pugh technique compares and ranks the various ideas with comparable features. The' favourite' idea is then identified as the basic principle and comparable with the remainder of the ideas. The ideas are measured by a range of-1 (the concept is worse than the baseline), 0 (performs in the same way) and + 1 (the concept is greater than the baseline). These values are increased and grouped together by the original ratings. In the results, the idea meets the demands best and is therefore further advanced.

Table 4.6. Pugh's technique for the selection of design concept-best problem solution.

ROW	Selection Criteria		Alternative 1	Alternative 2	Alternative 3 (Final Design)
1	Cost		0	0	0
2	Material		0	0	0
3	Function		1	1	1
4	Reusability		1	1	1
5	Safety		0	0	1
6	Ergonomy		0	1	1
7	Ease of use		-1	0	1
8	Benefit		1	1	1
9	Hygiene		0	1	1
10	Controllability		0	1	1
11	Durability		0	0	0
12	Efficiency		0	1	1
13	Design		0	0	1
		Total	2	7	10

.

Thanks to the Pugh technique, various design alternatives could be compared according to the criteria. As a result of this comparison, it is allowed to make the subjective views of an alternative against the other more objective. It also helps to see deficiencies, to learn about the robustness of a particular decision and to analyse.

In the table, it is seen that the final design scores more than alternative 1 and alternative 2. One of the main reasons for this is that the final design was developed after all the researches and interviews. In the following sections, alternative 1, alternative 2 and final design will be explained.

4.1.3. Details of Pre-Design

Alternative 1

After all the tools used, the first design, which is an alternative 1, was introduced (Figure 4.8.). The contribution of Alternative 1 to this study is very great because it forms the basis of the final design. After the first product was designed, it was discussed. As a result of a discussion, it has been noticed that there are some deficiencies and problems in the product.

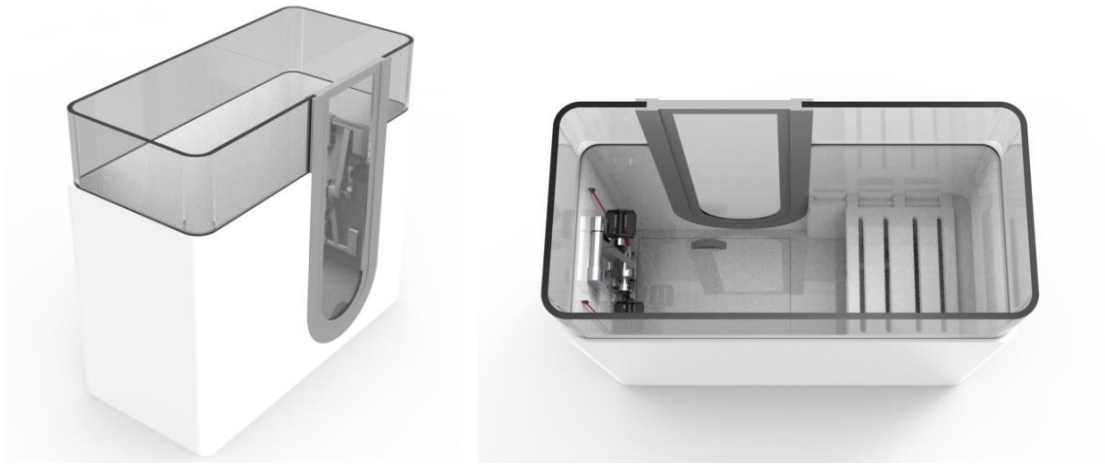


Figure 4.8. Alternative 1, first design.

The first problem is the seating (Figure 4.9.). The form of the seating was not suitable for patients. It is not ergonomic. In addition, the patient's slip could have been the result of the patient getting wet with water. For all these reasons, it was requested to be changed. Instead, a seat should be designed for patients to be more ergonomic, suitable for waist tricks and patients cannot slip when they sit. Research has been conducted for this purpose and the most appropriate form for patients has been decided.

Figure 4.9. The seat design for the alternative 1.

Another problem encountered is the lack of holding/handle apparatus in the design. This could cause serious injury to patients. Therefore, it is desirable to place the insertion apparatus in place.

Figure 4.10. The lack of holding/handle apparatus in the design.

The last problem encountered is the cover on the treadmill that on the floor. The cover is opened by fully lifting up. This could cause difficulties for both the patient and his / her relatives after some time. Therefore, it was suggested to change.

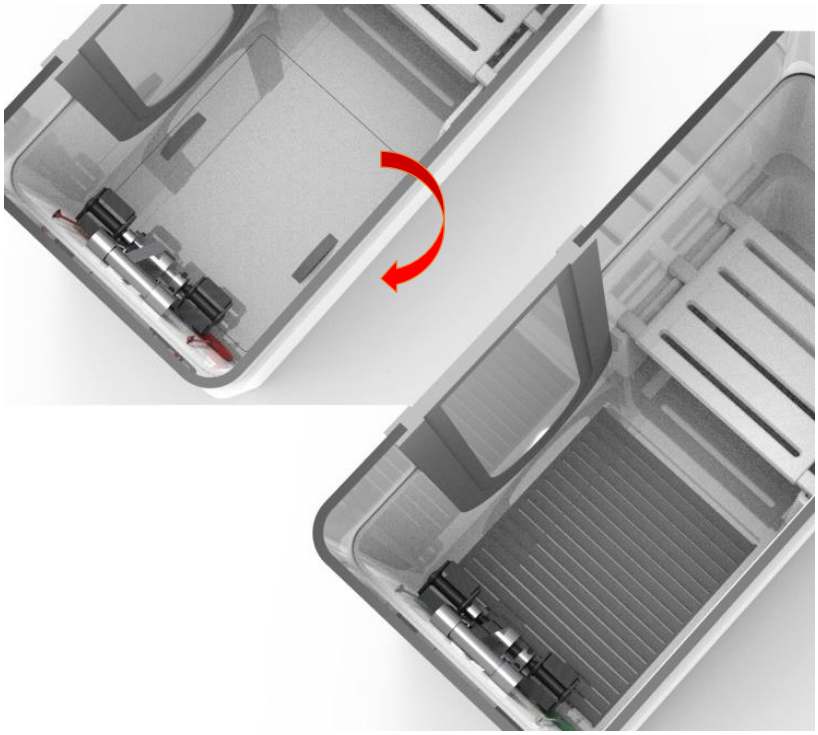


Figure 4.11. The cover on the treadmill.

Alternative 2

The problems identified for alternative 1 were solved in alternative 2 (Figure 4.12.). It was then prepared for presentation to physicians and patients. In all interviews, ideas were received from each individual about design. Some did not report any problems; some of them identified the missing and warned them.

Figure 4.12. Alternative 2, second stage of first design.

The situation that comes at the beginning of these warnings is the design of the door. It was stated that the form and size of the door were not suitable for the patients' entrance and exit. It has been said that it is not suitable for patients who have to use wheelchairs. Therewith, the form and dimensions of the door were examined again and designed from scratch.

Secondly, in order to solve the problem of handle apparatus, a holding device is provided inside the cabin (Figure 4.13.). However, according to the comments and warnings of the patients during the interviews, the problem is still not eliminated, it is concluded that the apparatus is not enough for the patients and should be increased.

Thirdly, the problem of treadmill cover, shown as a problem in alternative 1, was tried to be solved in alternative 2. Instead of the cover that needs to be removed, the sliding cover is made. In this way, patients can easily open the lid even if they are on their own. The idea of design for Alternative 2 was also appreciated by the interviewed individuals.

In the alternative 1, the seat was requested to be corrected in the alternative 2 and it was approved by every individual interviewed (Figure 4.15.).

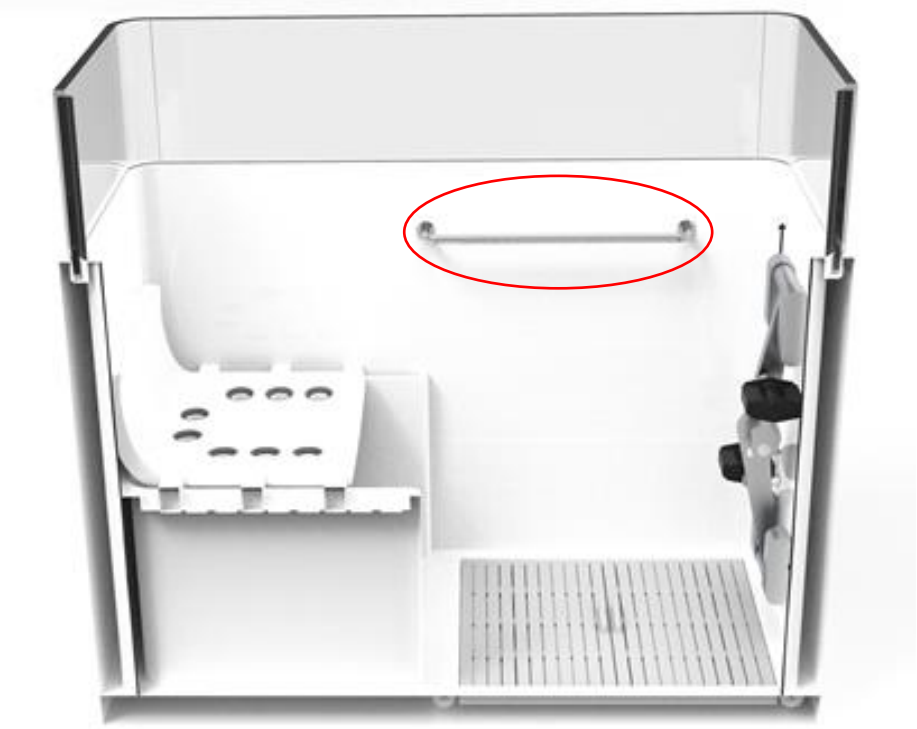


Figure 4.13. Handle apparatus design for alternative 2.

Figure 4.14. The idea of treadmill design for alternative 2.

Figure 4.15. The seat design for the alternative 2.

4.2. Product Development

After the problems discussed in alternative 1 and alternative 2 and decided to be improved, it was decided to pass the final concept. At this stage, it is possible to continue to be fully developed for the final concept. The different parameters that will occur in a number of interrelated will be discussed in the following sections: Product Production and Product Evaluation.

4.2.1. Product Generation

The aim in product production is to make the planned concept into a product. To do this, a number of parameters must be decided. There are three basic parameters in the design. We can list them as the form of the product, the material of the product and the production of the product. The criteria for these three parameters should be selected in such a way that the planned product can be produced (Ullman, 2018).

The product design is mainly interconnected with the materials and manufacturing procedures selected for production. The selection of material mainly depends on its accessibility. A product with a tiny manufacturing run or a single manufacturing would typically select parts and materials that can be purchased from a seller. During the design phase, the production technique is kept in mind all the time, so that the parts can be intended to fit in with that process, and vice versa. The manufacturing method can also be selected from the cost point and the amount of accuracy that the part requires to be manufactured (Ullman 2018).

4.2.2. Product Evaluation

After the concept and design of the product has passed through all necessary stages, the product is evaluated based on several “Design For-X“ tools for this study. These tools are cost, production, and reliability. These tools will enable the final design to be efficient.

Design for Cost (DFC)

Cost is a very important factor for a planned product. Therefore, the cost must always be kept in mind when designing a product. Things to consider for cost are as follows; be reliable, logistically efficient, can be produced, be appropriate to the service. Besides, material selection is also very important. The criteria included in other principles are:

- Reducing the connection elements and total number of parts,
- Pay attention to the modularity of the parts,
- Pay attention to standard sizes,
- Minimizing inefficiencies that may occur during the installation.

In addition, the sales price to be given to the new product is very important. Similar products in the market should be examined to determine this. There are criteria to be considered during the review. These are product dimensions, material and weight. In this study, after examining the form and function of similar products, individual sales prices were examined to obtain an average cost. At the end of the sales prices, the average cost is 8400 Turkish Liras (TL). But the price of the massage mechanism is also included in this price. It is an average of 1500 TL. In the final design there is no massage mechanism. Therefore, this price should be deducted from the total number. As a result, the average selling price for the final design is between 6000-7000 TL.

Design for Production (DFP)

Each design consists of different components. It is necessary to design these components in the most appropriate way for a specific production process. This enables the efficient production of components. The production methods chosen for design are directly related to cost. Therefore, the designer has to consider production methods when designing the product. If the system proceeds in this way, a correct design is created.

This system has been implemented for the final design. It was paid attention that each piece designed could be produced. In order to avoid high costs, components that do not force production are designed.

The technique used in production is vacuum forming. Manufacturing begins with an acrylic sheet. It is heated around 200 °C with ceramic elements. The sheet becomes soft valuable. It takes the form of the mold. Then, thousands of tiny holes

drilled in the shell. The sheet is suctioned with a vacuum. The mold must cold before it can be opened. The powerful cooler is below air directly on to the mold and lowering the temperature around 77 °C in 40-45 minutes. After that, the coolers are taken out. Then the shell easily removes from the mold.

Design for Reliability (DFR)

Anything wrong with design should be foreseen. Reliability is a measure of how a product is maintained. If the product is not protected, it has failed. Therefore, reliability should be examined in a range of subjects including variables such as environmental factors, lack of materials, faults, user errors, inadequate design. If there is any mechanical failure in the product, it will be caused by changes in some components. For example, overload, aging, changes in the environment, and wear. Therefore, the product to be designed should be designed to prevent these risks.

4.2.3. Product Specification

One of the aims of the designed product is to try to minimize the treatment costs of the patients. For this, the following calculation was made.

Calculation

1 year: **365 days**

Numbers of days SSK (social security authority) afford the charge: **30 days** (1 month free)

No physical therapy is provided on weekends. There are 105 days weekend in 1 year: **105 days**

The average of 100-200 TL per session is given in physical therapies: **100-200 TL**

365 days in 1 year
1 month free 30 days
Weekend 105 days
} 365-(30+105) = 230 days, 230 x 100 TL= **23.000 TL** + travel

It is seen that the therapy product that will be taken home after all the calculations will reduce the costs on the patients. If a patient goes to physical therapy

for 1 year, the fee is at least 23000 TL. However, the patient can take home a new physical therapy product designed for a fee of 6000-7000 TL. Moreover, patients will have the opportunity to exercise not only on weekdays but also on weekends. Thus, the average daily fee will be reduced to 17 TL.

4.2.4. Height and Weight Average for Final Design

The most important factor in determining the dimensions of the new product to be designed is the height and weight of the patient who will use the product. But height and weight vary from person to person. There are very distinct differences, especially among men and women. Therefore, the right method for correct detection is to take an average by looking around the world. Then, according to the data, it is necessary to design a product or products that may be suitable for both female patients and male patients.

A wide range of research has been conducted. According to the information obtained as a result of the research, the following data graphs were created. The following graphs show the average weights, heights of women and men from 130 countries. All figures include between the ages of 18 and 40 years. Respectively, the height and weight average of women is 160 cm and 68, 43 kg, the height and weight average of men is 173 cm and 78, 03 kg.

All details of the datas are shown in the graphs at the APPENDIX B.

4.3. Modelling Methods and Software

The following methods will be used for 3D modelling:

Modelling Physical Objects

Modelling a concept in a physical way makes it easier to understand the basic mechanisms of that idea. Today, the concept of three-dimensional modelling is a step that improves the design and accelerates the production process. Thanks to modelling, the designer makes a number of engineering calculations before production and makes it easier. A simple model allows the designer to quickly try what works and what option

is more appropriate. It helps to close existing errors. It enables the product to be marketed more easily by taking the measurements about the location of the product and the simulation of the reality (rendering). Nowadays, most designs present the rendered images to the media before they go into production and destroy the pulse of the market.

CAD Rhino – Keyshot

Alternative 1, alternative 2 and final design were drawn with Rhino which is a computer-aided drawing program. Later on, in order to present the product to the interviewed physiotherapists and patients in the best way, renders were taken in the Keyshot. Thanks to the technical drawing and rendering programs, it is easier to create drawings and structures. It allows to make changes on the design easily, to add and remove parts and to develop the product.

4.4. Final Design

Figure 4.16. Interior visual representation of the final design.

Figure 4.17. Interior visual representation of the final design.

Figure 4.18. General view of the final design.

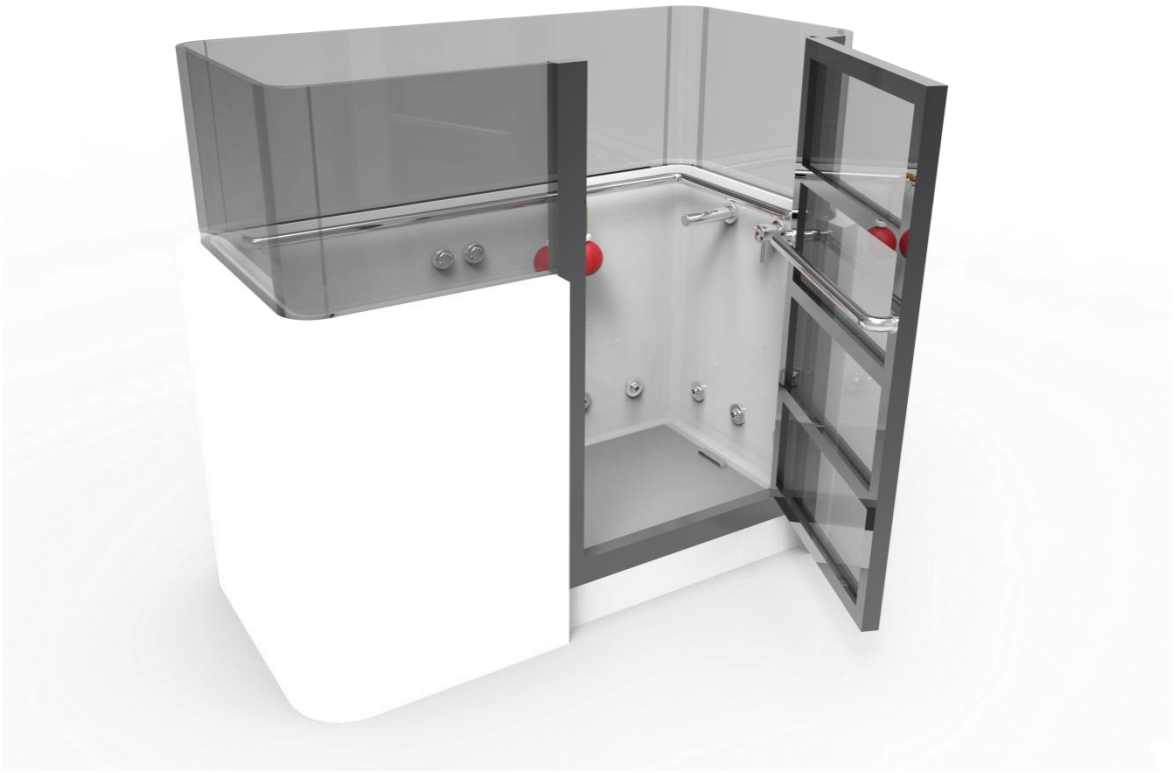


Figure 4.19. General view of the final design.

Product General Information

The designed product will bring aquatic therapy to the patients' feet (Figure 4.18.-4.19.). This new product, which they can place in their bathrooms, provides many opportunities for patients. With this product designed for MS patients, patients will have the opportunity to make many exercises in water. There are walking band, bicycle and arm exercise apparatus. Patients will be able to strengthen their muscles using these exercise movements. All of the exercise apparatuses included in the product are modular and can be removed if not used. This will be especially useful for the relatives of the patients, because the new design offers the possibility of taking a shower. Thus, patient and patient relatives can take shower easily by removing modular apparatus. In addition, this feature will provide convenience to the relatives of the patients in cleaning the cabin. It provides comfort to the patients with its ergonomic seat. Water can be filled into the cabin in a short time thanks to pressurized pumps. Thanks to the special door designed, water does not leak out. Patients will be able to adjust the temperature of the water. For this reason, they can use the product at any time in summer and winter. Patients can drain water whenever they want.

The installation system of the aqua therapy cabin (Figure 4.20.) is also considered in detail. There are details such as pipeline, water inlet, drainage outlet, pressure water pump line, shower head connection, temperature setting.

Below you will find detailed information about the aqua therapy cabin in the following sections.

Figure 4.20. The installation system of the aqua therapy cabin.

Figure 4.21. Section view of the aqua therapy cabin.

Human Relation

The level of the water inside the cabin is very important. Literature review and interviews gave information about the level of water to be able to provide maximum benefit to patients. It was learned that the water level should be at the level of thoracic eleventh spine, called T 11, and should be approximately two or three fingers above the chest. This level is 106 cm while there is a patient with a height of 160 cm (Figure 4.22.), 119 cm while there is a patient with a height of 173 cm. When the patient is

seated in 106 cm water level (Figure 4.23.), the water level is at the level of the neck. If the patient is uncomfortable with this level, water will drain easily when the handle is turned.

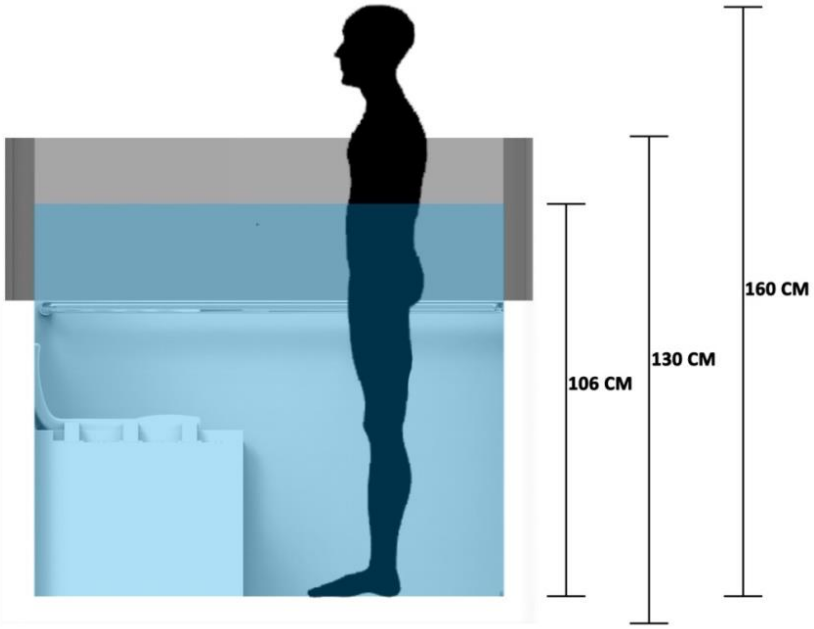


Figure 4.22. The water level while the patients were standing in the cabin.

Figure 4.23. The water level while the patients were sitting in the cabin.

Product Detailed Information

Door

The door system applied in the aqua therapy cabin works manually by means of a lever. In addition, it provides 100% sealing with the silicone gasket on the door (Figure 4.24.).

Figure 4.24. The door of the cabin and silicone seal.

The system, thanks to the special design of the door handle, pulls the door towards the cabin when the handle is brought to the closing position, allowing the silicone gaskets to adhere to the door slot in the cabin with the effect of vacuum. In addition, it is easily locked with the lock device on the door (Figure 4.25.). This prevents water from leaking out of the cabin.

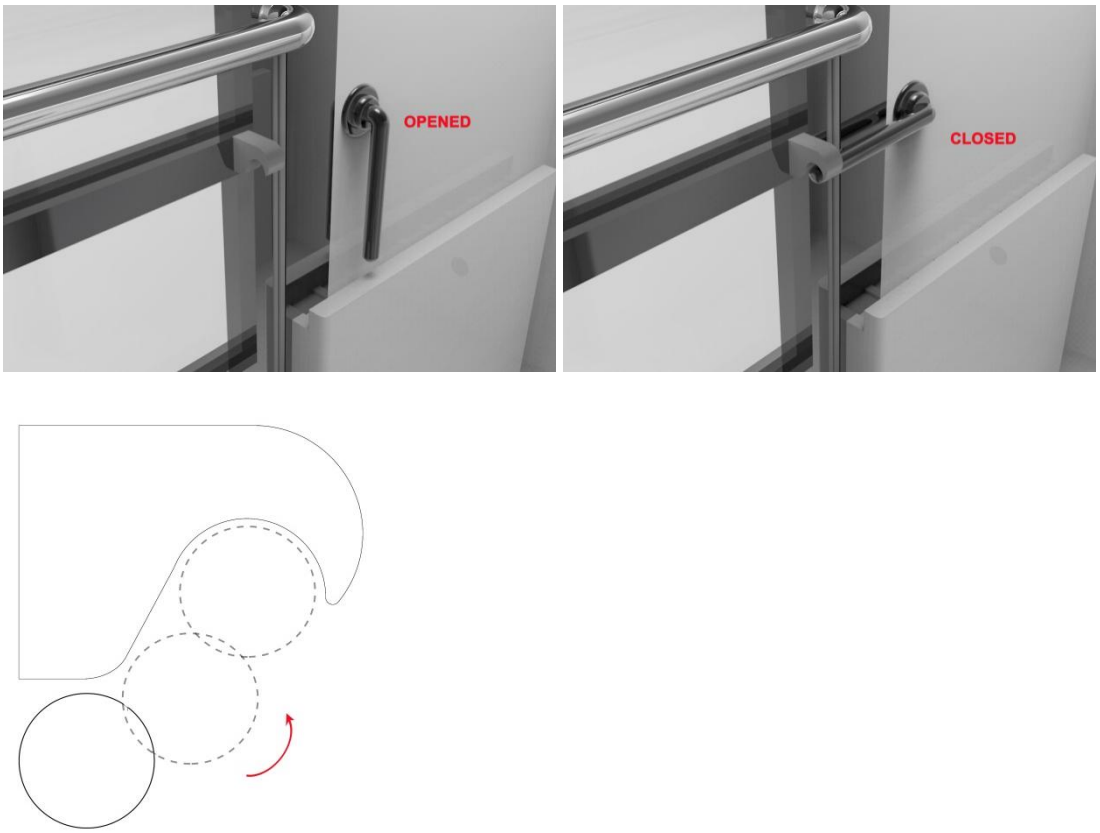


Figure 4.25. Compressed door closing and opening system.

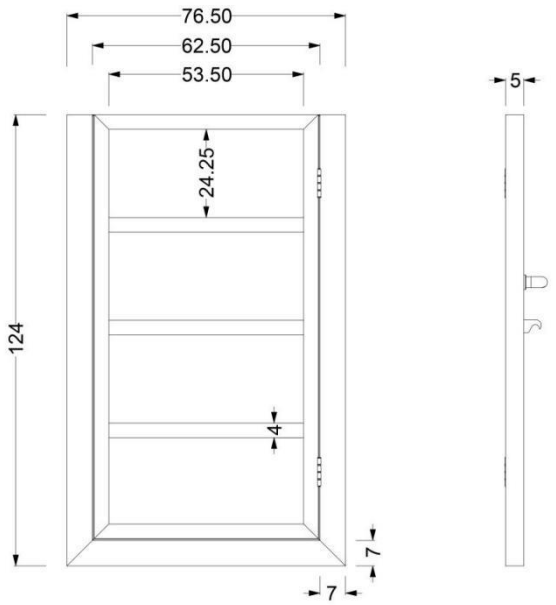


Figure 4.26. Dimensions of door.

Ergonomic Seat

Ergonomics is a very important issue for product design. Especially, this should be paid attention to in the design of the chair. Products should be designed to provide maximum comfort to the users while sitting. The user must be able to adjust his / her waist, legs and position correctly while sitting. It was paid attention to these in the design of new chair for the cabin. A product which designed to grasp the patient's waist and prevent it from sliding in the water and at the same time makes it comfortable. The chair rests on the edge supports inside the cabin. There are compartments on these edge supports. Thanks to these compartments, the patient can adjust his chair according to his own. This detail is considered because the leg length of each person is not the same. In addition, there are holes on the seat to prevent the puddle.

Figure 4.27. Ergonomic seat and compartments which can help to adjust the seat.

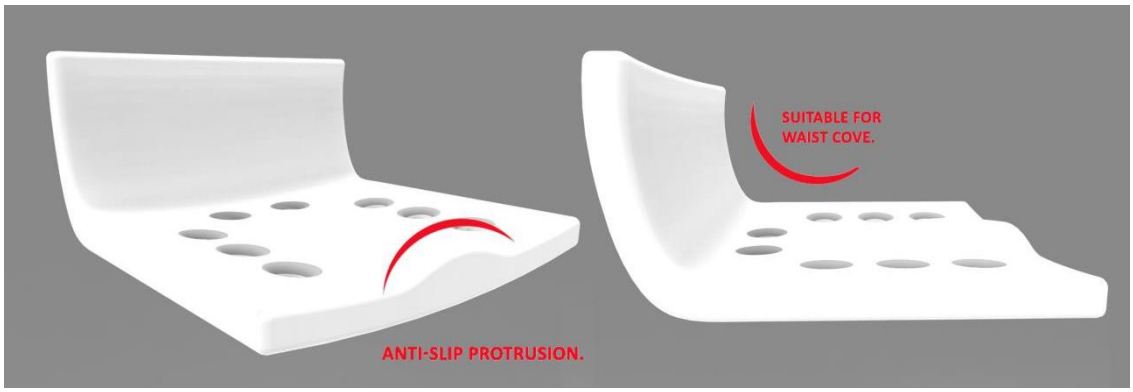


Figure 4.28. Anti-slip protrusion of seat design and suitable angle for waist.

Treadmill

The apparatus shown in the image is the treadmill. The walk has many benefits for MS patients. It primarily strengthens leg muscles. It gives energy, reduces cholesterol levels reduces high blood pressure, helps to control and prevent diabetes, reduces the risk against certain types of cancer such as breast, prostate and gastrointestinal, helps rehabilitation for heart attack and paralysis, regulates the operation of the intestines, supports sleep pattern, provides strengthening of bones. The designed treadmill does not work with electricity; it is manual so it does not pose any danger. Thanks to the cylinders on it, it offers the possibility of walking in water. The rollers spin when the patient starts to walk, and the rollers stop when patient stops walking. The treadmill is located inside the compartment on the floor of the cabin. Therefore, it doesn't take up space. There is sliding door on the compartment. It is sufficient for the patients to open the lid when they want to use the treadmill. Hygiene is very important for patients. When they want to clean the cabin, it will be enough to open the lid and remove the apparatus.

Figure 4.29. Closed sliding door.

Figure 4.30. Opened sliding door.

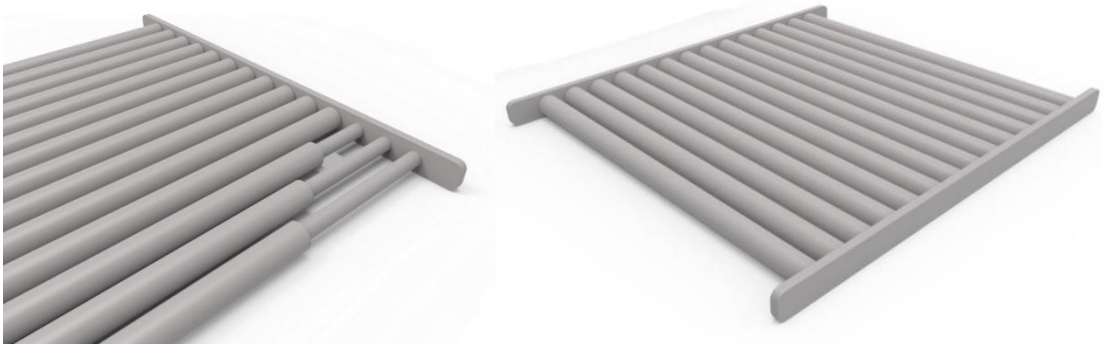


Figure 4.31. Detail of treadmill.

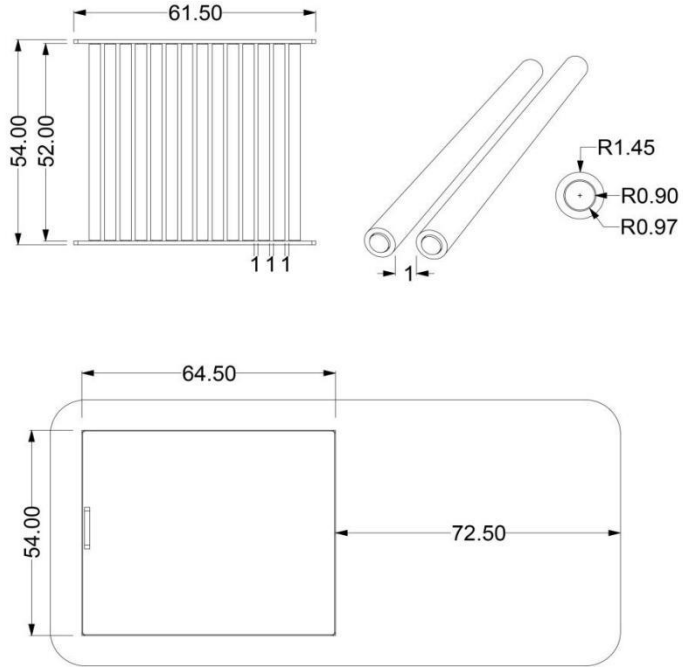


Figure 4.32. Dimensions of treadmill and sliding door.

Bike Apparatus

The apparatus show in the image is a mini-condition / mini exercise bike. It is designed to strengthen the leg muscles of patients. It works in accordance with the treadmill. The bottom of the bicycle apparatus is designed according to the treadmill. The circular slots on the base are designed to fit into the rollers on the treadmill. In this way, patients will be able to adjust the distance of the bike according to the leg length. The biggest reason for designing the apparatus in this way is that each individual has different height and weight. People's leg lengths vary. If the patient's legs are long, they should place the bike further away and the leg length short, they should place the bike closer. Patients can place the bike under the ergonomic seat to avoid space in the cab.

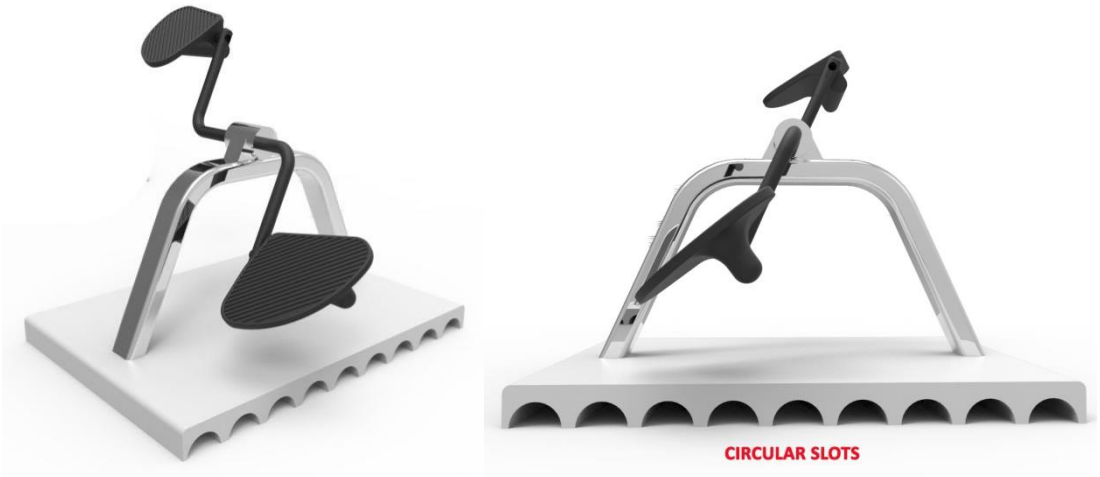


Figure 4.33. Bike apparatus and circular slots.

Figure 4.34. Position adjustments of bike apparatus.

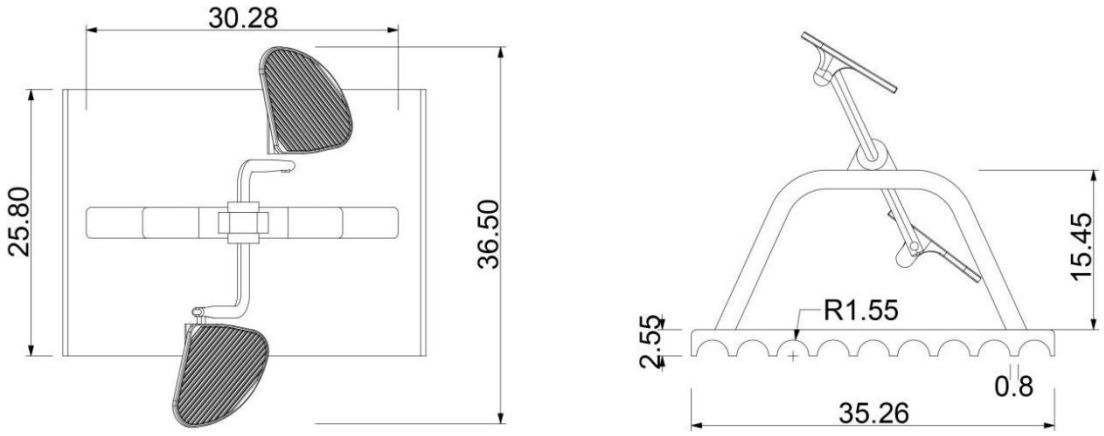


Figure 4.35. Dimensions of bike apparatus.

Hand Exercise Apparatus

The arm muscles of MS patients have weakness as well as the leg muscles. Exercises are advised to the patients. They are usually done with low weight apparatus in order not to force the patient.

An apparatus is designed for the final product that can be used by the patients. The apparatus consists of 2 weight balls. Each ball weighs 1 kg. Patients will be able to exercise by holding the balls in their hands while they are in the water. When they do not use the apparatus, they can hang on the hanging pipe in the cabin (Figure 4.36).

Figure 4.36. Weight balls.

There are also many kinds of arm and hand exercise apparatus used in aqua therapy in the market. Patients will be able to use these apparatuses in the cabin with the physiotherapist's advice.

Pressure Water

The aqua therapy unit allows water to be filled into the cabin at 6 points by means of an added water pump (Figure 4.37.). The pressurized water pump is located in the compartment under the seat. The system is easy to use thanks to an electric pump and control buttons. By pressing the on-off button the pump starts to work (Figure 4.38.). When the water level in the cabin reaches to the desired point the pump is stopped by pressing the on-off button.

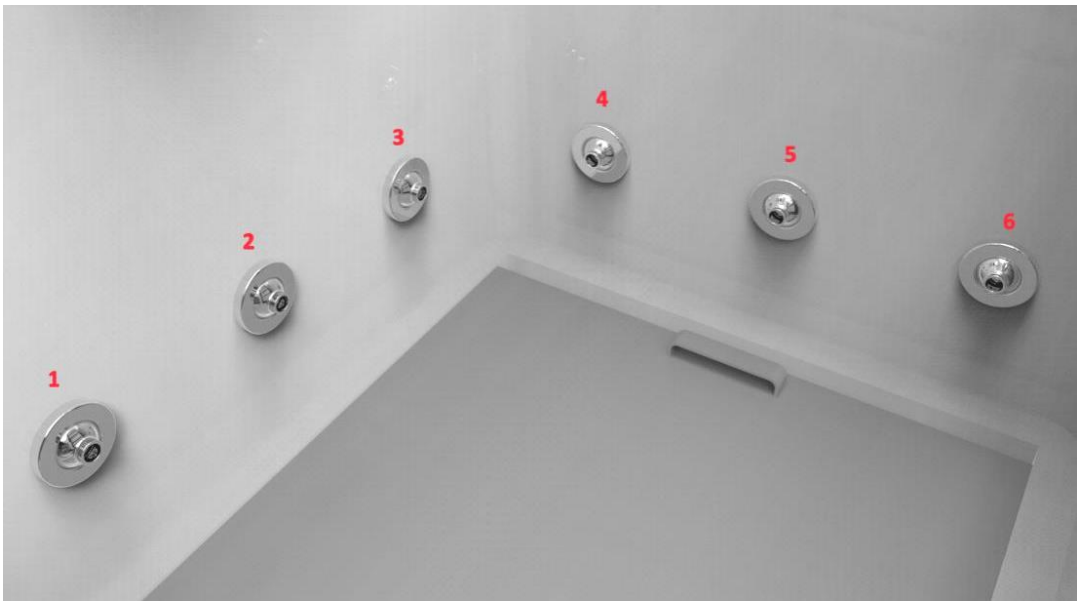


Figure 4.37 The 6 points of entry of water pressure.

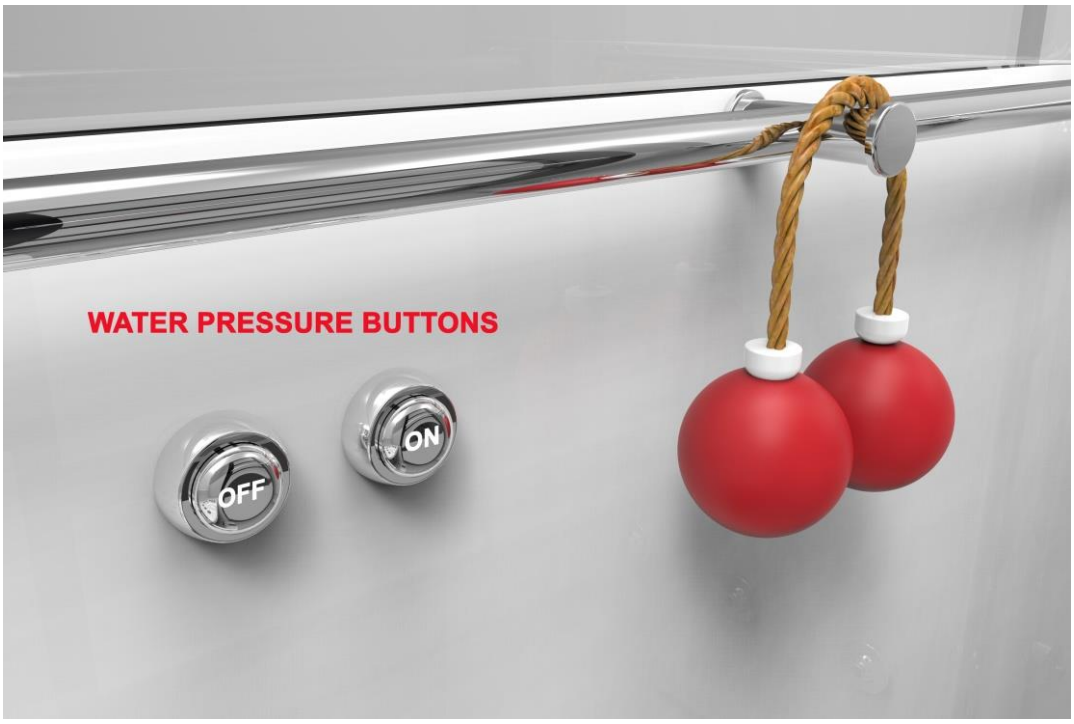


Figure 4.38. Water pressure buttons.

The 6 points that allow the water to fill the cabin are connected to the water pump with the pipeline (Figure 4.39.). Water passes through a single pipeline.

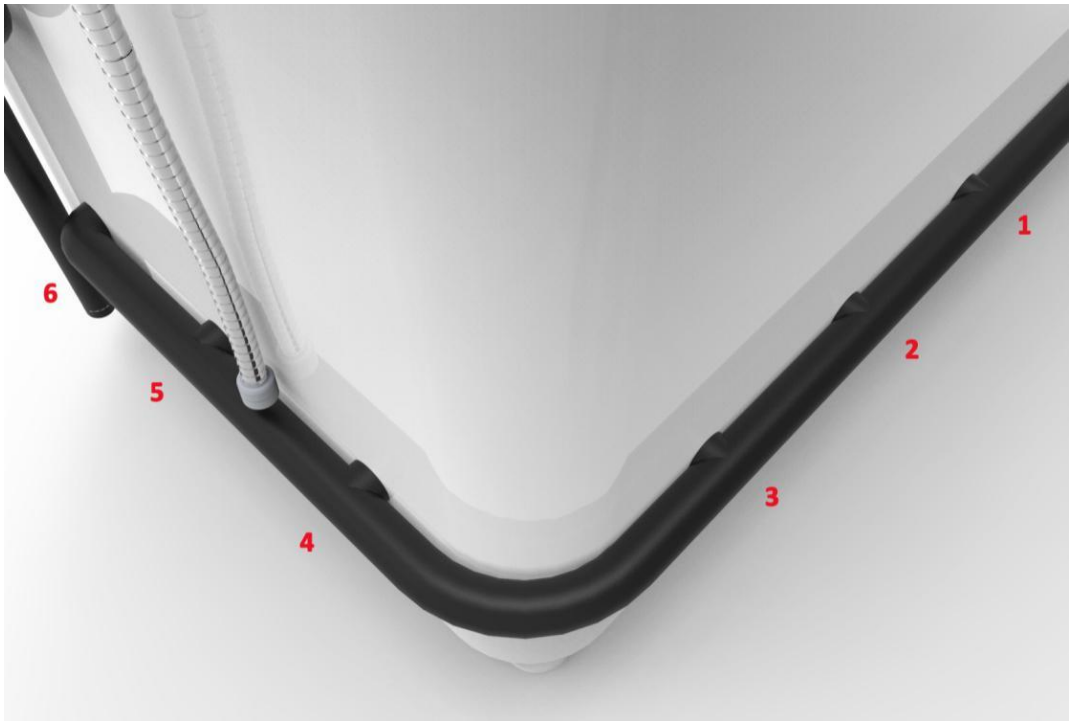


Figure 4.39. Water pressure pipeline.

The end of the pipeline is connected to the location of the pressurized water pump (Figure 4.40.). In this way, water can easily pass through here.

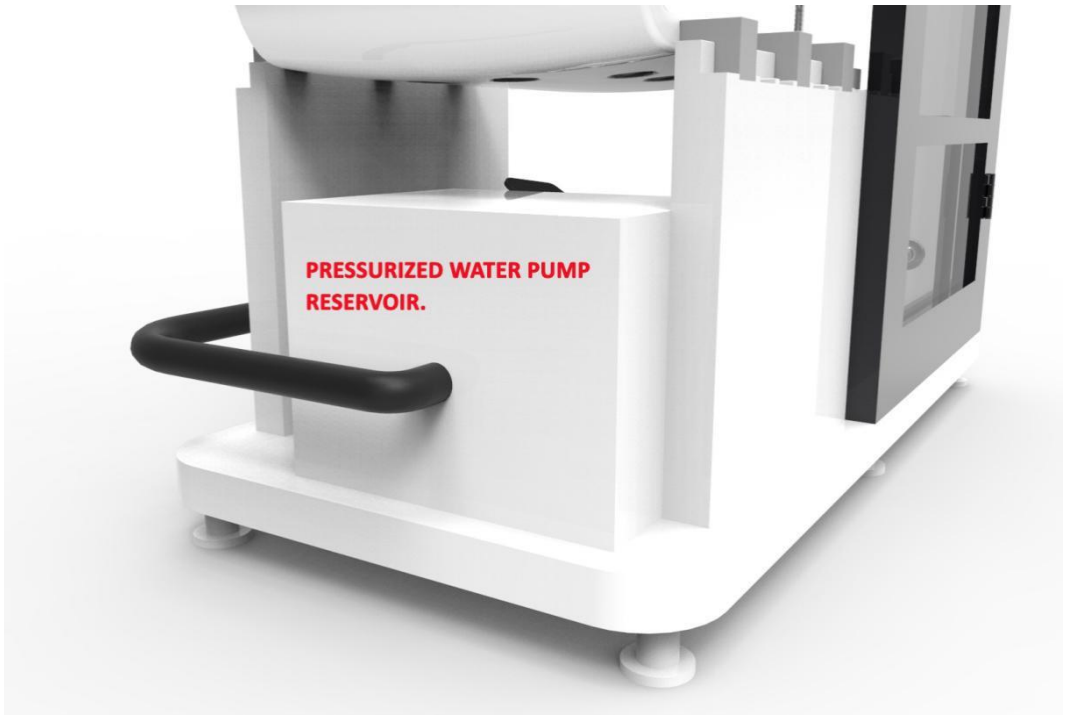


Figure 4.40. Pressurized water pump reservoir.

Figure 4.41. External view of pressurized water pump pipeline.

Shower Head and Heat Adjustment

The final design is designed to use as an aqua therapy product it is also use as a shower. Therefore, there is a shower line inside. In this shower line there is a shower head which provides the outlet of the water and the handle to adjust the temperature of the water (Figure 4.42). The shower head is connected to the water supply line by a stainless steel pipe for water outlet. In the same way, the water outlet of the other arm is connected to the water supply line with the pipe (Figure 4.43.). In this way, patients and their relatives will be able to use the aqua therapy booth as shower cabins.

Figure 4.42. Showerhead and hot-cold water adjustment handle.

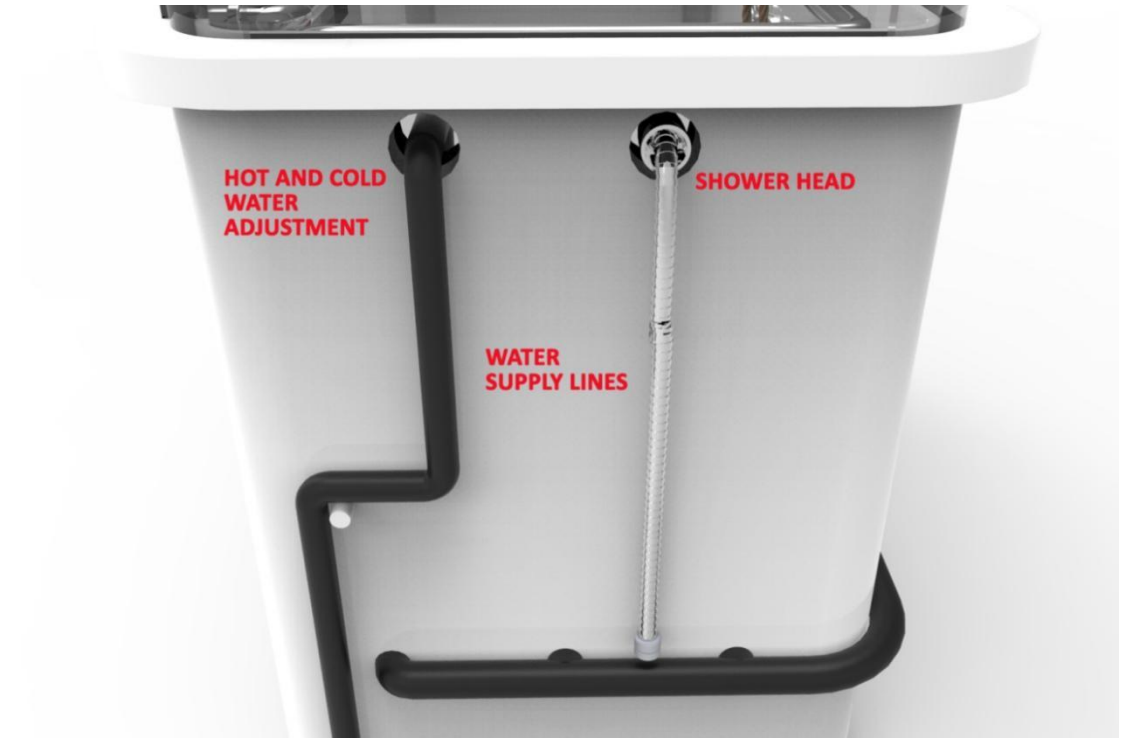


Figure 4.43. Water supply lines of hot-cold water adjustment handle and showerhead.

Cable Drainage System

In the design, water should be filled to the optimum level so that the patients can perform the exercises easily. Then, when the patients finish their exercises, the water must be drained. This drainage is achieved by the drainage device. Some mechanisms are designed to fit a single tub line. Some are designed to be installed in a standard bath.

Drainage devices are divided into two. Controlled under the waterline and controlled from the top of the waterline. The systems that are controlled under the water line are simple systems. The cover is opened with rubber pulling, manual lifting and touching with the foot, and then the water is drained. However, this system is not an appropriate system for patients. These processes pose a risk for loss of balance. The systems working from the top of the water line are the most suitable for patients. The mechanisms in this system are controlled either by a knob that replaces the overflow plate or a trip lever attached to the overflow plate.

In the design, the cable drainage system working from the top of the waterline was used. This system has a flange mounted on the steam trap and a stopper mounted on the flange. This flange and stopper system is known as pop-up. The stopper can move up and down by means of a metal cable connected. This cable passes through the pipes and is connected to the release lever inside the cabin. This release lever acts as a lock

when it is moved and keeps the water inside. If water is to be drained, the lever is turned again, the stop is lifted up and the water starts to drain.

The figure shows the placement of the drain in the cabin. It is located inside the compartment for the treadmill.

Figure 4.44. The placement of drain.

The figure 4.45. shows the working system of the cable drainage. There is an extended handle that opens the drain cover. When the patient rotates the handle to the left, the cover opens, when he/she rotates the handle to the right, the cover closes.

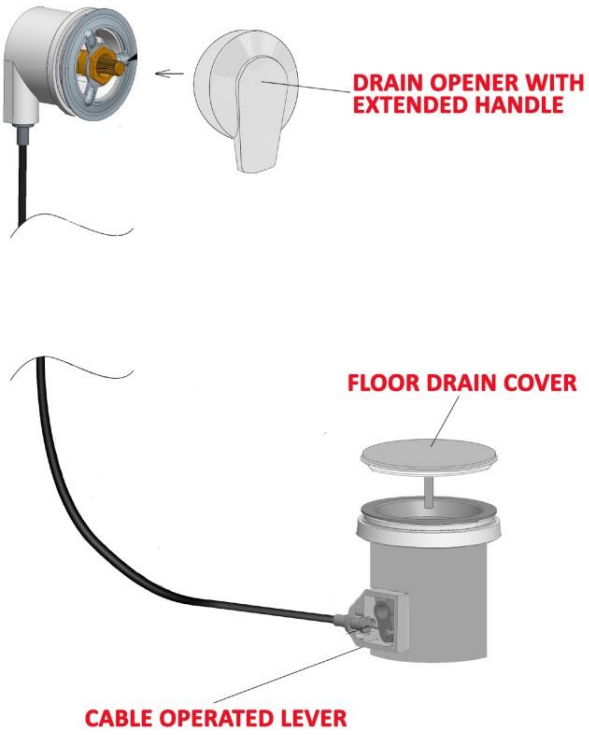


Figure 4.45. The cable drainage working system.

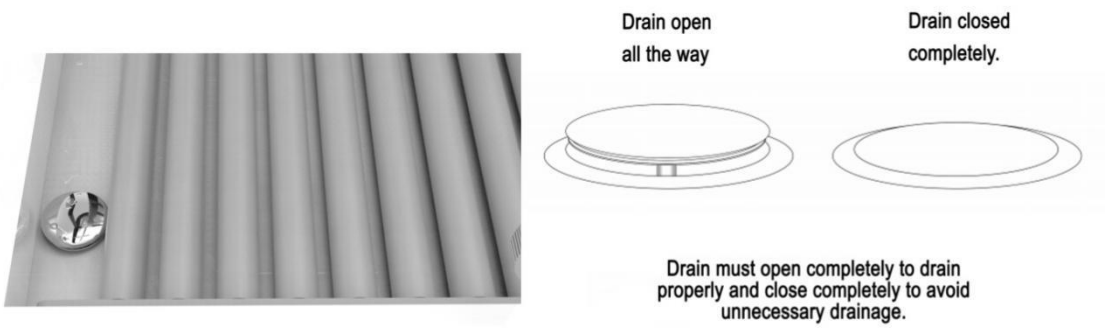


Figure 4.46. Drain open and closed situation.

The drain pipe allows water to flow into the sewage system where water is consumed. This is connected to the pipe drain. The material used in the production is PVC. The figure 4.47. shows the location of the drain pipe. It stands in the compartment under the cabin. Thus, it is not seen from the outside.

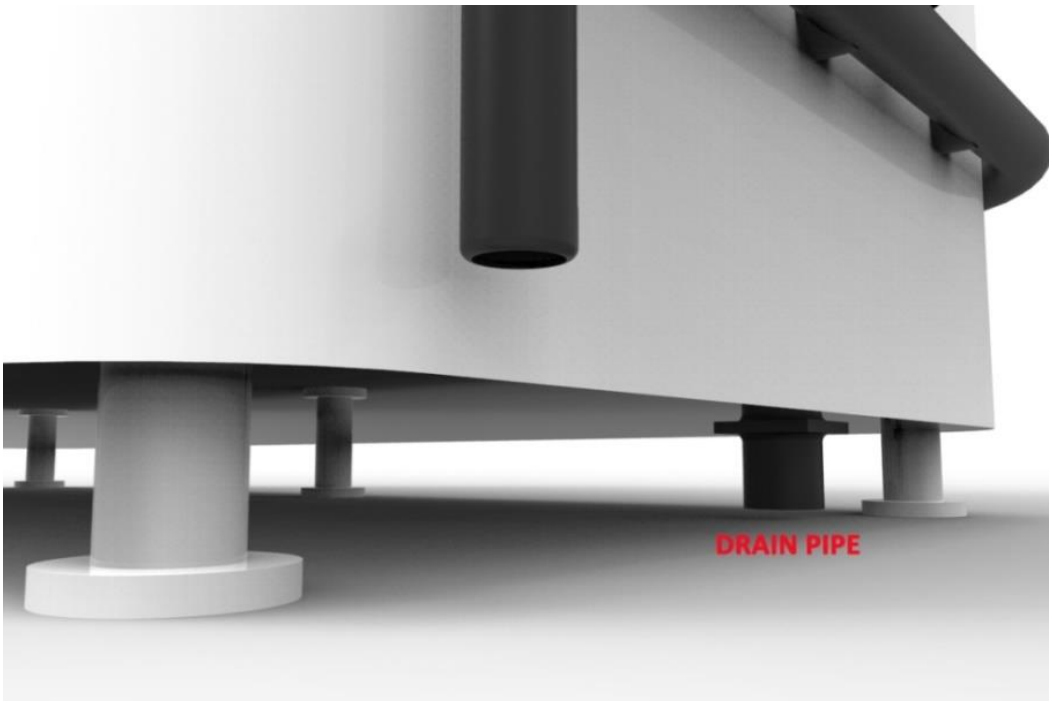


Figure 4.47. Drain pipe.

Interior Layout

While the interior layout of the cabinet was designed, care was taken to ensure that patients can move freely, not be bored and not be in danger. The first consideration when establishing this layout is that both the patients and their relatives can use the product. Therefore, lots of parts are made modular. If the patient or his / her relatives want to take a comfortable shower in the cabin, they can create space by taking out the seating area and bicycle apparatus (Figure 4.48.).

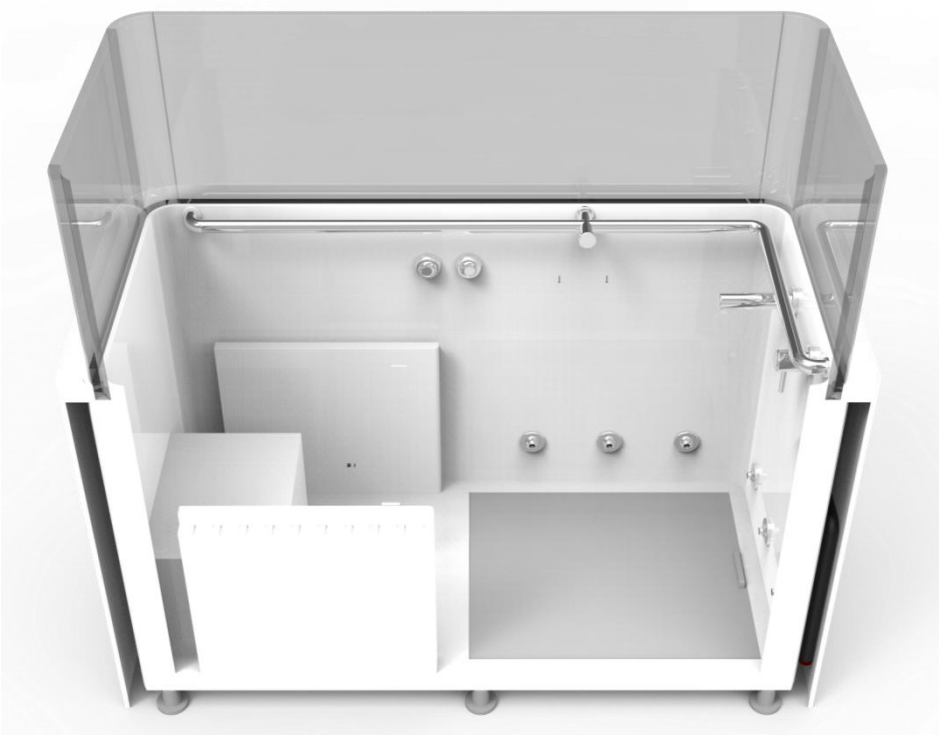


Figure 4.48. The emptied state of the cabin.

Another important consideration is that there are no obstacles around it when using any exercise apparatus. Therefore, a separate place for the bicycle apparatus was built in the cabin. In this way, patients will not have to take out the bicycle apparatus while using the treadmill or doing arm exercises. It is sufficient for the patients to place the apparatus under the seat (Figure 4.48.).

Figure 4.49. Interior layout of the cabin.

Details of Dimensions

The height and weight of people on the Earth varies. One of the most important elements to design a product is height and the other is kilos. The best way to reach the right result is to find the average. For the final design, men and women were separated and their height and weight averages were found. The height and weight average of

women is 160 cm and 68, 43 kg, the height and weight average of men is 173 cm and 78, 03 kg. Therefore, the dimensions of the final design were designed with these variables in mind and 3 different options were offered to the patients (Figure 4.50. and Figure 4.51.). In this way, patients will be able to choose the most appropriate measure for themselves.

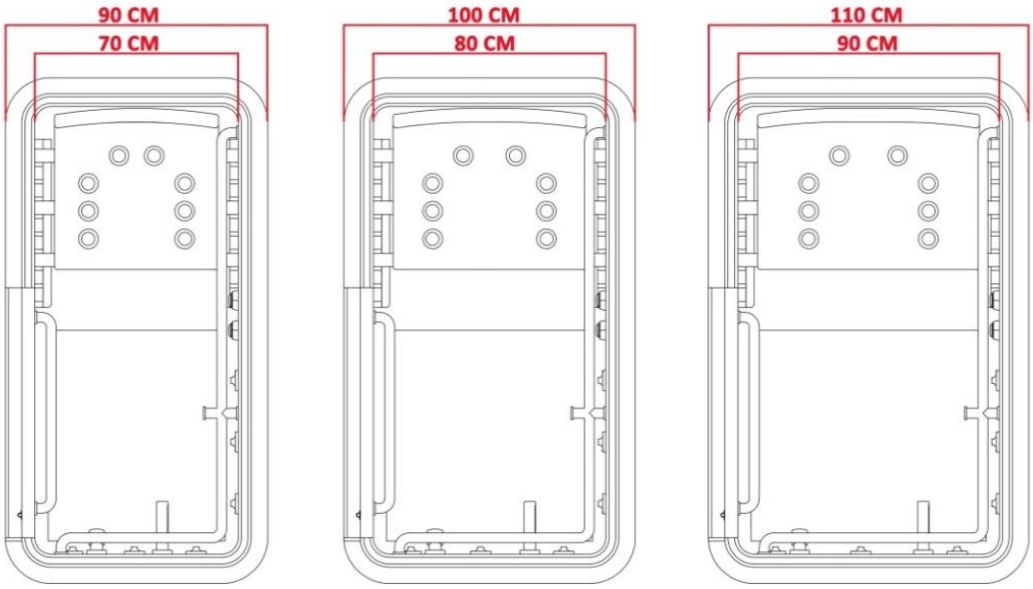


Figure 4.50. 3 different dimension options.

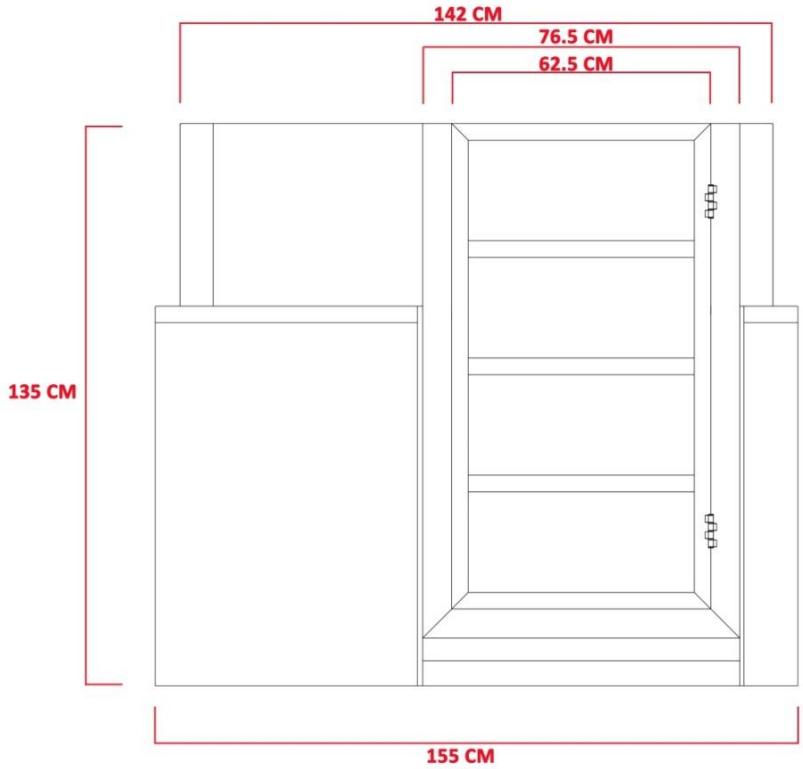


Figure 4.51. Dimensions of the final product.

Materials

The bathtubs made of acrylic material are very durable. Therefore, they provide many years of use. Thus, it protects the budget of patients and their relatives. Bath products made of this material are healthy and useful. It is highly resistant to materials used for cleaning the bathroom. In this way, it does not require any special cleaning material and can be cleaned easily.

Care must be taken when selecting the material of the glass used in the bathrooms, which are among the places where there is a risk of injury when broken. Because in these places, sharp points occur during the breaking of the glass, injuries and even death may occur. Therefore the most suitable material is tempered glass.

All the products in the cabin are in constant contact with water. For this reason, stainless steel is used in material selection. In this way, the product life will be long. In addition, stainless steel is heat resistant. This is an important feature for the designed product.

Table 4.7. Materials of the aqua therapy cabin.

Parts	**Material**
Cabin	Acrylic Sheet, Tempered Glass
Door	Stainless Steel, Tempered Glass
Ergonomic Seat	Acrylic Sheet
Treadmill	Plastic
Bike Apparatus	Plastic, Stainless Steel
Pressure Water	Stainless Steel, PVC, Acrylic Sheet
Shower Head and Heat Adjustment	Stainless Steel, PVC
Cable Drainage System	Stainless Steel, PVC

Features Added After the Committee

Some important deficiencies have been identified in the defense of the thesis on 18.07.2019. To ensure the safety of patients, a seat belt is recommended. Patients will not slip from this seat thanks to this belt. In addition, when the interior of the cabin is filled with water, patients will not be affected by the buoyancy of the water when they are in the sitting position with this seat belt.

Another missing feature is the absence of a belt on the pedal of the bicycle apparatus. If the pedal does not have a belt, patients' feet may slip off the pedal. This could be dangerous for them. Therefore, the belt must be worn on the pedal.

Finally, an emergency button has been suggested for emergency situations such as dizziness, fainting and attacks. With this button, the water in the cabin will be discharged rapidly and the patient's relatives will be able to reach the patient easily.

CHAPTER 5

FINDINGS

5.1. Findings of Observation

The disease manifested itself when my mother began to lift her foot hard when she was wearing trousers. After that, there were difficulties such as difficulty in balance, weakening of the limbs, and weakness in vision, difficulty in walking, difficulty in urination, difficulty in thinking and forming sentences. Currently, she is walking with a walker while she is in the house, and she continues to live in a wheelchair outside the home. He has difficulty in doing daily activities. Therefore, the quality of life is quite low. In order to improve my mother's quality of life, we moved to a detached house with pool and garden. My mother goes into the pool 5 or 6 times a week for about 4.5 months after the weather gets warm every year. She stays in the pool for about 1.5 hours. One of the biggest reasons for this is that it is able to do many movements that cannot be done on land while in the pool. This situation has many benefits for my mother. For example;

- She can improve his wings,
- She can move her legs and arms,
- Her self-confidence is increasing,
- She feels free.

The movements that she cannot do on land and can do in water are as follows;

- Step up and down
- Walking
- Balancing
- Lifting up and down her leg
- Swimming
- Squatting

After 1.5 hours of exercise, she feels better when she comes out of the pool than before she enters the pool. One of the biggest reasons is the opening of the muscles. During the day, she feels more energetic and moves less comfortably. However, she

cannot see the benefit when she is not routinely performed and does not apply frequently. Therefore, my mother enters the pool at least 5 times a week. Of course, this only happens when the weather is warm. When weather cools down during the winter months, the treatment remains unfinished and does not work. It is not possible to continue the treatment in another pool. Because, getting ready for treatment, getting out of the house, getting into the car, spending time in traffic, waiting in line when going to the treatment centre, wearing swimwear for the pool, taking a shower when coming out of the pool, dressing again, being exposed to traffic, getting into the car is very difficult for my mother. In addition, she needs to do it every day in order to benefit from the treatment. However, this is not possible for her. Therefore, her treatment stops in the winter.

As a result of observations, patients with the aqua therapy product expected to be designed,

- should be able to do many exercises with a single product,
- should be able to use the product summer-winter time,
- should be able to put the product in their home,
- should be able to feel safe and free.

5.2. Findings of In-Depth Interview with Physiotherapist

The interview have been made with the Barış GÜRPINAR who working at 9 Eylül University Hospital as a specialist physiotherapist. The interview have been took place at the amplifier of 9 Eylül University Hospital on March 7, 2019 at 15.00 am. It took about 50 minutes. During the interview, sound was recorded. Firstly, the questions were asked and then the draft design was presented. Very useful information has been obtained as a result of the questions answered.

Treatment methods applied to MS patients have varied from past to present. Each treatment has a different importance for patients. Particularly, water therapy has proven effects on patients. As a result of the questions asked, the advantages, effects and benefits of water on the patient were learned.

Learning the benefits of water therapy for MS patients is one of the most important points for this thesis. It has been learned about the medical benefits of

exercise in water. The effects of neurological rehabilitation on the patient's body were learned. It has been learned that water provides convenience to the patients with enabling the lifting force by removing the gravity, provide a safe environment for them and in this way it helps them to make the movements easily. In addition, water eliminated the problem of balance which is the biggest problem of MS patients and provided them with many movement options. Thus, patients can reach the desired aerobic threshold.

The methods used in water therapy from past to present have varied and a new one has been added every day. Learning these is important for the thesis. Therefore, it was learned which methods were used. The methods used as a result of the acquired information are Halliwick, Bad Ragaz Halka Metodu, Ai Chi, Watsu.

Treatments vary according to disease and each treatment has different effects. It is necessary to determine which method is more suitable for MS patients and to prepare a treatment program accordingly. It was learned that what these practices on patients do, which muscles they work on and what kind of improvements they provide. It has been reported that Ai Chi practices in MS patients can reduce spasm, fatigue and disability complaints, and increase balance, functional mobility, and upper and lower extremity muscle strength.

Muscles are vital for MS patients. Knowing the muscles to be treated increases the percentage of getting positive results from the treatment. It was learned that the most important muscle for MS patients is the body muscle. In addition, the leg muscles that provide the walking function and the importance of the most used arm muscles in daily life were learned.

It is very important to know the level and temperature of the water to be applied. It is necessary to use the lifting force of the water in the most efficient way and to ensure that the patient is able to undergo the treatment process in the most appropriate conditions. As a result of the questions, it was learned that the water level should be at the level of thoracic eleventh spine, called T 11, and should be approximately two or three fingers above the chest. It has been learned that if the water level is below this limit, the movement becomes more difficult, if it is above it the float increases and the water lifts the patient. If aerobic exercise is to be performed, the temperature should be 28-29 degrees. If calm-strength exercise is to be performed, the temperature should be at 31-32 degrees. The proposed temperature for the draft design is 31-32 degrees if the movements are slow, and it should be 28-29 degrees if the movements are fast. It was

learned that patients with MS should not exceed 31 degrees because of a distress called utof phenomenon.

It is necessary to learn the elements that should be considered when the bicycle mechanism used in the new product is used by the patients. Because if the angle and design of the bicycle is not suitable for the patient, the device may lose its therapeutic properties and cause harm to the patients. For this purpose, it was learned that hand and foot ergometry should be examined and a 2 cm height would be sufficient for the pedal. In addition, it is proposed that the bicycle apparatus to be used for the foot can be inserted into a position to be used in hand.

The treatment process should be at the optimum level for the patients and should not bother them. If the difficulty level cannot be adjusted, it may burden the healthy muscles of the patients or reduce the quality of life by exhausting patients. As a result of the questions asked to learn this level, it was learned that this was a desired thing, because if the muscles become harder to move, they become more powerful and easier to resist resistance.

Is it more appropriate for patients to undergo treatment processes stable? Should levels be determined for treatment? These are important points in the treatment. The most appropriate treatment process should be applied to them, because MS patients are sensitive. Therefore, it has been said that different resilient flexible tapes for the arm, pallets that increase surface resistance, floating materials and sponges could be used. It was recommended to make a decision on other stages with the physical therapist and to plan the program personally.

The safety of the patient during the treatment process is the most important thing. It is necessary to learn what needs to be done to maximize safety. Specialist doctor suggested that the reach button, emergency drain button, seat belt can be added in cases of faintness, slip, and misalignment.

Accurate arrangement of treatment time is very important. If the time is over, the patient gets tired, if the time is low, the effect of treatment on the patient decreases. Therefore; it is important to learn the optimum time. The prescription should not be given with the device and the duration of treatment should be decided by the doctors according to the patient's condition.

Knowing the healing process of patients with MS can help ease the direction of treatment. Knowing the healing process for the draft design can help to implement the right movements at the right time. However, according to the results learned from the

interview, the healing process of the patients is complicated, the patient should be considered as a whole, and the other parts of the body such as lung, liver and nervous system should be examined.

MS patients are taking many medications, going to therapy and sports by reason of the fact that there is no cure for the disease. The positive effects of water therapy on patients should not be ignored. However, the most important point here is to find out to fully recover with water therapy is possible or not for patients. It has been learned that this was not possible as a result of the questions asked, but it affected the patients both physically and psychologically very well, as effective as the drugs and that each patient should experience the water therapy experience.

The continuation of the patients' normal life after the treatments varies from person to person. Some of them cannot get a response from treatments, and others can continue their lives with quality until they get the next attack. This process can be difficult and long. Therefore, according to the expert, the time to return to normal life is adversity. Exercises are more effective than drugs. In addition, it is informed that the aerobic exercise to be done with the bicycle in the draft design can be as effective as the drugs because it has the feature of suppressing inflammation in the body.

The role of relatives of patients in the treatment process is very important. There are a number of tasks that they must undertake. Questions were asked to learn what patients' relatives should do in the design. According to the information obtained as a result of the questions asked, the patient should not use the product on its own, should have supervision that can help in the entrance and exit, the temperature of the water should be adjusted, and there should be someone next to the patient in case of dangerous situations during the exercise. In addition, disinfection is very important, so it is informed that the patient's relatives should clean the product on a weekly basis.

The materials to be used are very important for the health of the patients. Each of the options, such as being ergonomic, soft, hard, rough, smooth and slippery, form different scenarios. It should be able to identify the most suitable materials for the health of the patients and the progress of the treatment. The proposed material criteria for the draft design are as follows; Non-corrosive materials should be preferred, soft sponges should be avoided, materials that are easy to clean without roughness should be used, anti-bacterial materials should be used, parts that are easily removed and easy to repair should be used.

As a consequence all of these the following were learned respectively:

- Importance of water therapy for MS patients,
- The benefits of water therapy for MS patients,
- Treatment methods used in water therapy,
- Methods and movements applied to MS patients,
- Movements that strengthen the muscles of MS patients,
- Water level,
- Temperature of water,
- The most suitable bicycle mechanism for MS patients,
- Things to be done to facilitate patient movements in water,
- Treatment stages,
- Materials of the tools to be used,
- Considerations for patient safety,
- Duration of treatment,
- Patient healing process,
- Time to return to normal life,
- The things that the relatives of the patient should pay attention to during this process.

5.3. Findings of In-Depth Interview about General Information with Patients (Part 1)

The first stage of the interview started on 10.03.2019 at 10.00 and ended at 15.00. Five patients were interviewed during the day. One hour was reserved for each patient. The questions were asked with the papers that printed out before. There are 15 questions in total. The questions asked were consisted short answer questions and multiple choice questions. The second stage of the interview started on 02.04.2019 at 10.00 and ended at 15.00. In the same way, 5 patients were interviewed during the day.

90% of MS patients have problems with muscles in their bodies. The problems experienced in these muscles vary from person to person. In the interview study, almost all participants were having weaknesses on their muscles. Therefore the question was asked to determine which muscles the patients had problems with. As a result, the results in the table 5.19. below have been reached.

Table 5.8. The number of patients which have weaknesses on their muscles.

Muscle Weaknesses	The Number of Person
Leg	9
Arm	4
Wrist	1
Knee	1
Eye	1
Hand	2

According to the results, most of the patients have problems with leg muscles. In addition, the second is followed by the arm muscles. This means that in the new design to be proposed, the goal should be to strengthen the leg and arm muscles.

Medicines are not enough to strengthen the weakened muscles. There must be additional supplements next to medicines. These additional supplements usually consist of exercises. Exercises are divided into many areas within themselves. Question was asked to find out the most effective and correct exercise. The table 5.20. shows the movements of patients to strengthen their muscles.

Table 5.9. The movements that patients do for strengthening their muscles and the number of patient.

Strengthening Movements	The Number of Person
Swimming	2
Foot movements	1
Sports	1
Physical therapy	3
Yoga	6
Pilates	4
Walking	2

Most people who have problems with their muscles go to physical therapy as additional supplements. This includes MS patients. Physical therapy focuses on the re-training and control of muscles, the improvement of daily functions, the acquisition of power and flexibility, the development of motor system skills, the recovery of walking and the training of improvement and movement functions. So the effect on MS patients is great. Question was asked to learn how many patients experienced physical therapy and to learn about their experiences. The table 5.21. shows the number of people in physical therapy and the movements experienced by the patients.

Table 5.10. The number of people in physical therapy and the movements experienced by the patients.

Number of People in Physical Therapy	**9**
Physical Therapy Movements	**The Number of Person**
Step up and down	3
Walking	2
Leg stretching	3
Arm stretching	2
Arm strengthening	2
Leg strengthening	2
Arm tensioning	3
Leg tensioning	3
Muscle strengthening with electrical apparatus	1

The total number of patients experiencing physical therapy is 9. They all explained their experiences in detail. As a result of these experiences, 9 different exercises have emerged. The most common of these exercises among the patients are the following: step up and down, leg stretching, arm tensioning and leg tensioning. In the newly designed product, the exercise units to be applied to the patients were taken into consideration for these movements.

Water therapy is another treatment method applied by patients other than physical therapy. Patients can make many movements in the water easily by taking advantage of the basic features of water. In water exercises, patients can be exercised in different positions. In addition, in-water exercises increase cardiac capacity and balance and coordination. Because of all these advantages, it is a preferred form of exercise in many cases. It is a very suitable treatment for MS patients. Question was asked to learn how many patients experienced water therapy and to learn about their experiences. The table 5.22. shows the number of people in water therapy and the movements experienced by the patients.

Table 5.11. The number of patient in aqua therapy and the movements they experienced.

Number of People in Water Therapy	**9**
Water Therapy Movements	**The Number of Person**
Leg lifting lowering	5
Walking	5
Moving cups	2
Jump	2
Leg-side opening	2
Try to sit in the water	2

In total, the number of patients experiencing water therapy is 9. Because of the presence of the therapy pool at the MS association, the patients have a deep knowledge of this issue. Most of them are actively going to water therapy. Therefore, they could easily share their experiences. As a result of these experiences, 6 different exercises have emerged. The most common of these exercises among the patients are the following: leg lifting lowering and walking. In the newly designed product, the exercise units to be applied to the patients were taken into consideration for these movements.

Patients generally mentioned positive things about water therapy. They said that they felt safe, did the movements easily, did not have fear of falling, and the water therapy fulfilled their confidence and gave them joy.

Most activities in daily life are compelling for MS patients. Their quality of life is low due to the problems they experience in body muscles. Therefore, they are both physically and psychologically affected. This causes obstacles. In particular, the treatment process is very difficult. Table 5.23. shows the processes experienced during physical therapy or water therapy. Each substance represents a different compeller for the patient with MS. It varies from person to person. The question was multiple-choice so, patients were able to mark more than one option. The number of markings is also shown in the table.

Table 5.12. The processes experienced during physical therapy or water therapy and the number of people experiencing these difficulties.

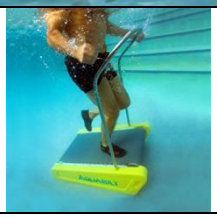
Challenges	**The Number of Person**
Having to act according to the given appointment time	5
Getting dressed	4
You have to leave the house at your own discretion	3
Traveling by car or public transportation	6
Wait in line when you go to hospital or treatment center	8
Exposure to the crowd in the hospital or treatment center	7
Treatment process	2

According to the results, it is the most difficult situation for patients to wait in a hospital or treatment centre. Besides that, the second and third places are followed by exposure to the crowds and public transport. In order to increase the living standards of the patients, design has been developed considering these difficulties.

A wide variety of therapy equipments are available on the market. Each of the therapy equipments has its own function. The therapy equpiments to be applied are

determined according to the patient and his / her symptoms. An incorrect equipment selection may affect the patient in a negative way. However, in general, equipments that used in water do not exhaust patients also offer a comfortable treatment for them. Every movement in the water is easier for patients. The visuals seen in the table 5.24. are shown to the patients with a multiple choice question. Images represent equipments used in water therapy. Each has a different function. Patients have marked the instruments that they think they can use and think it will be good for them.

Table 5.13. Pictures of selected therapy equipment and the number of person that choosing the Picture.

Selected Therapy Equipments	The Number of Person	Selected Therapy Equipments	The Number of Person
	6		5
	5		6
	3		8
	6		

According to the results, the most marked equipment is G. The tool in G is a foldable exercise bike. It strengthens leg muscles by helping to make the leg movement. Second place is A, D and F. The tool in the image A is an elastic tire. It used to strengthen arm muscles. The tool in D is the exercise bike. It used to strengthen the leg muscles. Finally, the tool in F is the walking band. It makes a great contribution to leg movement. It is effective in strengthening muscles. Patients who cannot walk on land can easily walk in water with this tool. B and E are in third place. The tool in B is an

almost identical function with the bicycle. It helps strengthen leg muscles. Finally, the tool in the image E is the weight arm apparatus. It strengthens arm muscles. All of the equipment selected by the patients were examined in detail and combined with a new idea and transferred to the design.

Lastly, the draft design has been shown to patients in order to get their opinions. It consists of 7 visuals. In the draft, the product has external appearance, details and functions. The patients examined the visuals in detail and gave their comments. Table 5.25. shows the constructs and items of the patient's comments about the draft.

Table 5.14. The categories and items of the patient's comments.

Category	**Items**
Need	That's exactly what I need.
	I don't need anything like that.
	I don't need it.
Confidence	I'm afraid I'm gonna drown in the pool, but I feel safe in something like this and I'm not scared.
Suggestion	Handle aparatus need to increase.
	Maybe the stair can be added. For patients do step.
	Maybe his door could be a little bigger.
Option	It's great not only for MS patients, also great for the elderly.
	It's good for patients who have trouble moving.
	Only MS patients do not have to use.
Attitude	I used it.
	I don't, but I have friends who are in bad shape. They can use it.
Ability	I can also do all of the movements here on land.
Pleasure	It's very good to have a walking belt and not to be particularly electric.
	I really like having a handle.
	It's a very good product.
	I found it very successful.
	Very nice. I think it's very successful.
Intention	I would definitely use it if my disease progressed.
	I'm good, but if I'm bad, I'il use it.
Health	This product does not harm my body because there will be no chlorine.
	Chlorinated water will not be used. That's the best part.
Compatibility	The device is very good and comfortable to offer many exercises at the same time with the convenience of water.
Want	I would definitely like something like this in my house.
	If there was such a thing in the market I would really love to take home.
Private	I like to have a personalized product.
Hygiene	There's no way the patient gets infected.

As a consequence all of these the following were learned respectively:

- Applied treatment methods,
- Muscles with problems,
- Muscle strengthening,
- Exercise at home,
- Physical therapy movements,
- Aqua therapy movements,
- Aerobic movement exercises in water,
- Difficulties on the way to treatment,
- Equipment and exercises to be used,
- Opinions about the newly designed product.

5.4. Findings of In-Depth Interview about Aquatic Therapy with Patients (Part 2)

The interview started on 09.04.2019 at 11.00 and ended at 13.00. Four patients were interviewed during the day. One and a half hour was reserved for each patient. The questions were asked with the papers that printed out before. The questions asked were consisted long answer questions.

The first question concerns how patients are prepared for water therapy. The purpose of this question is to learn which steps patients have undergone before starting water therapy. The table 5.26. shows the preparation stages and details of the patients respectively.

Table 5.15. The preparation stages and details of the patients.

Patient 1	1) Coming to the association.
	2) Going to the cabin.
	3) Wearing a swimsuit. (Difficulty.)
Patient 2	1) Wearing a swimsuit. (Difficulty.)
Patient 3	1) Wearing a swimsuit. (Difficulty.)
Patient 4	1) Wearing a swimsuit. (Difficulty.)
	2) Wearing a swimming hat. (Difficulty.)

As shown in the table, patients are having difficulties to wear swimsuits most during the preparation phase. The reason for this is the weakness of leg muscles. They're having trouble lifting their legs.

Various pools are used in water therapy. The pools are generally large because there will be more than one patient in the pools during the therapy. Sometimes these pools are a problem for patients. In particular, patients experience some problems when entering and leaving the pool. The table shows the most common difficulties that patients experience when entering and leaving the pool.

Table 5.16. Difficulties that patients experience when entering and leaving the pool.

	Difficulty
Patient 1	1) Having difficulty in entering and leaving the pool. 2) Afraid of slipping her foot because of wet floor 3) Struggling to step up and down.
Patient 2	1) Having difficulty in entering and leaving the pool. 2) Afraid of slipping her foot because of wet floor 3) Struggling to step up and down.
Patient 3	1) Struggling to step up and down.
Patient 4	1) Struggling to step up and down. 2) Afraid of slipping her foot because of wet floor

The pool offers a wet environment to the patients as it contains water. Therefore, patients have difficulty in entering and exiting the pool. The problem of the step, the wet floor problem and the shift of the feet are the most difficult situations for the patients. In the new concept design, attention has been paid to avoid these difficulties from patients.

Patients have difficulty in most of the environment due to their health problems. But this situation changes in water. Patients have difficulty in water, but also have the convenience. In fact, the number of convenience experienced is higher than the number of difficulties. The table shows the ease and difficulties that patients experience in water.

Table 5.17. Easiness and difficultness that patients suffer in water environment.

	Easiness	**Difficultness**
Patient 1	1) Lack of falling problem 2) Ease of movement 3) Feeling safe	1) The size of the pool 2) Handles and holding areas away from patients
Patient 2	1) Ease of movement	-
Patient 3	1) Ease of movement	1) Chlorine damage to the body 2) Not to stay too long in chlorinated water 3) Chlorine starts to burn the body and makes redness
Patient 4	(She doesn't know how to swim.) 1) Ease of movement	1) The size of the pool 2) Fear of drowning 3) Holding areas away from patients

According to the results, patients move more easily in the water. This is a very important result for the study, because patients will be completely in water in the final design. However, patients complain about the difficulties that the environment gives them in contrast to being in the water. The pool is large, the water is chlorinated, and swimming fear conditions such as situations force them. In the final design, attention was paid to avoid the patients with these problems.

According to what the patients said during the interview, water exercise is easier than exercise on land, because the movements are easier in the water. However, of course, there are moments when some movements force patients. Table 5.29. shows which movements are difficult for patients to do while in the water and which moves are easier for them.

Table 5.18. Easy and difficult movements for patients.

	Easy Movement	**Difficult Movement**
Patient 1	1) Lifting feet up and down	-
Patient 2	1) Lifting and lowering the leg 2) Strengthening arm muscles 3) Walking in water	-
Patient 3	1) Leg lifting movement	-
Patient 4	(She doesn't know how to swim.)	-

Patients were not forced to perform any movement. The results obtained from this study led the study. 100% of the patients can do all the movements given to them in water. Especially in leg movements, the feasibility rate is very high. This means that mechanisms should be used to make leg movements in the final design.

To determine the benefits of water therapy to patients, pre-therapy status and post-therapy status should be compared. This will also help to understand how the healing process is progressing. Table 5.30. shows the patients' experiences before and after the therapy.

Table 5.19. The patients' experiences before and after the therapy.

	Before the Therapy	**After the Therapy**
Patient 1	1) Hardness in muscles 2) Difficulty in movement	1) Muscle softening 2) Ease of movement
Patient 2	1) Difficulty in walking 2) Hardness in the muscles	1) Ease of walking 2) Muscle softening
Patient 3	1) Hardness in muscles	1) Muscle softening
Patient 4	(She doesn't know how to swim.)	-

After the question that asked, it is understood that patients benefit from water therapy. Before the therapy, the muscles were hard and unopened, and after the therapy all the muscles in their bodies were softened and opened. This increased the quality of life of patients. However, the most important point to be considered here is that patients should apply all these procedures continuously in order to get a full benefit from this treatment. Otherwise, the muscles become stiffened again. This applies not only to patients but also to healthy individuals.

In-water exercises have now become an important part of physical therapy. As previously said, it is very useful for patients. But this may vary from person to person. The benefit for everyone may be different. Table 5.31. shows the benefits of water therapy on patients.

Table 5.20. The benefits of water therapy on patients.

	Benefits
Patient 1	1) Feels free in the water. 2) Can make many movements in the water can not do on land. 3) Psychological as well as physically affects in a good way. 4) It feels more comfortable. 5) Self-confidence is increasing.
Patient 2	1) Moves more comfortably. 2) Strengthen the muscles. 3) Can stretch the body. 4) Feels happy.
Patient 3	1) Movement is not restricted. 2) Moves much more comfortably. 3) Feels free. 4) Feels safe.
Patient 4	1) Feels free. 2) Moves more comfortably. 3) Less tired.

As a consequence all of these the following were learned respectively:

- How patients are prepared for water therapy,
- Difficulties in entering and leaving the pool,
- The easiness and difficulties in the water,
- The movements within the water,
- Patient's condition before and after treatment,
- The benefits of water therapy.

5.5. Findings of Quantitative Study / Survey

The method of voice thinking consists of two stages. The first stage was applied on one patient in the MS association on 01.05.2019 at 11:00. The method lasted one hour. After the results, necessary corrections were made and the second stage of the method was started. The second stage was applied on one patient in the MS Society on 10.05.2019 at 12:00. It took about one hour. All visual details of the draft design prepared in advance are given in the papers to patients. Voice recording were made. Later, recorded audio recordings were transferred to writing. These documents were compared with observation notes. In this comparison, the framework of the speeches, which stated that the participants were hesitating, the times they were surprised, their comments and their distress, were also analysed.

Table 5.21. The sentences of patients, notes and codes.

Gender: Female
Age: 59

Sentences	**Notes**	**Code**	**Time**
I am walking.		Moved	10 seconds
I am opening the door.		Decided.	5 seconds
I might have trouble opening the door. Because there's no power on my hands.	The patient thought the door could be heavy.	Forced.	5 seconds
I opened the door.		Was able to do.	4 seconds
I need to lift my leg to get in.	The patient thought he couldn't leave the stair.	Worried.	6 seconds
But the digits are not high. I can get.	She was relieved to notice that the stair was not high.	Was able to do.	6 seconds
I may have trouble entering the door because the door is narrow.	The door was narrow so it was hard to get in.	Hesitated.	-
I got in.		Was able to do.	-
I need to close the door again. I shut the door.		Realized.	3 seconds
I need to sit down before I fill the water. I sat on the chair.		Prepared.	4 seconds

(cont. on the next page.)

Table 5.21. (Cont.)

I want to work on the walking band first. That's why I have to push the cover on the floor.		Preferred.	-
I leaned over to push the cover. I pushed it. The door is opened.		Solved.	8 seconds
Now I can fill the water.		Prepared.	-
The water needs to be filled quickly so I can't wait. If I wait, I'm cold.	She worried that the water would not fill quickly. However, her worries passed because water filled up quickly.	Worried.	-
The water's full. I stood up. I'm using the treadmill. It's easy to walk in the water.	Enjoyed walking in the water. Because it's hard to walk on land.	Was able to do.	Around 5 minutes
I walked 15-20 minutes.		Was able to do.	20 minutes
I'm tired. I need to sit and rest.	She's tired because she has weak muscles yet.	Tired.	10 seconds
I relax. I want to use the bike apparatus. I have to stand back to adjust.		Realized.	6 seconds
I got up. I need to bend over to open the bike. I leaned over. But I made it difficult. I didn't find it useful.	There were difficulties with the bicycle apparatus. The patient was forced to open the apparatus. Not practical.	Forced.	17 seconds
I need to sit back to use it. I sat.		Prepared.	7 seconds
I stretched my legs. I'm starting to use it. I like to ride a bike in the water. I can't do it on land.	Enjoyed the bike. She was happy to do it.	Was able to do.	8 seconds
I can do it for about 10 minutes.		Was able to do.	10 minutes
I did. I gotta get up. But the holding pipe is in one place. That's why I got so hard every time.	Due to lack of handle apparatus was forced.	Forced.	8 seconds
I need to turn off the bike. I had a hard time closing it.	The patient was forced to close the apparatus.	Forced.	14 seconds

(cont. on the next page.)

Table 5.21. (Cont.)

I want to work with tires. I took the tires. I'm starting to pull. I can do this on the land. For arm muscles, something else can be considered	The rubber apparatus used to strengthen the arm muscles was inadequate.	Realized.	10 seconds
I worked with the arm apparatus for 5-10 minutes.		Worked.	9 minutes
I will get out of the cabin. I'm draining the water.		Decided.	5 minutes
I have drained the water.		Prepared.	-
I closed the treadmill cover.		Prepared.	11 seconds
I stood up. I opened the door. The door is really small.		Forced.	9 seconds
I'm lifting my foot. I'm getting out of the cabin. I'm closing the door.		Completed.	15 seconds
Total			**51 minutes**

After the first part of the think aloud method, changes have been made on the new design. While applying the method, there were cases that the patient had difficulty in using the design. The patient had problems trying to get in and out of the cabin door, trying to use the bicycle pedals, and sitting up and sitting down with the holding/handle apparatus. Considering these, the design has been improved. Then, through the healing design, the same method was tested with another patient. Table 5.33. shows the method with other patient.

The patients completed the method by making use of the images given to them as if they were using the product. As a result of the application, facilitators and preventive elements were identified. Determined preventive elements have been eliminated by improving.

In addition, patients have different duration of product use. The reason for this is related to the physical condition of the patients. Some patients move slowly, some patients move faster. As seen here, one patient completed the treatment in 51 minutes and the other patient completed in 37 minutes. The difference between the designs of the two products affects the time. The product used by the first patient is a problem product, so the duration of use has been prolonged. Because the problems in the final product were minimized, the patient was not forced and the duration was shorter.

Table 5.22. The sentences of patients, notes and codes.

Gender: Female
Age: 59

Sentences	Notes	Codes	Time
I am walking.		Moved.	8 seconds
I want to go through the door. I need to open the door for that.		Decided.	3 seconds
I'm opening the door. I'm going in.	The first patient could not get in after opening the door. She had trouble. There was no problem here.	Moved.	4 seconds
There's a stair. I need to lift my foot.		Thought.	5 seconds
I lifted it up and walked in.		Was able to do.	5 seconds
I have to close the door again.		Decided.	-
I shut the door.		Completed.	4 seconds
I walked in. No problem.	The patient was able to enter without problems.	Was able to do.	-
I have got to open the floor cover so I can use the bike and treadmill.		Thought.	-
I am opening the cover.		Moved.	6 seconds
There's a splash under the cover. The treadmill is here.		Realized.	-
I need to fill the water. I'm sitting.		Prepared.	4 seconds
Water's starting to fill up. I'm waiting.		Waited.	5 minutes
The water's full. I'm gonna stand up and use the treadmill.		Decided.	3 seconds
I'm standing up and I'm walking on the treadmill.		Was able to do.	-
I'm walking for about 10 minutes.		Was able to do.	10 minutes
I like it so much.	The patient enjoyed walking on the treadmill.	Liked.	-
Now I'm going to ride the bike. The bike apparatus is under the seat. I need to drain some water to make it work.	The patient was a little uneasy here.	Prepared.	-
I'm draining the water.		Was able to do.	21 seconds

(cont. on the next page.)

Table 5.22. (Cont.)

I take the apparatus and put it back in place.		Was able to do.	8 seconds
I'm replenishing the water.		Moved.	22 seconds
The water's full.		Completed.	-
I'm starting to use the bike.		Moved.	-
I'm using 10 minutes. I'm satisfied. When I'm done, I put the apparatus back under my seat.	The previous patient was forced to turn the bike on and off. But the new design bike apparatus did not experience this problem. She liked. İt.	Was able to do.	10 minutes
There are arm apparatuses hanging on the pipes. I' will use them.		Decided.	-
There are weight balls here. I pick them up in the water.		Preferred.	3 seconds
After a little work, I put it back. I liked it.	The patient was pleased to work with weight balls.	Liked.	1,5 minutes
There's elastic bands. I can connect them to where I want.		Learned.	-
I'm connecting one to the right and one to the left.		Implemented.	16 seconds
I take one on my right hand, the other on my left hand. I'm starting to pull it down.		Decided.	2 minutes
More compelling than weight balls. But my arm muscles worked.	The patient had some difficulty pulling elastic bands, but he was satisfied.	Compared.	-
I am tired.		Tired.	-
I want to leave. I'm draining the water.		Decided.	5 minutes
The water's empty.		Completed.	-
I'm closing the cover on the floor.		Was able to do.	11 seconds
I'm up where I'm sitting.		Moved.	2 seconds
I am opening the door. Door opened.		Was able to do.	4 seconds
I'm getting out of the cabin.		Moved.	5 seconds
I am closing the door.		Completed.	4 seconds
Total			**37 minutes**

5.6. Findings of Questionnaire

As a result of the survey, a variable was given to each question in order to reach the correct data (Figure 5.34.). SPSS program was used to reach the analysis of these variables. Correlation analysis and ANOVA analysis were conducted in accordance with the results.

Table 5.23. Variables and questions of questionnaire.

Variables	Questions
Proxy	I am a patient relative.
PatientYear	How many years have you been fighting MS?
Weight_Prob	I think I'm overweight
Location	I live away from treatment centers
Assistant	Is there someone who can help you on your way to treatment centers?
Therapy1	I regularly do my physical exercises
Therapy2	What are the treatment methods you use other than taking medication? (Physical therapy, water exercise, yoga, etc.)
AquaTherapy	What do you think about water exercise / water treatment?
Difficulty1	Are you having trouble going to treatments?
Difficulty2	Which of the following options force you?
Dif_Giy	Dress Up
Dif_Cik	Leaving home
Dif_Arac	Using public transport
Dif_Trafik	Exposure to traffic
Dif_Kalabalik	Crowded in treatment centers
Dif_Bekle	Waiting queue in treatment centers
Dif_Zaman	Loss of time spent outside the treatment process
Difficulty3	I think the equipments in the treatment centers are comfortable to use
Innovativeness	I am cautious in adopting new products
Self_efficacy1	I can easily use this kind of products by myself
Self_efficacy2	I'm not sure that I can use such products
Concern_Health1	I feel guilty when I don't do my physical exercises
Concern_Health2	It's hard to find good health care when I need it
Concern_Health3	I feel weak when I have a health problem
Flexibility	I want the product to have the flexibility to add some functions that I deem necessary
Personalization	Product's width, length, height, I would like to determine the characteristics of myself
Triability	It is important that I can use it for trial purposes so that I can understand the properties of the product.
Image	Using this product, I think I will have a different image among my similar friends.
Pleasure	I enjoy using this product
Compatability	Suitable for my style, life

(cont. on the next page.)

Table 5.23. (Cont.)

FacilitatingCond	Having a user manual will make my job easier
InternalInfluence1	I care about the views of my relatives
InternalInfluence2	It is important for me to recommend my doctor
ExternalInfluence	Advertising or advertising of such products affect me
Storage	I don't have enough space in my house to put this product
Regulation	I would like a portion of this product to be covered by the state / private health insurance.
Support	Get technical support quickly and easily
Security1	I may be in danger during use
Security2	I find it safe to use
Security3	I don't think I'm going to have a slip problem
Privacy	Unlike treatment centers, I will not have any hygiene problems as this product is only mine.
Quality	I would have received a higher quality treatment compared to treatment in treatment centers
Size1	I can move in comfortably.
Size2	I find enough dimensions
Ergonomic1	I think it is handy
Ergonomic2	I find the product ergonomic
CostExist1	Do the treatments give you financial difficulties?
CostExist2	The cost of going to treatment centers is high
CostProduct1	The purchase cost of the product is high (6500 TL)
CostProduct2	I can afford to buy this product
CostChange	I think the product will reduce treatment costs to a lesser extent.
EoL1	It takes time to learn to use
EoL2	I can easily learn how to use
EoU1	No difficulty in use
EoU2	I find it easy and practical to use
Usefulness1	I think it is useful
Usefulness2	Makes my daily life easier
Usefulness3	Not affected by adverse weather conditions
Usefulness4	I don't have to waste time in traffic
Usefulness5	Using this product at home saves me time
Usefulness6	I need less help
Usefulness7	Thanks to this product I use water without chlorination
Usefulness8	I can continue my treatments at home with this product.
Usefulness9	Thanks to this product, I can exercise in water at any time.
Usefulness10	This product gives me more freedom of movement.
Usefulness11	The product has a layout that can be used in everyone's home.
Attitude1	Good idea to use in my opinion
Attitude2	Would recommend to others
Attitude3	I would consider using
Intention1	I intend to take.
Intention2	I plan to get it soon

Full table of the variables and questions is seen in the APPENDIX E.

Results of Correlation Analyses

Correlation analysis was conducted to show the relationship between constructs. Table 5.35. shows the correlation results analyses of intermediary variables.

If significant (Sig. (2-tailed)) value is closer to zero (0), indicates that there is correlation between variables.

The variable of the sentence that ‘’I enjoy using this product.’’ is Pleasure. The patient or relatives who answered this question found the product to be enjoyable and also found it easy to use. In addition, there is a correlation between Pleasure and Usefulness. Therefore, it is understood that they find the product useful. Also there is a correlation between Pleasure and Attitude. Patients are being positive towards to product. The correlation between Pleasure and Intention is not as strong as in other variables. However, it is seen that patients intend to buy the product.

The variable of the sentence that ‘It suits my style, my life.’’ is Compatibility. There is a correlation between Compatibility and Ease of Use (EoU), Usefulness, Attitude, Intention. Therefore, patients who find the product suitable for themselves also find the product easy to use, find the product useful, being positive towards to product and intend to buy the product.

The variable of the sentence that ‘’Having a user manual will make my work easier.’’ is FacilitatingCond. There is a correlation between FacilitatingCond and Ease of Use (EoU), Usefulness, Attitude. However, the correlation between FacilitatingCond and Intention is not strong. As a result of this, the patient or relatives who answered this question find the product easy to use, find the product useful, being positive towards to product but they do not intend to buy the product.

The variable of the sentence that ‘I find it safe to use.’’ is Security2. There is a correlation between Security2 and Ease of Use, Usefulness, Attitude, Intention. Therefore, patients who find the product safe for themselves also find the product easy to use, find the product useful, being positive towards to product but they intend to buy the product.

The variable of the sentence that ‘’Unlike treatment centers, I will not have any hygiene problems as this product will only belong to me.’’ is Privacy. There is a correlation between Privacy and Ease of Use, Usefulness, Attitude, Intention. Therefore, patients who find the product private for themselves also find the product easy to use,

find the product useful, being positive towards to product but they intend to buy the product.

The variable of the sentence that ‘’I would have received a higher quality treatment than treatment at the treatment centers.’’ is Quality. The patient or relatives who answered this question found the product quality and also found it easy to use. In addition, there is a correlation between Quality and Usefulness. Therefore, it is understood that they find the product useful. Also there is a correlation between Quality and Attitude. Patients are being positive towards to product. The correlation between Quality and Intention is not as strong as in other variables. However, it is seen that patients intend to buy the product.

Looking at the last three variables, EoU2- Usefulness8- Attitude3, Sig values appear to be zero (0). Therefore, there is a strong correlation between variables and Ease of Use, Usefulness, Attitude, Intention.

Everything in the attitude has a potential to become intention.

Table 1 Table 5.24. Correlation analyses.

Variables		**EoU**	**Usefulness**	**Attitude**	**Intention**
Image	Pearson Correlation	0,27	0,40	0,32	0,32
	Sig. (2-tailed)	0,017	0,000	0,004	0,004
	N	80	80	80	80
Pleasure	Pearson Correlation	0,51	0,64	0,57	0,30
	Sig. (2-tailed)	0,000	0,000	0,000	0,007
	N	80	80	80	80
Compatability	Pearson Correlation	0,50	0,63	0,52	0,35
	Sig. (2-tailed)	0,000	0,000	0,000	0,001
	N	80	80	80	80
FacilitatingCond	Pearson Correlation	0,38	0,55	0,54	0,14
	Sig. (2-tailed)	0,000	0,000	0,000	0,227
	N	80	80	80	80
Storage	Pearson Correlation	-0,37	-0,21	-0,32	-0,37
	Sig. (2-tailed)	0,001	0,065	0,003	0,001
	N	80	80	80	80
Support	Pearson Correlation	0,32	0,24	0,29	0,40
	Sig. (2-tailed)	0,004	0,033	0,009	0,000
	N	80	80	80	80
Security2	Pearson Correlation	0,71	0,68	0,62	0,37
	Sig. (2-tailed)	0,000	0,000	0,000	0,001
	N	80	80	80	80

(cont. on the next page.)

Table 5.24. (Cont.)

Security3	Pearson Correlation	0,38	0,35	0,31	0,14
	Sig. (2-tailed)	0,001	0,001	0,005	0,230
	N	80	80	80	80
Privacy	Pearson Correlation	0,58	0,60	0,63	0,33
	Sig. (2-tailed)	0,000	0,000	0,000	0,003
	N	80	80	80	80
Quality	Pearson Correlation	0,48	0,42	0,52	0,31
	Sig. (2-tailed)	0,000	0,000	0,000	0,006
	N	80	80	80	80
Size1	Pearson Correlation	0,53	0,58	0,64	0,50
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Size2	Pearson Correlation	0,46	0,53	0,65	0,43
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Ergonomic1	Pearson Correlation	0,61	0,66	0,81	0,50
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Ergonomic2	Pearson Correlation	0,58	0,63	0,74	0,45
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
CostProduct1	Pearson Correlation	-0,06	0,11	-0,05	-0,37
	Sig. (2-tailed)	0,627	0,320	0,652	0,001
	N	80	80	80	80
CostProduct2	Pearson Correlation	0,32	0,17	0,21	0,50
	Sig. (2-tailed)	0,003	0,123	0,060	0,000
	N	80	80	80	80
CostChange	Pearson Correlation	0,53	0,43	0,41	0,58
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
EoL2	Pearson Correlation	0,72	0,46	0,41	0,36
	Sig. (2-tailed)	0,000	0,000	0,000	0,001
	N	80	80	80	80
EoU1	Pearson Correlation	0,93	0,64	0,57	0,33
	Sig. (2-tailed)	0,000	0,000	0,000	0,003
	N	80	80	80	80
Usefulness1	Pearson Correlation	0,62	0,84	0,70	0,30
	Sig. (2-tailed)	0,000	0,000	0,000	0,008
	N	80	80	80	80
Usefulness2	Pearson Correlation	0,59	0,74	0,71	0,47
	Sig. (2-tailed)	0,000	0,000	0,000	0,000

(cont. on the next page.)

Table 5.24. (Cont.)

	N	80	80	80	80
Usefulness3	Pearson Correlation	0,62	0,86	0,68	0,33
	Sig. (2-tailed)	0,000	0,000	0,000	0,003
	N	80	80	80	80
Usefulness4	Pearson Correlation	0,65	0,86	0,66	0,26
	Sig. (2-tailed)	0,000	0,000	0,000	0,019
	N	80	80	80	80
Usefulness5	Pearson Correlation	0,46	0,76	0,63	0,23
	Sig. (2-tailed)	0,000	0,000	0,000	0,037
	N	80	80	80	80
Usefulness6	Pearson Correlation	0,59	0,85	0,63	0,41
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Usefulness7	Pearson Correlation	0,43	0,78	0,61	0,40
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Usefulness8	Pearson Correlation	0,56	0,84	0,66	0,38
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Usefulness9	Pearson Correlation	0,46	0,84	0,66	0,18
	Sig. (2-tailed)	0,000	0,000	0,000	0,107
	N	80	80	80	80
Usefulness10	Pearson Correlation	0,50	0,86	0,67	0,30
	Sig. (2-tailed)	0,000	0,000	0,000	0,007
	N	80	80	80	80
Usefulness11	Pearson Correlation	0,51	0,66	0,70	0,41
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Security	Pearson Correlation	0,62	0,58	0,53	0,28
	Sig. (2-tailed)	0,000	0,000	0,000	0,011
	N	80	80	80	80
Size	Pearson Correlation	0,52	0,59	0,68	0,50
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Ergonomic	Pearson Correlation	0,63	0,68	0,82	0,50
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80

Full table of correlation analyses is seen in the APPENDIX F.

Results of ANOVA Analyses

ANOVA analysis has been conducted on demographic values including gender, age and education.

Significant results for ANOVA analysis based on gender construct can be found on Table 5.36.

There is a significant difference between men and women in the first 5 variables. When the first variable (Pleasure) is examined, it is seen that women will enjoy using this product more than men. Moreover, women think that they will not be affected by weather conditions with this product more than men. Lastly, it is seen that women attach great importance to triability than men.

Table 5.25. ANOVA gender analyses.

Gender			**Women**	**Men**	**Total**
		N=	59	21	80
Variables	**F**	**Sig.**	**Mean**	**Mean**	**Mean**
Pleasure	10,613	0,002	**4,39**	**3,43**	**4**
Usefulness3	9,926	0,002	**4,39**	**3,52**	**4**
Triability	9,134	0,003	**4,76**	**4,05**	**5**
AquaTherapy	9,011	0,004	**4,41**	**3,62**	**4**
FacilitatingCond	8,730	0,004	**4,90**	**4,43**	**5**

Full table of ANOVA gender analyses is seen in the APPENDIX G.

According to age, participants were grouped into four categories, namely 24 or below, 25-34, 35-34, and 45 or above. Table 5.37. shows the results of ANOVA for age construct.

The results shows that compared to aged users, 24 or below patients can afford to buy the product. Patients in the age of 45 or above and 24 or below stated that they (Usefulness3: Not affected by adverse weather conditions.) will not be affected by weather conditions more than 25-34 and 35-44 ages. Furthermore, this group found the product more useful.

Table 5.26. ANOVA age analyses.

Age			24 or below	25-34	35-44	45 or above	**Total**
		N=	2	32	24	22	80
Variables	**F**	**Sig.**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**
CostProduct2	3,50	0,011	**3,00**	**2,78**	**1,92**	**2,77**	**2,53**
Usefulness3	3,91	0,012	**4,50**	**4,34**	**3,54**	**4,55**	**4,16**

Full table of ANOVA age analyses is seen in the APPENDIX H.

ANOVA results for education types shows that (Table 5.38.), there is a huge mean differences between education levels for the variable of CostProduct2. Patients with doctoral degree have enough financial power to purchase this product than the other education degrees. In addition, patients who have doctoral degree think using this product at home will save them time.

Table 5.27. ANOVA education level analyses.

Education Level			Primary school	High school	University	Master	Doctorate	
								Total
		N=	4	20	29	23	4	80
Variables	**F**	**Sig.**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**
CostProduct2	3,501	0,011	2,00	1,95	2,59	2,65	4,75	2,53
Usefulness5	3,132	0,019	3,00	4,40	4,62	4,52	5,00	4,48

Full table of ANOVA education level analyses is seen in the APPENDIX I.

Significant results for ANOVA analysis based on income construct can be found on Table 5.39..

There is a significant difference between men and women in the first 5 variables. When the first variable (EoL2) is examined, it is seen that patients with income of 4001 TL and over can learn to use the product more easily than people with other incomes. In addition, patients who have chosen the income range of 1001-2000 TL are more cautious in adopting the product than those in the other income range (Innovativeness).

Table 5.28. ANOVA income analyses.

Income			0-1000 TL	1001-2000TL	2001-3000TL	3001-4000TL	4001TL and over	
								Total
		N=	9	12	18	18	23	80
Variables	**F**	**Sig.**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**
EoL2	4,966	0,001	**3,78**	**3,92**	**2,89**	**4,33**	**4,39**	**3,90**
CostProduct2	4,935	0,001	**1,56**	**2,00**	**1,89**	**3,00**	**3,30**	**2,53**
Storage	4,096	0,005	**2,56**	**3,58**	**3,72**	**2,00**	**3,22**	**3,04**
Innovativeness	4,033	0,005	**2,33**	**3,92**	**3,78**	**3,11**	**3,83**	**3,50**
Compatability	3,987	0,005	**3,22**	**4,25**	**3,11**	**4,39**	**4,30**	**3,93**

Full table of ANOVA income analyses is seen in the APPENDIX J.

CHAPTER 6

CONCLUSION

When literature is examined, it can be said that aqua therapy has positive effects on MS patients. However, patients face a number of difficulties in the therapy process. The purpose of this study is to design an aqua therapy product in which patients can easily use it in their homes and do not have to bear the difficulties of the therapy process. Therefore, in order to design a new aqua therapy product, all information about multiple sclerosis and aquatic therapy was investigated. During the study, both qualitative and qualitative studies have been applied in order to aquatic therapy cabin design adoption taxonomy.

6.1. Implications

The target audience of this study is Multiple Sclerosis patients who were treated or will be treated with aquatic therapy. In this study, the priorities of design inputs for patients were investigated. First, an extensive observation was performed on the patient. Afterwards, in-depth interviews with doctors and patients were made. Finally, think aloud method was applied on the patients. At the end, many analyses were performed.

According to all descriptive analyses, the priority of the product designed for patients is the safety of patients. Therefore, the therapy cabinet is designed in such a way that patients can provide the easiest access. It has a rectangular shape and it is possible to install it in the bathroom of each house as it is not exceeded the standard dimensions. According to the data obtained as a result of height and weight histograms, 3 different measurement options are presented. Therefore, product can be adjustable for different

According to the information obtained as a result of the observation method, MS patient starts to move more easily when patient enters into an aquatic environment. The balance problem is completely eliminated. Therefore, patient's confidence increases because the patient is not afraid to fall .When the effects of aqua therapy on the patient

were examined, positive results were obtained. However, the patient can do the exercises in aqua therapy only in the summer months. This causes difficulties in the continuity of treatment. With this aqua therapy product, this problem will be eliminated. The patient will be able to continue her treatment by using the product designed in summer and winter.

As a result of interviews with specialist physicians, aquatic therapy is a very useful treatment for MS patients. MS patients secrete happiness hormone during the aquatic therapy. In this case, it affects the psychology of patients positively. Patients can make many movements in an aqueous environment that they cannot do on land. In this case, it contributes to the development of muscles. Exercise movements are given to patients by specialist doctors. Levels are determined by the patient's condition. In addition, information about water level and water temperature was learned. These are the most important elements for aqua therapy. Aquatic therapy exercises, which are planned to be designed for the new product, have been approved by the specialist. Exercises do not pose any problems for patients.

As a result of interviews with patients, it was learned that most of the patients experienced aqua therapy. All patients were observed to benefit from aqua therapy. The exercises they experienced in aqua therapy have led the design. The patients contributed to the development of the design by declaring their ideas about the designed product and the points they considered incomplete.

To sum up, thanks to the designed final product, patients will be able to continue their treatment in the home environment. In this way patients,

- will not have economic difficulties,
- will not get tired to go to treatment,
- will not be exposed to traffic,
- can spare time for themselves.

6.2. Further Works

While the literature study, qualitative and quantitative analyses were used for 64 constructions, only a number were applied for the implementation of multiple sclerosis and aquatic treatments. For this reason, extracted constructs or new constructs from the literature can be added to the proposed taxonomy and validity test can be carried out.

Although the designed product is made for MS patients, it can be used by other patients. Any individual who has problems in walking functions, and who have muscle weaknesses such as MS patients can use this product. This includes children, young people, adults and especially the elderly.

The aqua therapy cabinet is designed for home use. However, the product also has a structure and function that can be used in rehabilitation centers, hospitals and associations.

The research can be carried out in various cultures to decrease the impacts of cultural variations. This can generalize the outcomes of the research in a bigger population.

6.3. Limitations

One limitation of this study is survey size, which are 80. Furthermore, it would be beneficial to improve the respondent size in order to generalize findings.

In the study, only physicians and MS patients were asked questions related to the main topic. However, in the process, for pilot studies, many people in different professions such as elderly people, children, designers, students etc. may were asked.

The product could not be prototyped. Therefore, no real physical experience can be obtained. Prototyping of the product can be performed on patients and improved by detecting deficiencies.

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APPENDIX A

PILOT STUDY FOR INTERVIEWS (PHYSIOTHERAPIST)

Transcripts of Physiotherapist

Transcript 1

Kişi: Barış GÜRPINAR

Uzmanlık: Uzman Fizyoterapist

Tarih, başlangıç-bitiş süresi: 07.03.2019 15.00-15.50

Yer: 9 Eylül Üniversitesi Hastanesi

Cinsiyet: Kadın

Su terapisi MS hastaları için önemli midir?
Su hidromekanik özelliklerinden dolayı harekete destek olur, kolaylık sağlar ve düşme gibi problemlerde yaralanma riskini azaltır. Su içerisinde yavaş hareket edildiği zaman daha az kas lifi kullanılarak, daha az enerji harcanarak hareket fonksiyonu sağlanır. Yürüme fonksiyonu, hareket fonksiyonu gibi. Alt-üst bacak ve kol uzuvlarıyla fonksiyonlar tamamlanır.

Onlara ne gibi faydalar sağlamaktadır?
Su içerisinde egzersiz yapmak ne işe yarar? İlk olarak beyin hareketi anlar. Özellikle hareket kaybı olan veya hareketin azaldığı MS hastalarında beyinin hareket koreografisini azaltır. Bunları, plasticity dediğimiz beyinin tekrar üretme kısmında, daha geniş hareket koreografilerini beyine öğretmemiz nörolojik rehabilitasyon açısından önemlidir. Bir diğeri, karada yer çekiminin spasticityleri de arttığı için kaslar yeteri kadar çalışamıyor. Ama su içerisinde yer çekimi ortadan kalkıp suyun kaldırma kuvveti işin içine girdiğinde, suyun viskozitesi de onlara güvenli bir ortam sağladığından hareketleri çok daha büyük ve daha fazla kas lifini içeren hareketlerle rahatlıkla yapabiliyorlar. Bizim için MS'li hastalarda en önemli şeylerden bir tanesi düşmedir. Denge problemleri çok farklı sebeplerden kaynaklı olarak açığa çıkıyor. Kas kuvvetini arttırmak olabilir, spasticity'i azaltmak olabilir. Denge, genel olarak duyusal verilerin azalması ile ilgilide olabilir. Ama buna bir bütün olarak baktığımızda su içerisinde denge çalışmaları karadan hem güvenli, hem daha etkilidir. Suda hastayı düşme sınırına getirebiliyoruz. Hastayı düşme sınırına getirebildiğimiz zaman ancak denge etkin olabiliyor. MS hastalarının en önemli sıkıntılarından bir tanesi de günlük hayata katılımları azaldığı için fiziksel aktivite düzeyleri oldukça düşüyor. Fiziksel aktivite düzeylerini düşmesi ne demektir? Kalp damar sistemindeki hastalıkların açığa çıkması ve akciğer problemlerinin açığa çıkması, sedanter bir hayatın olmasıdır. Bu problemlerin açığa çıkmaması için sağlıklı dediğimiz kişilerde aerobik egzersizi öneriyoruz. Ama MS hastalarında aerobik egzersiz önermek biraz problemli olabiliyor. Hem enerji sarfiyatları çok fazla oluyor, hem de aerobik egzersiz gibi yüksek şiddetli egzersizleri yaparken yaralanma riskleri artıyor. Ama bunu su içerisinde yaptıkları zaman çok daha güvenli ve daha rahat bir şekilde o aerobik eşiğe ulaşabiliyorlar.

Su terapisinde kullanılan tedavi yöntemleri kaça ayrılır, isimleri nelerdir?
Halliwick, Bad Ragaz Halka Metodu, Ai Chi, Watsu yöntemlerini kullanıyoruz.

MS hastalarına uygulanan yöntem ve hareketler nelerdir?
Su içerisinde kas kuvvetlendirme, spasticity azaltma, eklem hareketlerini açma, nöroplastiste beyne tekrar hareketleri öğretme ve dengeyi arttırma gibi uygulamalar yapıyoruz. Literatürde Multiple Sklerozlu (MS) ve inmeli hastalarda Ai Chi uygulamalarının spazm, yorgunluk ve dizabilite şikâyetlerin de azalma sağladığı, denge, fonksiyonel mobilite, alt ve üst ekstremite kas kuvvetini arttırdığı bildirilmiştir. Yaşlı popülasyon da dengenin iyileştirilmesi için güvenle kullanılabileceği birçok çalışmada gösterilmiştir.

Bu hareketler hastanın hangi kaslarını güçlendirmektedir?
Fizik tedavide en önem verdiğimiz şey gövde kaslarıdır. Gövdenin kontrolü olması gerekiyor ki hastalar kol ve bacaklarını rahatlıkla kullanabilsinler. Bu bizim için önemlidir. Bacak kasları elbette ki, çünkü yürüme fonksiyonunu düşmeden devam ettirmek zorundadırlar. Sadece kuvvetlenmek için değil hızlı kasılması içinde önemlidir. Düşerken bacağını hızlı şekilde öne adım atmak zorundasın veya hızlı bir şekilde kaslarını kasmak zorundasın ki dengeyi geri kazanabilesin. Ama MS hastaları bunları yapamıyor. Bunun yanında elbette ki kol kasları da çok önemlidir. Çünkü günlük hayatta en çok kullandığımız uzuvlarımız kollarımızdır. Uzanıyoruz, tutuyoruz, katlıyoruz, çekiyoruz. Eğer kişi bunu tam olarak kullanamazsa bu sefer gövdesinden ve bacaklarından yardım isteyecektir. Bu da yine kişinin hem enerji harcamasını arttıracak, hem de dengesinde problem oluşturacak.

Su seviyesi ve sıcaklığı nasıl olmalıdır?
Genellikle biz su seviyesini T 11 dediğimiz, torakal vert on birinci omurganın hizası, göğüs kafesini aşağı yukarı iki ya da üç parmak üstünde tutuyoruz. Bunun altında olduğu zaman gövde işin içine giriyor ve hareketler zorlaşıyor. Bunun üstünde olduğu zaman da yüzerlik artıyor, su hastayı kaldırıyor, stabilizasyon yani yerinde durma zorlaşıyor. Tedavide en optimum seviye göğüs altı veya göğüs kafesi hizası oluyor. Su sıcaklığı yapılan egzersize göre değişir. Eğer aerobik egzersiz yapılacaksa, yani solunum frekansı, kalp atışı artacaksa 28-29 derecede olmalı ama daha sakin kuvvetlendirme egzersizleri yapılacaksa 31-32 derece seviyelerinde olmalıdır. **Follow-up question: Projemde yapmış olduğum hareketler yapılırsa su kaç derece olmalıdır?** Yavaş yapılırsa 31-32 derecelerde olmalıdır. Hızlı yapılırsa aerobik egzersiz olur, 28-29 derecelerde olması gerekir. Ama MS hastalarında utof fenomeni denilen bir sıkıntı vardır. Eğer su çok sıcak olursa semptomları artırır. O yüzden 31 dereceyi çokta aşmamak gerekir. Çok sıcak su onlara göre değildir.

Bacak kaslarını kuvvetlendirmek için kullanılan bisiklet mekanizmasını hastanın en doğru şekilde kullanabilmesi için nelere dikkat edilmelidir?
Bunun için el ve ayak ergometresi incelenmelidir. Suyun içerisinde olacağı hasta bisiklet hareketini yapmada çok zorluk yaşamaz. Fakat yere yakın olursa ya da kademeli olarak yükseklik ayarlanabilirse hastalar için daha kullanışlı olur. Pedal için aşağıdan 2 cm'lik bir yükseklik verilmesi yeterli olacaktır. Ayak için kullanılacak olan bisiklet aparatı ayrıca el içinde kullanılacak bir pozisyona sokulabilir. Bu durumda hasta hem ayak kaslarını hem de kol kaslarını güçlendirebilir.

Suyun hastanın hareketlerini zorlaştırmaması için neler yapılmalıdır? (Hareket yönü, oturma pozisyonu, açı vb.)

Aslında bu bazen istediğimiz bir şey. Kasların hareketleri zorlaşsın ki kuvvetlensin çünkü kas dirence karşı kuvvetlenir. Belki sonraki aşamalarda bu pedallara suya direnç yapan ek aparatlar eklenebilir. Eğer bisiklet boş olursa çevirmek daha kolay olur ama yüzey direncini arttırabilecek bir şey kullanılabilir. Veya ayaklara ağırlık değil tersine yüzdürücü süngerler takılabilir. Bu şekilde ayak yukarı kalkmak isteyecek hasta aşağıya bastıracak. Bunun benzeri farklı adaptasyonlar kullanılabilir. Hareketlerin zorlaşmaması için suyun yükseklik ve sıcaklık seviyesine dikkat edilmelidir.

Tasarlanacak olan üründe kolaydan zora doğru ilerleyen tedavi aşamaları kullanmak gerekir mi?
Kesinlikle gerekli. Buna katılıyorum. Ama bu ilk tasarımda olmak zorunda değil. Kol için kullanılan esnek bantların farklı renkleri, farklı dirençleri var. Onlar kullanılabilir. Veya suyun yüzey direncini arttıracak paletler kullanılabilir. Onun dışındaki aşamalar fizik tedavi uzmanı ile kara verilerek, kişiye özel planlanmalıdır. Hareket aşamalarını, derecelerini kişi kendi başına karar vermemelidir. Belki buraya ayriyeten kalp hızını ölçen, su geçirmez bir sistem konulabilir. Hem güvenliği sağlar, hem de vücuda yüklenme seviyesi ayarlanabilir.

Su terapisinde kullanılacak olan aletler için en uygun malzemeler hangileridir?
Yüzen malzemeler, süngerler gibi suyun yüzey direncini arttıran palet tarzı malzemeler olabilir. Çok fazla ağırlık kullanmayı ben sevmiyorum çünkü onlar yer çekimine özel şeyler ama onlarda kullanılabilir. Dediğim gibi kollar elastik bantlarda kullanılabilir.

Hastanın güvenliği için nelere dikkat edilmelidir?
Ulaşım butonu olması lazım, hastaya ulaşmak için acil boşaltma butonu olması lazım. Başa bir emniyet kemeri takılabilir. Kayma, baygınlık, fenalaşma durumlarında hastanın başı suya batmaması için. En ufak bir durumda başı suya girmesin. Çünkü en riskli şey boğulmadır.

Tedavi süresi ortalama ne kadar sürmelidir?
Tedavi süresi kişiye göre, profesyoneller tarafından karar verilmeli. Cihazla beraber reçete verilmemeli.

Hastanın iyileşme süreci nasıl ilerlemektedir?
Bu karmaşık bir konudur. Hastayı bütüncül olarak ele almamız lazım. Yani bacaklar iyileşince hasta iyileşecek diye bir şey söylemek zor. Hem kalbini hem akciğerini hem sinir sistemini her şeyini işin içine almamız lazım. Belki de atak geçirecek arada buda elde olmayan bir durumdur.

Hasta tamamen su terapisi ile iyileşebilir mi?
Tamamen su terapisi ile keşke hastalar iyileşebilse. Ama suda terapiyi çok seviyorlar. İyileşmese bile suyun içerisinde hareket yapabilmek, bir şeyler yapabilmek onları psikolojik olarak çok iyi yönde etkiliyor. Birde suda mutluluk hormonu yani endorfin hormonu salgılamasında da bir etkisi var.

Hastanın normal hayatına dönüş süresi ortalama ne kadardır?
Normal hayata dönüş süreside sıkıntılıdır. MS'den MS'e çok fark var. Ama egzersiz bu işin olmazsa olmazıdır. Şuanda ilaçlardan dahi daha etkili olduğu söyleniyor. Bu arada senin tasarladığın bisiklet ile yapılan aerobik egzersiz vücuttaki inflamasyonu baskılayıcı özelliği var. İlaçlar kadar etkilidir.

Hasta yakınları bu süreçte nelere dikkat etmelidir?

Mümkünse hasta bu ürünü tek başına kullanmamalı. Süpervizyon olması lazım. Suyun sıcaklığının ayarlanması çok önemlidir. Duyu kayıpları olabilir. Hasta yakınları giriş çıkışlarda, ıslak zeminin olduğu yerlerde yardım etmelidir. Islak mayo vücutta kalmamalıdır. Dezenfeksiyonu çok önemlidir. Her kullanımdan sonra veya tek kişi kullanacak ise haftalık, aylık temizlemeler gibi olabilir.

Tutacak ve oturak için hangi malzeme kullanılmalıdır? (Daha yumuşak ver ergonomik olması için)

Mümkünse paslanmayan malzemeler tercih edilmeli. Yumuşak süngerlerin çoğu bakteriler için risktir. Yüzeyi pürüzlü olmayan temizlenmesi kolay olan malzemeler kullanılmalıdır. Üzerinde su biriktirmeyen, anti-bakteriyel malzemeler kullanılmalıdır. Çünkü su ve ılık su olduğu için en çok korkulan durum bakteri oluşumudur. Anti-bakteriyel, kolay temizlenebilen basit bir malzeme olmalıdır. Mümkünse malzeme kırılma durumlarında yerinden kolayca çıkabilen, tamir edilmesi kolay olan parçalar kullanılmalıdır. Veya yıllık bir defa değiştirilebilir. Ne kadar az girinti çıkıntı olursa temizlik o kadar kolay olur.

APPENDIX B

PILOT STUDY FOR INTERVIEWS (PATIENTS)

Transcripts of Patients

Transcript 1

Tarih, başlangıç-bitiş süresi: 26.03.2019, 10.00-11.00
Yer: MS Derneği
Cinsiyet: Kadın
Yaş: 27
Meslek: Ev hanımı

-Kaç senedir MS hastalığı ile mücadele etmektesiniz?
2015'ten beri.

-Uyguladığınız tedavi yöntemleri nelerdir?
İlaç kullanıyorum.

-MS'den dolayı vücudunuzda hangi kaslarınız zayıf?
Sağ taraf, bacak, sağ kol.

-Kaslarınızı güçlendirmek için neler yapıyorsunuz?
Yoga yapıyorum.

-Evde egzersiz yapıyor musunuz? Cevabınız evet ise nasıl egzersizler yapıyorsunuz?
Evet bazen. Bacaklarımı yukarı kaldırıp indirme hareketleri yapıyorum.

-Fizik tedaviye gittiniz mi?
Evet, 1,5 yıl gittim.

-Eğer gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Alet kullanmadım. Çünkü, devreye alet girdi mi işi alet yapıyor. Siz kaslarınızı kullanamıyorsunuz.

-Suda terapi-suda tedavi (aquatic terapi) hakkında bir bilginiz var mı?
Evet bilgim var.

-Suda tedaviye gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Gittim fakat kalbimde problem olduğu için devam edemedim. Birde ben zaten sudan korkuyorum. Boğulacakmışım gibi geliyor.

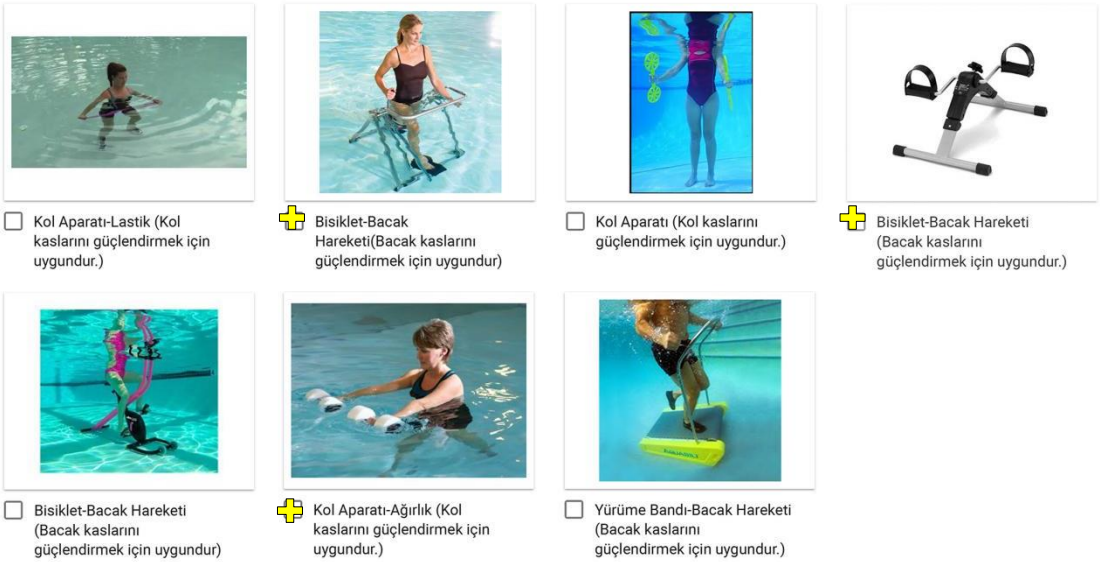
-Bir hasta olarak, fizik tedavi ve suda terapide eksik gördüğünüz noktalar, şu şöyle olsaydı daha iyi olurdu dediğiniz öneriler var mı?
Eksik gördüğüm nokta yok. Zaten zorluk derecesi ayarlanabiliyor.

-Tedavilere gelirken kendinize ayırdığınız özel zamandan harcıyor musunuz? Cevabınız evet ise bu durum sizi nasıl etkiliyor?
Evet, ayırıyorum ama bu benim için sorun olmuyor. Derneğe gelmek beni mutlu ediyor.

-Su içerisinde (terapi havuzu, deniz, vb.) aerobik hareket çalışmaları deneyiminiz oldu mu?
Evet oldu. Ama dediğim gibi sudan korktuğum için faydasını göremedim. Bacak hareketleri, kol hareketleri çalışmıştık.

-Tedavilere giderken aşağıdaki zorluklardan hangilerini yaşıyorsunuz?
- o Verilen randevu saatine göre hareket etmek zorunda olmak
- o Giyinmek, hazırlanmak
- o Evden kendi isteğiniz dışında çıkmak zorunda kalmak
- ✚ o Araba ya da toplu taşıma ile yolculuk yapmak, tedavilere gidip gelmek
- ✚ o Hastane ya da tedavi merkezine gittiğinizde sıra beklemek
- ✚ o Hastane ya da tedavi merkezinde bulunan kalabalığa, gürültüye maruz kalmak
- o Tedavi süreci

-Su içerisinde aşağıda bulunan hangi alet ya da aletlerle çalışmak isterdiniz?



-Seçtiğiniz hareketleri ev ortamında fazla yer kaplamayan tek bir ürün içerisinde uygulayabiliyor olsaydınız sizin için daha iyi olur muydu?
Tabi ki çok iyi olurdu.

-Aşağıda görselde bulunan yeni tasarlanmış aqua therapy ürünü hakkında ne düşünüyorsunuz?

Bence çok güzel bir ürün. Ben kullanırdım. Kesinlikle tam ihtiyacım olan şey bu. Çünkü havuzda boğulacağım diye korkuyorum ama böyle bir şeyin içinde kendimi güvende hissederim ve korkmam. Sadece tutunma aparatlarının artması gerek bence.

Transcript 2

Tarih, başlangıç-bitiş süresi: 26.03.2019, 11.00-12.00
Yer: MS Derneği
Cinsiyet: Kadın
Yaş: 49
Meslek: Halka ilişkiler uzmanı, pazarlama

-Kaç senedir MS hastalığı ile mücadele etmektesiniz?
1997'den beri.

-Uyguladığınız tedavi yöntemleri nelerdir?
Yoga, fizik tedavi

-MS'den dolayı vücudunuzda hangi kaslarınız zayıf?
Ayaklar, sol taraf %60 güçsüz, sol diz ve el bileklerim sıkıntılı.

-Kaslarınızı güçlendirmek için neler yapıyorsunuz?
Fizik tedavi

-Evde egzersiz yapıyor musunuz? Cevabınız evet ise nasıl egzersizler yapıyorsunuz?
1 kg ağırlık ile kol hareketleri yapıyorum. Bisiklet çok iyi geliyor fakat evimde yer yok.

-Fizik tedaviye gittiniz mi?
Evet.

-Eğer gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Alet yoktu. Kol ve bacak esnetme hareketleri.

-Suda terapi-suda tedavi (aquatic terapi) hakkında bir bilginiz var mı?
Evet. Düşme riski yok. Zor hareketleri bile kolaylıkla yapabiliyorsunuz.

-Suda tedaviye gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Bardak düşürmeden götürme, bacak kaldırma, zıplama, kademeli adımlar.

-Bir hasta olarak, fizik tedavi ve suda terapide eksik gördüğünüz noktalar, şu şöyle olsaydı daha iyi olurdu dediğiniz öneriler var mı?
Yok.

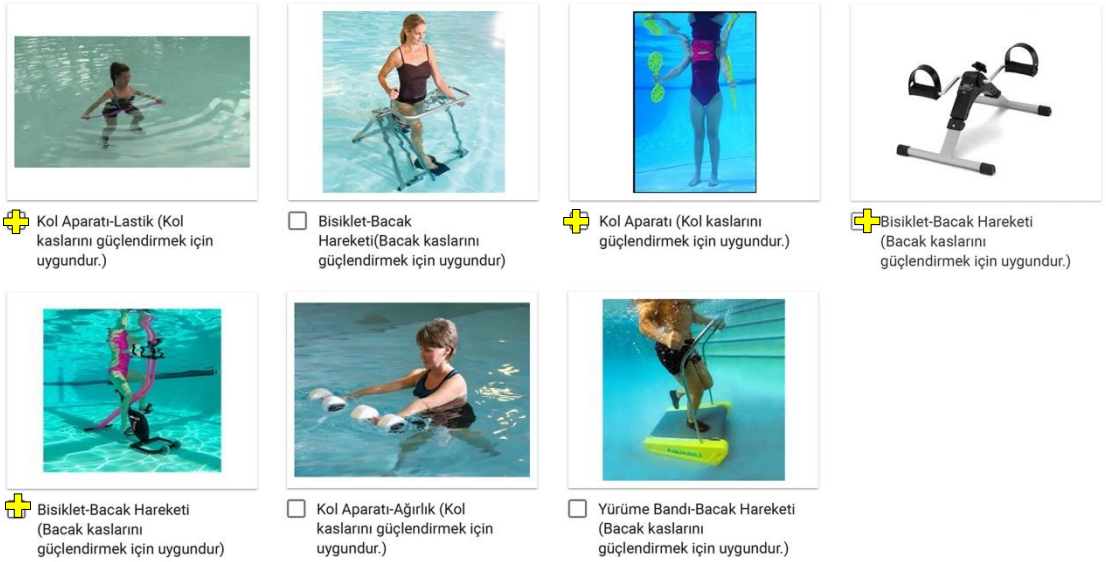
-Tedavilere gelirken kendinize ayırdığınız özel zamandan harcıyor musunuz? Cevabınız evet ise bu durum sizi nasıl etkiliyor?
Evet. Benim için sorun olmuyor.

-Su içerisinde (terapi havuzu, deniz, vb.) aerobik hareket çalışmaları deneyiminiz oldu mu?
Evet.

-Tedavilere giderken aşağıdaki zorluklardan hangilerini yaşıyorsunuz?
- Verilen randevu saatine göre hareket etmek zorunda olmak
- Giyinmek, hazırlanmak

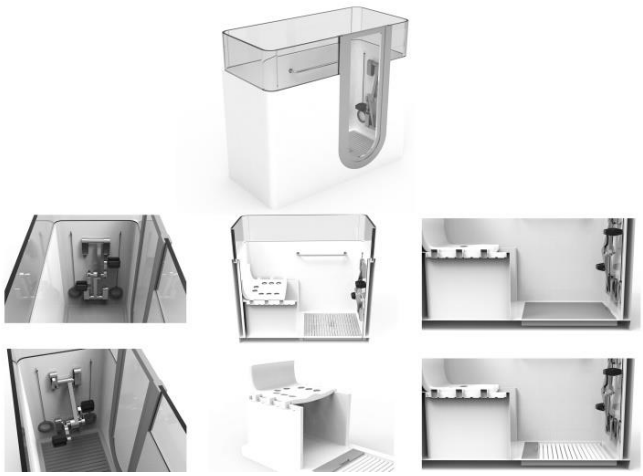
- Evden kendi isteğiniz dışında çıkmak zorunda kalmak
- Araba ya da toplu taşıma ile yolculuk yapmak, tedavilere gidip gelmek
- ✚ Hastane ya da tedavi merkezine gittiğinizde sıra beklemek
- ✚ Hastane ya da tedavi merkezinde bulunan kalabalığa, gürültüye maruz kalmak
- Tedavi süreci

-Su içerisinde aşağıda bulunan hangi alet ya da aletlerle çalışmak isterdiniz?



-Seçtiğiniz hareketleri ev ortamında fazla yer kaplamayan tek bir ürün içerisinde uygulayabiliyor olsaydınız sizin için daha iyi olur muydu?
Evet iyi olurdu.

-Aşağıda görselde bulunan yeni tasarlanmış aqua therapy ürünü hakkında ne düşünüyorsunuz?



Çok başarılı, süper çok güzel. Gerçekten hastalar için kullanışlı. Sadece MS hastaları için değil, yaşlılar için bile harika olur.

Transcript 3

Tarih, başlangıç-bitiş süresi: 26.03.2019, 12.00-13.00
Yer: MS Derneği
Cinsiyet: Kadın
Yaş: 60

Meslek: Ev hanımı

-Kaç senedir MS hastalığı ile mücadele etmektesiniz?
1985-1987'den beri.

-Uyguladığınız tedavi yöntemleri nelerdir?
İlaçlar.

-MS'den dolayı vücudunuzda hangi kaslarınız zayıf?
Sol bacak.

-Kaslarınızı güçlendirmek için neler yapıyorsunuz?
Yoga, pilates, yüzme.

-Evde egzersiz yapıyor musunuz? Cevabınız evet ise nasıl egzersizler yapıyorsunuz?
Hayır yapmıyorum.

-Fizik tedaviye gittiniz mi?
Evet, İstanbul'da yaşarken gitmiştim.

-Eğer gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Basamak inip çıkma, yürüme.

-Suda terapi-suda tedavi (aquatic terapi) hakkında bir bilginiz var mı?
Evet çok daha rahat.

-Suda tedaviye gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Yürüme ve bir takım bacak hareketleri.

-Bir hasta olarak, fizik tedavi ve suda terapide eksik gördüğünüz noktalar, şu şöyle olsaydı daha iyi olurdu dediğiniz öneriler var mı?
Yok.

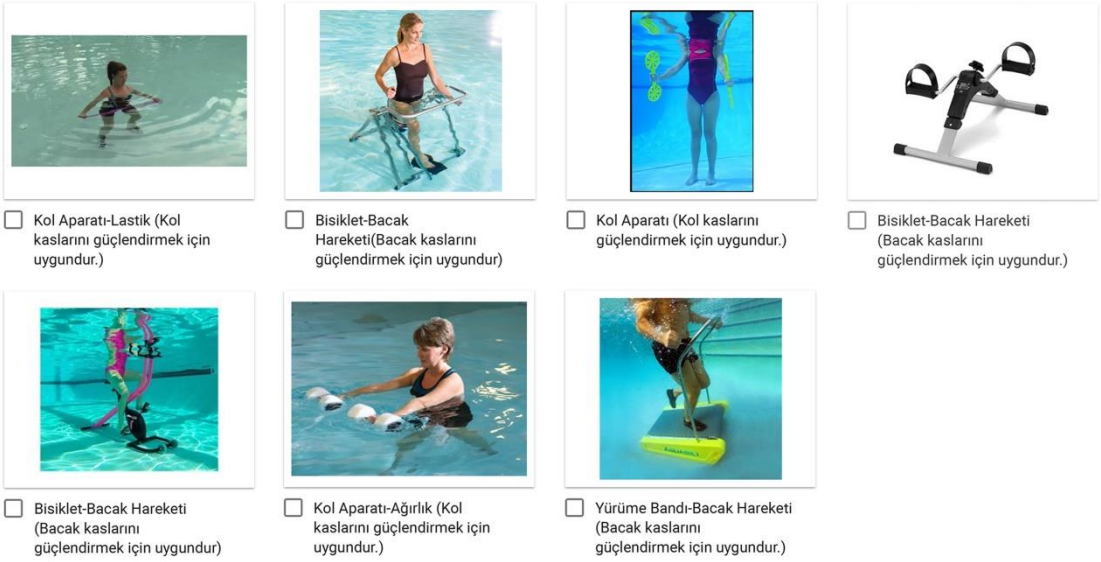
-Tedavilere gelirken kendinize ayırdığınız özel zamandan harcıyor musunuz? Cevabınız evet ise bu durum sizi nasıl etkiliyor?
Evet, bazen zorlanıyorum.

-Su içerisinde (terapi havuzu, deniz, vb.) aerobik hareket çalışmaları deneyiminiz oldu mu?
Evet oldu.

-Tedavilere giderken aşağıdaki zorluklardan hangilerini yaşıyorsunuz?

- Verilen randevu saatine göre hareket etmek zorunda olmak
- Giyinmek, hazırlanmak
- Evden kendi isteğiniz dışında çıkmak zorunda kalmak
- Araba ya da toplu taşıma ile yolculuk yapmak, tedavilere gidip gelmek
- Hastane ya da tedavi merkezine gittiğinizde sıra beklemek
- Hastane ya da tedavi merkezinde bulunan kalabalığa, gürültüye maruz kalmak
- Tedavi süreci

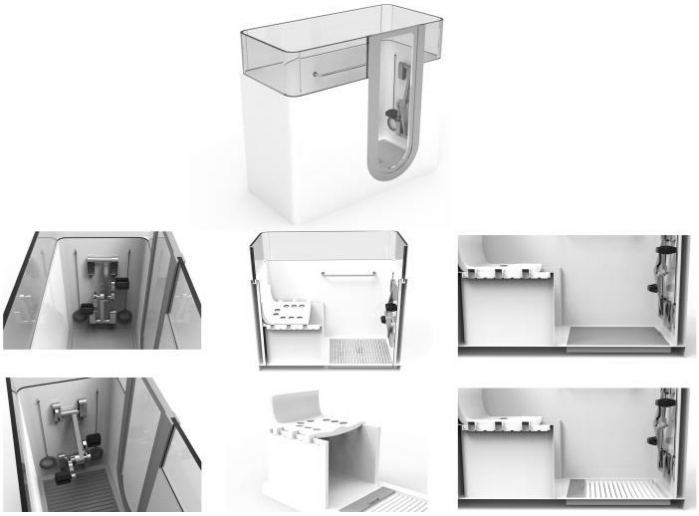
-Su içerisinde aşağıda bulunan hangi alet ya da aletlerle çalışmak isterdiniz?



Hiç birine ihtiyaç duymuyorum. Şuanda hastalığım iyi durumda olduğu için hareketlerin hepsini karada yapabiliyorum.

-Seçtiğiniz hareketleri ev ortamında fazla yer kaplamayan tek bir ürün içerisinde uygulayabiliyor olsaydınız sizin için daha iyi olur muydu?
Benim için fark etmez.

-Aşağıda görselde bulunan yeni tasarlanmış aqua terapi ürünü hakkında ne düşünüyorsunuz?



Ben tüm burada yapılması gereken hareketlerin hepsini karada da yapabiliyorum. İhtiyaç duymuyorum. O yüzden kullanmam. Ama hastalığım ilerlerse mutlaka kullanmak isterim.

Transcript 4

Tarih, başlangıç-bitiş süresi: 26.03.2019, 13.00-14.00
Yer: MS Derneği
Cinsiyet: Erkek
Yaş: 62
Meslek: Emekli

-Kaç senedir MS hastalığı ile mücadele etmektesiniz?
96'dan beri.

-Uyguladığınız tedavi yöntemleri nelerdir?
İlaç kullanıyorum.

-MS'den dolayı vücudunuzda hangi kaslarınız zayıf?
Sağ taraf.

-Kaslarınızı güçlendirmek için neler yapıyorsunuz?
Yoga, pilates, yürüme, bisiklet.

-Evde egzersiz yapıyor musunuz? Cevabınız evet ise nasıl egzersizler yapıyorsunuz?
Evet, bacak hareketleri, esneme, gerdirme. Ama düzenli değil.

-Fizik tedaviye gittiniz mi?
Gitmedim.

-Eğer gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
-

-Suda terapi-suda tedavi (aquatic terapi) hakkında bir bilginiz var mı?
Evet.

-Suda tedaviye gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Çok iyi geldi. Hepsi fayda sağladı.

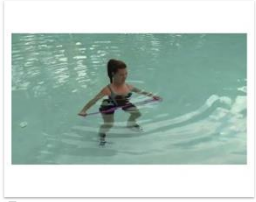
-Bir hasta olarak, fizik tedavi ve suda terapide eksik gördüğünüz noktalar, şu şöyle olsaydı daha iyi olurdu dediğiniz öneriler var mı?
Yok.

-Tedavilere gelirken kendinize ayırdığınız özel zamandan harcıyor musunuz? Cevabınız evet ise bu durum sizi nasıl etkiliyor?
Evet, yol yoruyor.

-Su içerisinde (terapi havuzu, deniz, vb.) aerobik hareket çalışmaları deneyiminiz oldu mu?
Evet.

-Tedavilere giderken aşağıdaki zorluklardan hangilerini yaşıyorsunuz?
- o Verilen randevu saatine göre hareket etmek zorunda olmak
- o Giyinmek, hazırlanmak
- o Evden kendi isteğiniz dışında çıkmak zorunda kalmak
- ✚ o Araba ya da toplu taşıma ile yolculuk yapmak, tedavilere gidip gelmek
- ✚ o Hastane ya da tedavi merkezine gittiğinizde sıra beklemek
- ✚ o Hastane ya da tedavi merkezinde bulunan kalabalığa, gürültüye maruz kalmak
- o Tedavi süreci

-Su içerisinde aşağıda bulunan hangi alet ya da aletlerle çalışmak isterdiniz?



Kol Aparatı-Lastik (Kol kaslarını güçlendirmek için uygundur.)

Bisiklet-Bacak Hareketi(Bacak kaslarını güçlendirmek için uygundur)

Kol Aparatı (Kol kaslarını güçlendirmek için uygundur.)

Bisiklet-Bacak Hareketi (Bacak kaslarını güçlendirmek için uygundur.)

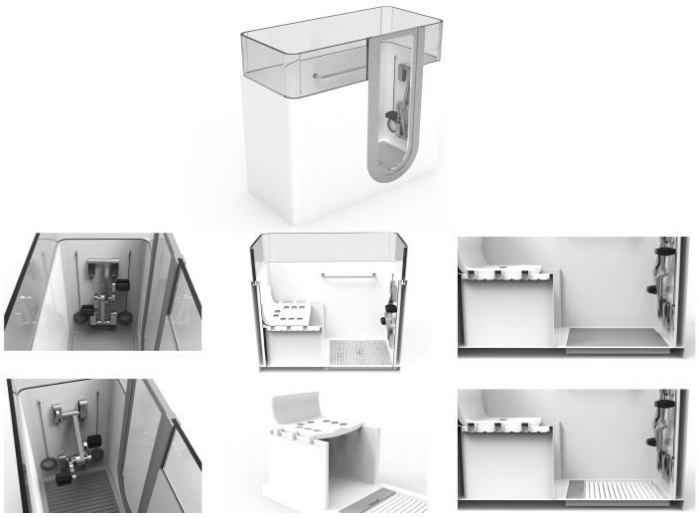
Bisiklet-Bacak Hareketi (Bacak kaslarını güçlendirmek için uygundur)

Kol Aparatı-Ağırlık (Kol kaslarını güçlendirmek için uygundur.)

Yürüme Bandı-Bacak Hareketi (Bacak kaslarını güçlendirmek için uygundur.)

-Seçtiğiniz hareketleri ev ortamında fazla yer kaplamayan tek bir ürün içerisinde uygulayabiliyor olsaydınız sizin için daha iyi olur muydu?
Evet.

-Aşağıda görselde bulunan yeni tasarlanmış aqua therapy ürünü hakkında ne düşünüyorsunuz?



Benim böyle bir şeye ihtiyacım yok. Hastalığım ilerlemiyor. Ama hareket etmede sıkıntı yaşayan hastalar için gayet iyi.

Transcript 5

Tarih, başlangıç-bitiş süresi: 26.03.2019, 14.00-15.00
Yer: MS Derneği
Cinsiyet: Kadın
Yaş: 36
Meslek: Ev hanımı

-Kaç senedir MS hastalığı ile mücadele etmektesiniz?
17 senedir.

-Uyguladığınız tedavi yöntemleri nelerdir?
İlaç, fizik tedavi, yoga.

-MS'den dolayı vücudunuzda hangi kaslarınız zayıf?
Denge sorunu yaşıyorum. Bazen bacak kaslarımda problemler oluyor.

-Kaslarınızı güçlendirmek için neler yapıyorsunuz?
Yoga, pilates yapıyorum.

-Evde egzersiz yapıyor musunuz? Cevabınız evet ise nasıl egzersizler yapıyorsunuz?
Evde egzersiz yapmıyorum. Çok nadir. Genelde derneğe geldiğimde yapıyorum.

-Fizik tedaviye gittiniz mi?
Evet.

-Eğer gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Şuanda hatırlayamıyorum. Uzun zaman oldu.

-Suda terapi-suda tedavi (aquatic terapi) hakkında bir bilginiz var mı?
Evet, iyi geldi. Ama vücudumda sıkıntı çıktı. Kırmızı kırmızı benekler oluştu. O yüzden gitmiyorum.

-Suda tedaviye gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Bacak hareketleri, suda oturmaya çalışma hareketi, bacak kaldırma indirme, bacak kenara açma.

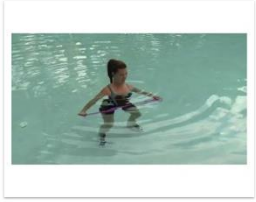
-Bir hasta olarak, fizik tedavi ve suda terapide eksik gördüğünüz noktalar, şu şöyle olsaydı daha iyi olurdu dediğiniz öneriler var mı?
Hayır.

-Tedavilere gelirken kendinize ayırdığınız özel zamandan harcıyor musunuz? Cevabınız evet ise bu durum sizi nasıl etkiliyor?
Evet.

-Su içerisinde (terapi havuzu, deniz, vb.) aerobik hareket çalışmaları deneyiminiz oldu mu?
Evet oldu.

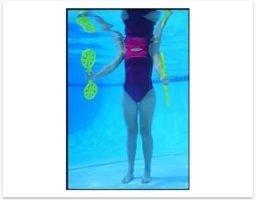
-Tedavilere giderken aşağıdaki zorluklardan hangilerini yaşıyorsunuz?
- o Verilen randevu saatine göre hareket etmek zorunda olmak
- o Giyinmek, hazırlanmak
- o Evden kendi isteğiniz dışında çıkmak zorunda kalmak
- o Araba ya da toplu taşıma ile yolculuk yapmak, tedavilere gidip gelmek
- ✚ o Hastane ya da tedavi merkezine gittiğinizde sıra beklemek
- ✚ o Hastane ya da tedavi merkezinde bulunan kalabalığa, gürültüye maruz kalmak
- o Tedavi süreci

-Su içerisinde aşağıda bulunan hangi alet ya da aletlerle çalışmak isterdiniz?



Kol Aparatı-Lastik (Kol kaslarını güçlendirmek için uygundur.)

Bisiklet-Bacak Hareketi(Bacak kaslarını güçlendirmek için uygundur)



Kol Aparatı (Kol kaslarını güçlendirmek için uygundur.)

Bisiklet-Bacak Hareketi (Bacak kaslarını güçlendirmek için uygundur.)

Bisiklet-Bacak Hareketi (Bacak kaslarını güçlendirmek için uygundur)

Kol Aparatı-Ağırlık (Kol kaslarını güçlendirmek için uygundur.)

Yürüme Bandı-Bacak Hareketi (Bacak kaslarını güçlendirmek için uygundur.)

-Seçtiğiniz hareketleri ev ortamında fazla yer kaplamayan tek bir ürün içerisinde uygulayabiliyor olsaydınız sizin için daha iyi olur muydu?
Evet.

-Aşağıda görselde bulunan yeni tasarlanmış aqua therapy ürünü hakkında ne düşünüyorsunuz?

Durumum iyi ama kötü olursam kullanırım. Gayet uygun bir ürün. Tutunma aparatının bulunması çok hoşuma gitti. Yürüme bandı olması ve özellikle elektrikli olmaması çok çok iyi. Ayrıca bu ürünün içinde klor bulunmayacağından benim vücuduma zarar vermez. Klor suyu kızartıyor vücudumu.

Transcript 6

Tarih, başlangıç-bitiş süresi: 02.04.2019, 10.00-11.00
Yer: MS Derneği
Cinsiyet: Erkek
Yaş: 61
Meslek: Emekli

-Kaç senedir MS hastalığı ile mücadele etmektesiniz?
20 sene.

-Uyguladığınız tedavi yöntemleri nelerdir?
İlaç tedavisi.

-MS'den dolayı vücudunuzda hangi kaslarınız zayıf?
Bacak kaslarında.

-Kaslarınızı güçlendirmek için neler yapıyorsunuz?
Pilates, evin içinde yürüyüş.

-Evde egzersiz yapıyor musunuz? Cevabınız evet ise nasıl egzersizler yapıyorsunuz?
Evet, yürüyüş yapıyorum. Dışarıda yürümeye korkuyorum. O yüzden evin içinde yürüyorum.

-Fizik tedaviye gittiniz mi?
Evet, şuanda da gidiyorum.

-Eğer gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Bacak esnetme, kasları çalıştırmak için bacak indirip kaldırma, yürüyüş, küçük engeller üzerinden geçme.

-Suda terapi-suda tedavi (aquatic terapi) hakkında bir bilginiz var mı?
Evet.

-Suda tedaviye gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Evet gittim, fizik tedavide yapılan hareketlerin benzerleri. Ama tabi ki çok daha kolay yapılıyor ve kesinlikle daha zevkli.

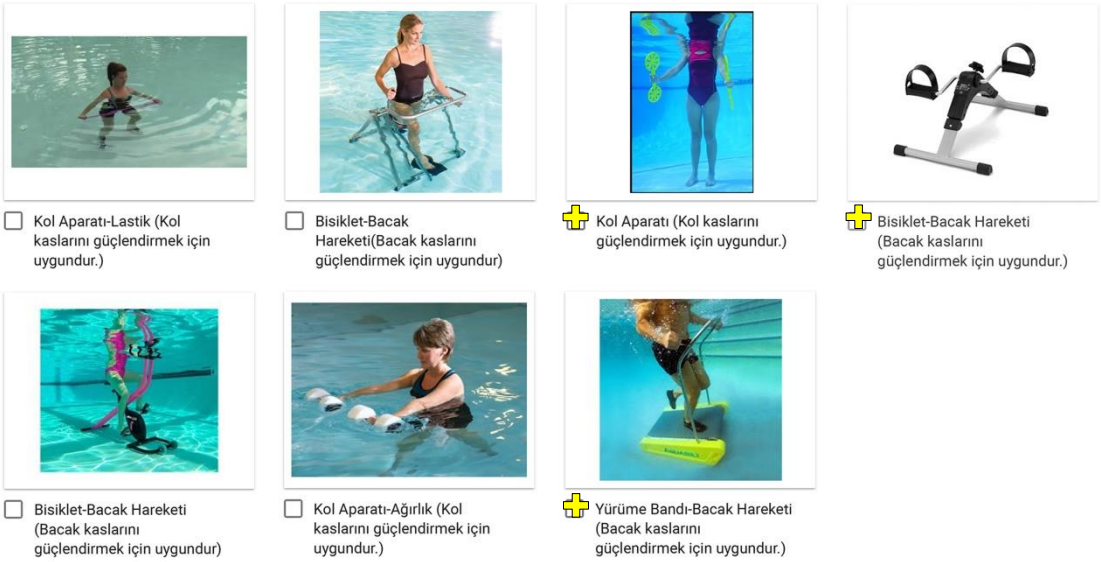
-Bir hasta olarak, fizik tedavi ve suda terapide eksik gördüğünüz noktalar, şu şöyle olsaydı daha iyi olurdu dediğiniz öneriler var mı?
Hayır.

-Tedavilere gelirken kendinize ayırdığınız özel zamandan harcıyor musunuz? Cevabınız evet ise bu durum sizi nasıl etkiliyor?
Evet, yolda çok vakit kaybediyorum ve çok yoruluyorum. Ama tedaviler için buna katlanmak zorundayım.

-Su içerisinde (terapi havuzu, deniz, vb.) aerobik hareket çalışmaları deneyiminiz oldu mu?
Evet oldu.

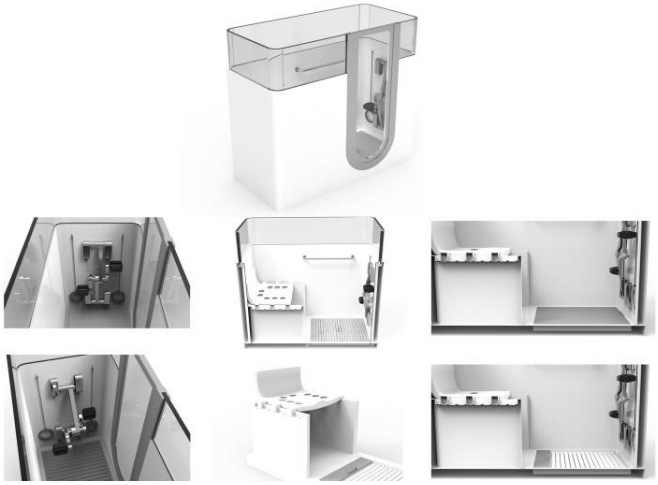
-Tedavilere giderken aşağıdaki zorluklardan hangilerini yaşıyorsunuz?
- ✚ Verilen randevu saatine göre hareket etmek zorunda olmak
- ✚ Giyinmek, hazırlanmak
- Evden kendi isteğiniz dışında çıkmak zorunda kalmak
- ✚ Araba ya da toplu taşıma ile yolculuk yapmak, tedavilere gidip gelmek
- ✚ Hastane ya da tedavi merkezine gittiğinizde sıra beklemek
- ✚ Hastane ya da tedavi merkezinde bulunan kalabalığa, gürültüye maruz kalmak
- Tedavi süreci

-Su içerisinde aşağıda bulunan hangi alet ya da aletlerle çalışmak isterdiniz?



-Seçtiğiniz hareketleri ev ortamında fazla yer kaplamayan tek bir ürün içerisinde uygulayabiliyor olsaydınız sizin için daha iyi olur muydu?
Keşke. Harika olurdu gerçekten.

-Aşağıda görselde bulunan yeni tasarlanmış aqua therapy ürünü hakkında ne düşünüyorsunuz?



Cihazın bir çok egzersizi suyun verdiği rahatlık ile aynı anda yapabilme imkânını sunması çok iyi ve komforlu. Kesinlikle evimde böyle bir şey olmasını isterdim. Belki basamak eklenebilir. Hastaların step yapabilmesi için.

Transcript 7

Tarih, başlangıç-bitiş süresi: 02.04.2019, 11.00-12.00
Yer: MS Derneği
Cinsiyet: Kadın
Yaş: 67
Meslek: Önceden öğretmen, şimdi ev hanımı

-Kaç senedir MS hastalığı ile mücadele etmektesiniz?
40 sene.

-Uyguladığınız tedavi yöntemleri nelerdir?
İlaçlar.

-MS'den dolayı vücudunuzda hangi kaslarınız zayıf?
Sol ayak, sol kol, göz kasları.

-Kaslarınızı güçlendirmek için neler yapıyorsunuz?
Fizik tedavi ve yoga.

-Evde egzersiz yapıyor musunuz? Cevabınız evet ise nasıl egzersizler yapıyorsunuz?
Hayır yapmıyorum.

-Fizik tedaviye gittiniz mi?
Evet. Şuanda da Balçova'da gidiyorum.

-Eğer gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Kol, omuz hareketleri, elektrikli aparat ile kasları güçlendirme, esnetme hareketleri.

-Suda terapi-suda tedavi (aquatic terapi) hakkında bir bilginiz var mı?
Evet. Çok etkili.

-Suda tedaviye gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Suda yürümeye çalışma.

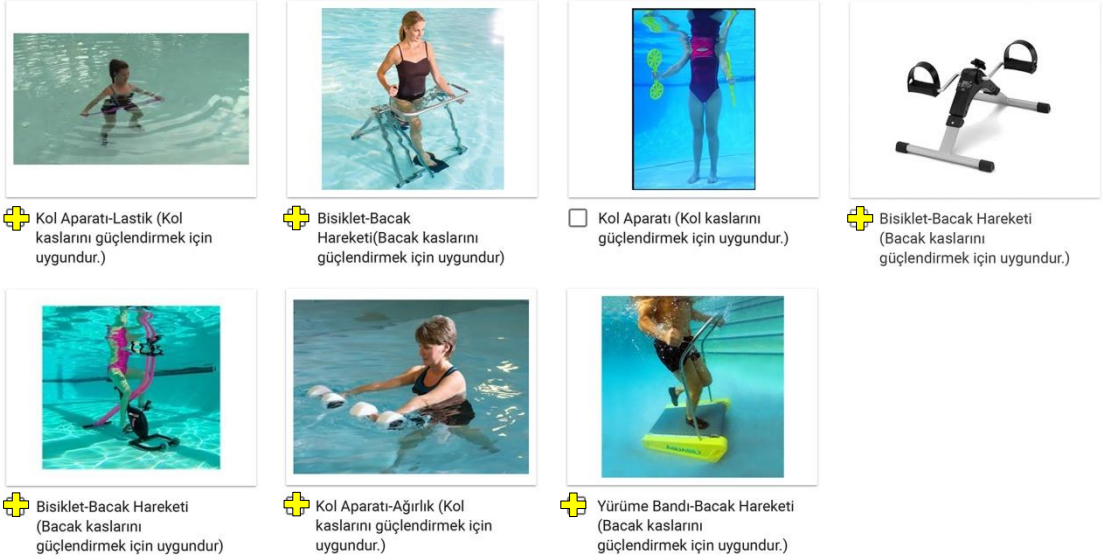
-Bir hasta olarak, fizik tedavi ve suda terapide eksik gördüğünüz noktalar, şu şöyle olsaydı daha iyi olurdu dediğiniz öneriler var mı?
Yok.

-Tedavilere gelirken kendinize ayırdığınız özel zamandan harcıyor musunuz? Cevabınız evet ise bu durum sizi nasıl etkiliyor?
Etkilemiyor.

-Su içerisinde (terapi havuzu, deniz, vb.) aerobik hareket çalışmaları deneyiminiz oldu mu?
Evet.

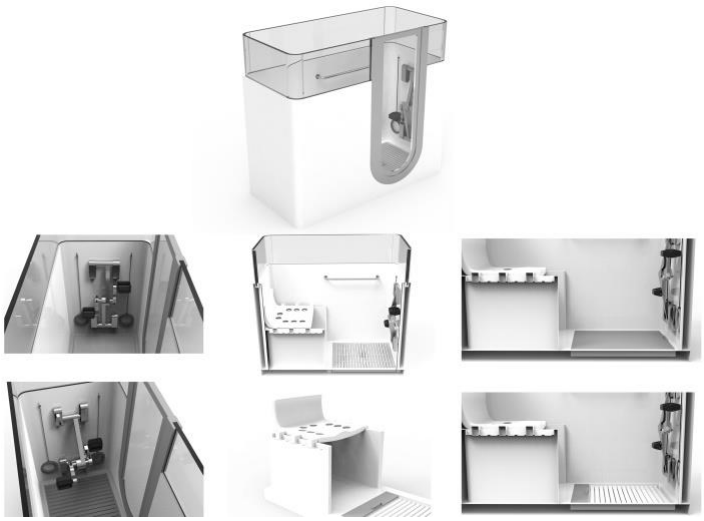
-Tedavilere giderken aşağıdaki zorluklardan hangilerini yaşıyorsunuz?
- ✚ ○ Verilen randevu saatine göre hareket etmek zorunda olmak
- ✚ ○ Giyinmek, hazırlanmak
- ✚ ○ Evden kendi isteğiniz dışında çıkmak zorunda kalmak
- ✚ ○ Araba ya da toplu taşıma ile yolculuk yapmak, tedavilere gidip gelmek
- ✚ ○ Hastane ya da tedavi merkezine gittiğinizde sıra beklemek
- ✚ ○ Hastane ya da tedavi merkezinde bulunan kalabalığa, gürültüye maruz kalmak
- ✚ ○ Tedavi süreci

-Su içerisinde aşağıda bulunan hangi alet ya da aletlerle çalışmak isterdiniz?



-Seçtiğiniz hareketleri ev ortamında fazla yer kaplamayan tek bir ürün içerisinde uygulayabiliyor olsaydınız sizin için daha iyi olur muydu?
Evet.

-Aşağıda görselde bulunan yeni tasarlanmış aqua therapy ürünü hakkında ne düşünüyorsunuz?



Çok başarılı buldum. Sadece MS hastaları kullanmak zorunda değil. Belki kapısı biraz daha büyük olabilirdi.

Transcript 8

Tarih, başlangıç-bitiş süresi: 02.04.2019, 12.00-13.00
Yer: MS Derneği
Cinsiyet: Kadın
Yaş: 64
Meslek: Ev hanımı

-Kaç senedir MS hastalığı ile mücadele etmektesiniz?
Yaklaşık 40 sene.

-Uyguladığınız tedavi yöntemleri nelerdir?
İlaçlar.

-MS'den dolayı vücudunuzda hangi kaslarınız zayıf?
Bacak, kol, el, hepsi.

-Kaslarınızı güçlendirmek için neler yapıyorsunuz?
Fizik tedavi, yoga.

-Evde egzersiz yapıyor musunuz? Cevabınız evet ise nasıl egzersizler yapıyorsunuz?
Hayır yapmıyorum, üşeniyorum.

-Fizik tedaviye gittiniz mi?
Evet hala gidiyorum.

-Eğer gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Kas gerdirme, bacak kaldırma indirme.

-Suda terapi-suda tedavi (aquatic terapi) hakkında bir bilginiz var mı?
Evet, dernekte yapıyoruz.

-Suda tedaviye gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Yürüme, bacak hareketleri. Ama ben klorlu suyu sevmiyorum. O yüzden çok memnun kalamıyorum. Aslında suda egzersiz bizler için çok faydalı ama klor iyi değil.

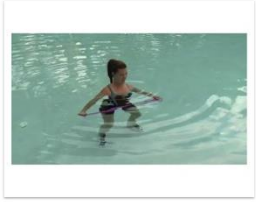
-Bir hasta olarak, fizik tedavi ve suda terapide eksik gördüğünüz noktalar, şu şöyle olsaydı daha iyi olurdu dediğiniz öneriler var mı?
Hayır yok.

-Tedavilere gelirken kendinize ayırdığınız özel zamandan harcıyor musunuz? Cevabınız evet ise bu durum sizi nasıl etkiliyor?
Evet, ayırıyorum.Yorucu.

-Su içerisinde (terapi havuzu, deniz, vb.) aerobik hareket çalışmaları deneyiminiz oldu mu?
Evet.

-Tedavilere giderken aşağıdaki zorluklardan hangilerini yaşıyorsunuz?
- Verilen randevu saatine göre hareket etmek zorunda olmak
- Giyinmek, hazırlanmak
- Evden kendi isteğiniz dışında çıkmak zorunda kalmak
- Araba ya da toplu taşıma ile yolculuk yapmak, tedavilere gidip gelmek
- Hastane ya da tedavi merkezine gittiğinizde sıra beklemek
- Hastane ya da tedavi merkezinde bulunan kalabalığa, gürültüye maruz kalmak
- Tedavi süreci

-Su içerisinde aşağıda bulunan hangi alet ya da aletlerle çalışmak isterdiniz?



Kol Aparatı-Lastik (Kol kaslarını güçlendirmek için uygundur.)

Bisiklet-Bacak Hareketi(Bacak kaslarını güçlendirmek için uygundur)

Kol Aparatı (Kol kaslarını güçlendirmek için uygundur.)

Bisiklet-Bacak Hareketi (Bacak kaslarını güçlendirmek için uygundur.)

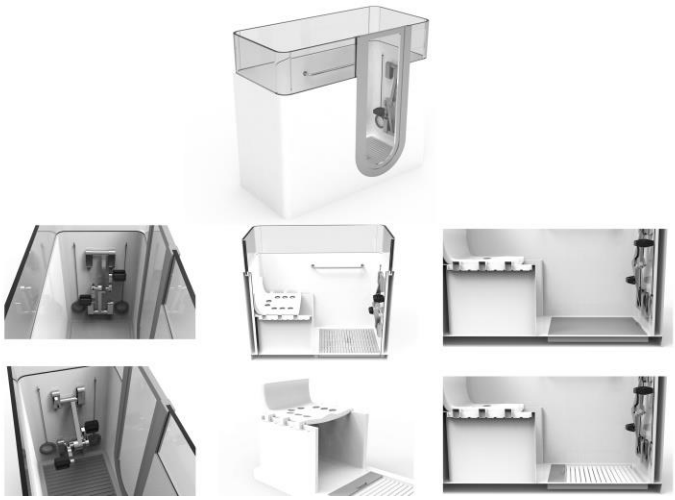
Bisiklet-Bacak Hareketi (Bacak kaslarını güçlendirmek için uygundur)

Kol Aparatı-Ağırlık (Kol kaslarını güçlendirmek için uygundur.)

Yürüme Bandı-Bacak Hareketi (Bacak kaslarını güçlendirmek için uygundur.)

-Seçtiğiniz hareketleri ev ortamında fazla yer kaplamayan tek bir ürün içerisinde uygulayabiliyor olsaydınız sizin için daha iyi olur muydu?
Tabi ki.

-Aşağıda görselde bulunan yeni tasarlanmış aqua therapy ürünü hakkında ne düşünüyorsunuz?



Kişiye özel bir ürün olması çok hoşuma gitti. Hijyen benim için çok önemli. Hastanın mikrop kapma ihtimali yok. Ayrıca klorlu su kullanılmayacak sanırım. En güzel tarafı da bu.

Transcript 9

Tarih, başlangıç-bitiş süresi: 02.04.2019, 13.00-14.00
Yer: MS Derneği
Cinsiyet: Kadın
Yaş: 43
Meslek: Çizimci

-Kaç senedir MS hastalığı ile mücadele etmektesiniz?
11 sene.

-Uyguladığınız tedavi yöntemleri nelerdir?
İğneler, ilaçlar.

-MS'den dolayı vücudunuzda hangi kaslarınız zayıf?
-

-Kaslarınızı güçlendirmek için neler yapıyorsunuz?
Spor.

-Evde egzersiz yapıyor musunuz? Cevabınız evet ise nasıl egzersizler yapıyorsunuz?
Yürüyüş.

-Fizik tedaviye gittiniz mi?
Evet.

-Eğer gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Denge, pilates, yoga

-Suda terapi-suda tedavi (aquatic terapi) hakkında bir bilginiz var mı?
Evet bilgim var.

-Suda tedaviye gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Gitmedim.

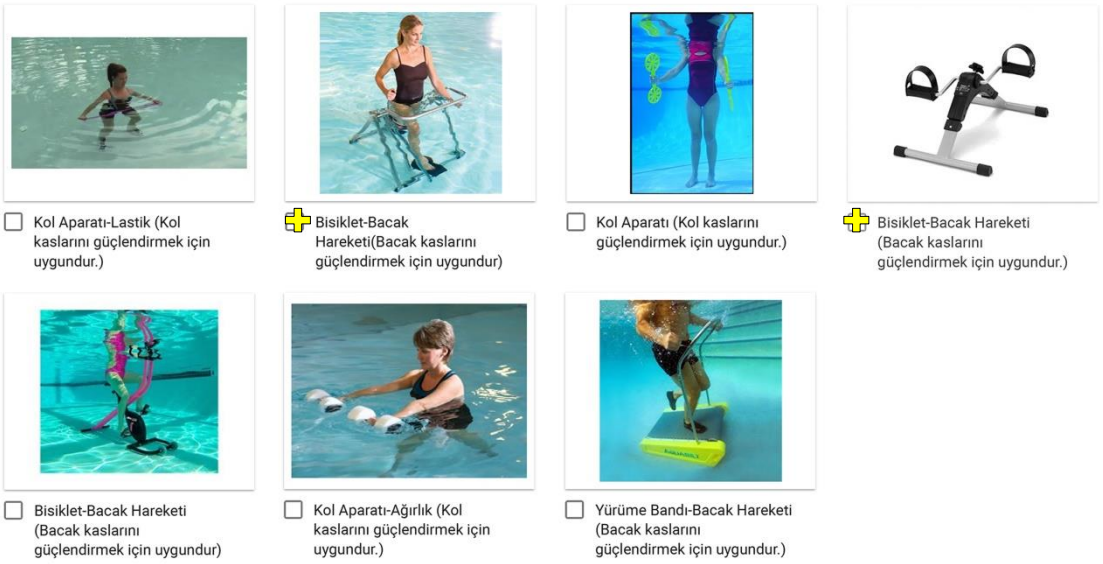
-Bir hasta olarak, fizik tedavi ve suda terapide eksik gördüğünüz noktalar, şu şöyle olsaydı daha iyi olurdu dediğiniz öneriler var mı?
Yok.

-Tedavilere gelirken kendinize ayırdığınız özel zamandan harcıyor musunuz? Cevabınız evet ise bu durum sizi nasıl etkiliyor?
Evet, keyif alıyorum.

-Su içerisinde (terapi havuzu, deniz, vb.) aerobik hareket çalışmaları deneyiminiz oldu mu?
Hayır.

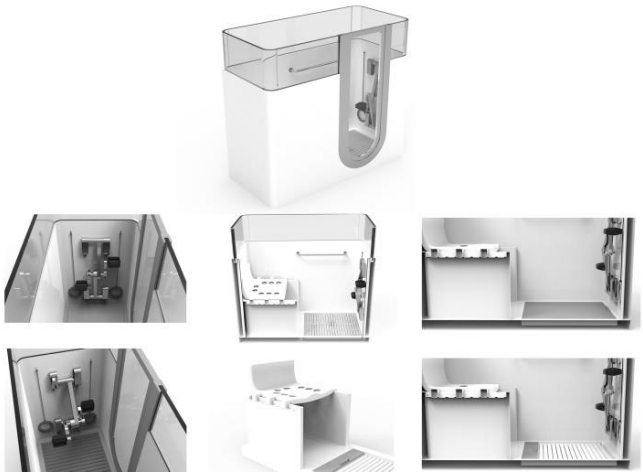
-Tedavilere giderken aşağıdaki zorluklardan hangilerini yaşıyorsunuz?
- Verilen randevu saatine göre hareket etmek zorunda olmak
- Giyinmek, hazırlanmak
- Evden kendi isteğiniz dışında çıkmak zorunda kalmak
- Araba ya da toplu taşıma ile yolculuk yapmak, tedavilere gidip gelmek
- Hastane ya da tedavi merkezine gittiğinizde sıra beklemek
- Hastane ya da tedavi merkezinde bulunan kalabalığa, gürültüye maruz kalmak
- Tedavi süreci

-Su içerisinde aşağıda bulunan hangi alet ya da aletlerle çalışmak isterdiniz?



-Seçtiğiniz hareketleri ev ortamında fazla yer kaplamayan tek bir ürün içerisinde uygulayabiliyor olsaydınız sizin için daha iyi olur muydu?
İyi olurdu.

-Aşağıda görselde bulunan yeni tasarlanmış aqua therapy ürünü hakkında ne düşünüyorsunuz?



Çok iyi fikir. Ben şuan iyiyim. Bu tarz şeylere ihtiyaç duymuyorum. Ben kullanmam ama kötü durumda olan arkadaşlarım var. Hepsine uygun, kullanabilecekleri bir tasarım.

Transcript 10

Tarih, başlangıç-bitiş süresi: 02.04.2019, 14.00-15.00
Yer: MS Derneği
Cinsiyet: Kadın
Yaş: 59
Meslek: Ev hanımı

-Kaç senedir MS hastalığı ile mücadele etmektesiniz?
17 yıl.

-Uyguladığınız tedavi yöntemleri nelerdir?

İlaçlar ve havuz.

-MS'den dolayı vücudunuzda hangi kaslarınız zayıf?
Ayaklar, kollar, eller.

-Kaslarınızı güçlendirmek için neler yapıyorsunuz?
Yüzme ve ayak hareketleri.

-Evde egzersiz yapıyor musunuz? Cevabınız evet ise nasıl egzersizler yapıyorsunuz?
Evet, tutunarak yürüme ve ayak hareketleri.

-Fizik tedaviye gittiniz mi?
Evet. Gidiyorum.

-Eğer gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Bacak ve kol hareketleri, kas güçlendirme, kas gerdirme.

-Suda terapi-suda tedavi (aquatic terapi) hakkında bir bilginiz var mı?
Evet. Su terapisi bizim için en iyisi bence. Daha rahat hareket edebiliyorum.

-Suda tedaviye gittiyseniz; hangi hareketler uygulandı, hangi aletler kullanıldı, size en çok fayda sağlayan hareket ve alet hangisi oldu?
Alet kullanmadım. Ama varsa kullanmak çok isterdim. İyi geleceğini düşünüyorum.

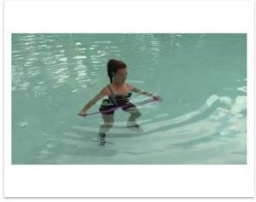
-Bir hasta olarak, fizik tedavi ve suda terapide eksik gördüğünüz noktalar, şu şöyle olsaydı daha iyi olurdu dediğiniz öneriler var mı?
Tutunma yerleri eksik. Düşme korkum var.

-Tedavilere gelirken kendinize ayırdığınız özel zamandan harcıyor musunuz? Cevabınız evet ise bu durum sizi nasıl etkiliyor?
Evet. Tedavilere giderken zorlanıyorum. Evden çıkmak bizim için çok zor.

-Su içerisinde (terapi havuzu, deniz, vb.) aerobik hareket çalışmaları deneyiminiz oldu mu?
Çok iyi geliyor. Suda kendimi daha iyi hissediyorum.

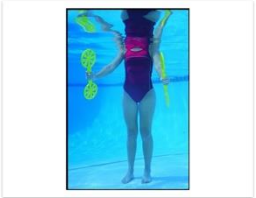
-Tedavilere giderken aşağıdaki zorluklardan hangilerini yaşıyorsunuz?
- ✚ Verilen randevu saatine göre hareket etmek zorunda olmak
- ✚ Giyinmek, hazırlanmak
- ✚ Evden kendi isteğiniz dışında çıkmak zorunda kalmak
- Araba ya da toplu taşıma ile yolculuk yapmak, tedavilere gidip gelmek
- Hastane ya da tedavi merkezine gittiğinizde sıra beklemek
- Hastane ya da tedavi merkezinde bulunan kalabalığa, gürültüye maruz kalmak
- Tedavi süreci

-Su içerisinde aşağıda bulunan hangi alet ya da aletlerle çalışmak isterdiniz?



Kol Aparatı-Lastik (Kol kaslarını güçlendirmek için uygundur.)

Bisiklet-Bacak Hareketi(Bacak kaslarını güçlendirmek için uygundur)



Kol Aparatı (Kol kaslarını güçlendirmek için uygundur.)

Bisiklet-Bacak Hareketi (Bacak kaslarını güçlendirmek için uygundur.)

Bisiklet-Bacak Hareketi (Bacak kaslarını güçlendirmek için uygundur)

Kol Aparatı-Ağırlık (Kol kaslarını güçlendirmek için uygundur.)

Yürüme Bandı-Bacak Hareketi (Bacak kaslarını güçlendirmek için uygundur.)

-Seçtiğiniz hareketleri ev ortamında fazla yer kaplamayan tek bir ürün içerisinde uygulayabiliyor olsaydınız sizin için daha iyi olur muydu?
Çok güzel olurdu. Kendimi daha güvende hissederdim. Zamandan kazancım olurdu.

-Aşağıda görselde bulunan yeni tasarlanmış aqua therapy ürünü hakkında ne düşünüyorsunuz?

Çok güzel. Bence çok başarılı. Piyasada öyle bir şey olsaydı eğer gerçekten almak isterdim evime. Benim işimi çok görürdü.

APPENDIX C

PILOT STUDY FOR INTERVIEWS 2 (PATIENTS)

Transcripts of Patients-Stage 2

Tarih: 9 Nisan 2019

Yer: MS Derneği

Saat: 11:00 – 11:30

Cinsiyet: Kadın

Yaş: 59

Patient 1

Su terapisine nasıl hazırlanıyorsunuz?
Su terapisi için derneğe geliyorum. Su terapilerinin olacağı tarihler daha önceden belli oluyor o tarihlere göre kendimi hazırlıyorum, mayomu hazırlıyorum ve o gün yanımda getiriyorum. Dernekte kabinler var oralarda giyiniyorum fakat giyinirken benim için zor oluyor çünkü mayo giymek çok da kolay olmuyor. En çok zorlandığım mayo giymek.

Havuza girerken ve çıkarken en çok yaşadığınız zorluklar nelerdir?
Havuza girerken ve çıkarken evet zorlanıyorum çünkü sulu bir ortam olduğu için ayağımın kaymasından korkuyorum. Ama havuzun kenarlarında tutunabileceğim borular var. Onlara tutunarak havuza girmeye çalışıyorum. İlk adımlar benim için çok zor oluyor çünkü su seviyesi az oluyor. Birkaç adım daha indikten sonra su seviyesi yükseldiği için artık suya bu seviyeden sonra daha rahat girebiliyorum.

Suyun içerisinde yaşadığınız kolaylıklar ve zorluklar nelerdir?
Suyun içerisinde aslında çok fazla zorluk yaşamıyorum. Fakat havuz ne kadar büyük olursa benim için o kadar sıkıntı oluyor. Çünkü tutunacağım yerler bana uzakta kalmış oluyor. Havuzun küçük olduğu yerlerde kendimi daha güvende hissediyorum. Zaten su seviyesi bizim boyumuzu aşmadığı için herhangi bir düşme problemi de yaşamıyoruz. Bu yüzden suyun içerisinde çok zorlanmıyorum ama alan ne kadar dar olursa benim için o kadar iyi oluyor.

Suda yapılan hareketlerde hangisi sizi en çok zorluyor, hangisi sizin için daha kolay ve hangi hareket en çok fayda sağlıyor?
Suda hocamız bize birçok hareket gösteriyor. Benim için en kolay olan hareket ayakları yukarı ve aşağı kaldırıp indirmek. Bu çok kolay oluyor. Aslında zorlandığım herhangi bir hareket yok çünkü suyun içerisinde kaldırma kuvveti olduğu için hareketlerimi kolaylıkla yapabiliyorum. Zorlandığım herhangi bir hareket olmuyor. Zaten hocalarımız bize ona göre seviye belirliyorlar.

Su terapisi öncesi ve sonrası durumunuzu nasıl değerlendiriyorsunuz?
Önce kaslarım sert oluyor. Suya girdikten sonra yapılan hareketlerden dolayı kaslarım açılıyor. Bu yüzden sudan çıktıktan sonra daha rahat hareket edebiliyorum. Öncesinde kaslarım sert olduğu için daha yavaş ama sudan sonra kaslar açıldığı için daha hızlı hareket edebiliyorum.

Fakat birkaç saat geçtikten sonra yine eski halime dönüyorum. Eski halimi dönmemem içinde su terapisini haftada birkaç kere uygulamam gerekiyor. Uyguladığım zamanlarda daha çok faydasını görüyorum. Fakat dernekte bazı dönemlerde su terapileri uygulanıyor. Eğer her gün ya da haftada 3-4 kere uygulayabileceğim bir yer olsa benim için çok daha iyi olurdu.

Suyun size sağladığı faydalar nelerdir?
Suyun bana sağladığı faydalar çok var. Öncelikle kendimi suda özgür hissediyorum çünkü karada yapamadığım birçok hareketi suda yapabiliyorum. Bu hem beni psikolojik hem de fiziksel olarak iyi yönde etkiliyor. Hareketleri suda yaptığım zaman kendimi daha rahat hissediyorum. Kendimi olan özgüvenim artıyor. Psikolojik olarak beni çok iyi etkiliyor. Fiziksel olarak da gösterdiği etkiler büyük. Devamlı olarak bu tedaviyi uygulamak gerekiyor. Yarım bırakmamak gerekiyor.

Patient 2

Tarih: 9 Nisan 2019

Yer: MS Derneği

Saat: 11:30 - 12:00

Cinsiyet: Kadın

Yaş: 43

Su terapisine nasıl hazırlanıyorsunuz?
Su terapisi için mayo giymek dışında herhangi bir hazırlık yapmıyorum fakat mayo giymek benim için zor oluyor. Çünkü bacak kaslarımda sıkıntılar var. Ayaklarımı kaldırırken zorluk yaşıyorum. Onun dışında herhangi bir hazırlığım olmuyor.

Havuza girerken ve çıkarken en çok yaşadığınız zorluklar nelerdir?
Havuza girerken ve çıkarken zorluk yaşıyorum. Çünkü kaygan zemin olduğu için korkuyorum. Havuzun kenarları genelde ıslak oluyor. Bu yüzden ayağım kayacağı için korkuyorum havuzdan. Merdivenler var. Basamaklardan inip çıkmak da bazen zor oluyor.

Suyun içerisinde yaşadığınız kolaylıklar ve zorluklar nelerdir?
Suyun içindeyken zorluk yaşamıyorum. Çok rahat hareket edebiliyorum. Aksine karada hareket edebilmemden daha rahat hareket ettiğim için çok mutlu oluyorum.

Suda yapılan hareketlerde hangisi sizi en çok zorluyor, hangisi sizin için daha kolay ve hangi hareket en çok fayda sağlıyor?
Suda yapılan hareketler beni zorlamıyor. Hepsinin benim için ayrı bir güzelliği, faydası var. Bacak kaldırıp indirme, kol kaslarını çalıştırma, suda yürüme. Bunlar bana iyi geliyor. Zaten beni zorlayacak herhangi bir hareket olduğunda o hareketi yapmıyorum. Zaten yapamıyorum.

Su terapisi öncesi ve sonrası durumunuzu nasıl değerlendiriyorsunuz?
Su terapisine girmeden çok yavaş hareket ediyorum. Suya girdikten sonra hareketlerden dolayı kaslarımda yumuşamalar oluyor. Bu yüzden daha rahat hissediyorum kendimi. Tedavi sonrasında daha rahat yürüyebiliyorum.

Suyun size sağladığı faydalar nelerdir?
Suyun bana sağladığı faydalar elbette ki var. Suyun içerisinde hareket edebiliyorum. Kaslarımı güçlendirebiliyorum. Vücudumu esnetebiliyorum. Karadı bunların çoğunu yapamıyorum ve su benim için çok keyifli. Ben yüzmeyi çok seviyorum fakat denizde yüzmekten korkuyorum. Bu yüzden su terapisinde havuzda güzel yüzebiliyorum. Bu da beni çok mutlu ediyor.

Patient 3

Tarih: 9 Nisan 2019

Yer: MS Derneği

Saat: 12:00 – 12:30

Cinsiyet: Kadın

Yaş: 64

Su terapisine nasıl hazırlanıyorsunuz?
Ben artık havuz terapilerine katılmıyorum. Çünkü havuzun içerisinde olan klor benim vücuduma zarar veriyor. Ama daha önceden kaldığım zamanlarda su terapisini hazırlanma sürecinde tabii ki de mayo giyiyordum. Mayo giymek benim için zor oluyordu. Ama şu an su terapisine gidecek olursam eğer mayo giymek benim için zor olmaz. Çünkü eski halimden daha iyi durumdayım. Kendimi daha iyi hissediyorum.

Havuza girerken ve çıkarken en çok yaşadığınız zorluklar nelerdir?
Basamaklardan inip çıkmak tehlikeli oluyor. Keşke basamak olmayan bir havuz olsaydı. Suya direk gidebilseydik.

Suyun içerisinde yaşadığınız kolaylıklar ve zorluklar nelerdir?
Suyun içerisinde yaşadığım en büyük zorluk klorun vücuduma zarar vermesiydi. Zaten suda çok fazla kalamadım. Vücudum yanmaya ve kızarmaya başladı. Klor kullanılmayan bir havuz olması lazım ancak benim için.

Suda yapılan hareketlerde hangisi sizi en çok zorluyor, hangisi sizin için daha kolay ve hangi hareket en çok fayda sağlıyor?
Çok deneyimle fırsatım olmadı aslında. Sadece birkaç hareket yapabildim sonrasında sudan çıktım. Bacak kaldırma hareketi yapmıştık. Çok rahat yaptım. Hiç sorun yaşamadım. Zorlukta yaşamadım.

Su terapisi öncesi ve sonrası durumunuzu nasıl değerlendiriyorsunuz?
Suda kısa süreli bulunmuş olmama rağmen kaslarımda gevşemeler oldu.

Suyun size sağladığı faydalar nelerdir?
Suyun İçerisinde bulunduğum süre zarfında hareketlerim kısıtlanmadan çok daha rahat hareket edebildim. Yaklaşık 15-20 dakika kadar suyun içerisinde bulundum. Karada olduğumdan çok daha kendimi özgür ve güvende hissettim.

Patient 4

Tarih: 9 Nisan 2019

Yer: MS Derneği

Saat: 12:30 - 13:00

Cinsiyet: Kadın

Yaş: 67

Su terapisine nasıl hazırlanıyorsunuz?
Mayo giyiyorum, bone takıyorum. Bunları yapmak benim için yorucu oluyor aslında. Terapiye hazırlanma kısmı biraz zahmetli.

Havuza girerken ve çıkarken en çok yaşadığınız zorluklar nelerdir?
Zeminin kaygan olması beni çok korkutuyor. Bu zaman kadar herhangi bir sıkıntı yaşamadım. Düşmedim, kaymadım. Ama her seferinde ayağım kaymasın diye çok dikkatli olmaya çalışıyorum. Bu biraz beni yoruyor. Suya girdikten sonra düşme sorunu olmuyor. Ama suya girene kadar o tehlike hep varmış gibi geliyor. Aslında bu zamana kadar kimse düşmedi. Görmedim. Ama hastalıktan dolayı korkuyorum.

Suyun içerisinde yaşadığınız kolaylıklar ve zorluklar nelerdir?
Suyun içerisinde boğulmaktan korkuyorum. Ben yüzmede iyi değilim. Terapilerdeki su seviyesi bizim hiçbir zaman boyumuzu aşmıyor. Ama havuz büyük olduğu için sanki bir yere tutunamayacakmışım ve boğulacakmışım gibi geliyor. Bu durumu yaşayan başka hasta görmedim. Çoğu yüzme biliyor. Ben bilmediğim için ister istemez bu korku içimde hep var.

Suda yapılan hareketlerde hangisi sizi en çok zorluyor, hangisi sizin için daha kolay ve hangi hareket en çok fayda sağlıyor?
Suyun içinde korktuğum için hareketlerin çoğunu rahat yapamıyorum. Aslında yapabilsem hiçbir zorluğu olmayacak. Çünkü gerçekten suda hareket etmek çok kolay. Su sayesinde daha rahat hareket edebiliyorum. Aslında sizin yapmayı planladığınız tasarım tam bana göre. Alan çok dar olduğu için öyle bir şeyin içinde kendimi güvende hissedeceğimden eminim. Hiç korkum olmazdı. Özgürce hareketlerimi yapabilirdim.

Su terapisi öncesi ve sonrası durumunuzu nasıl değerlendiriyorsunuz?
Ben terapiden önce geriliyorum korktuğum için. Bu yüzden öncesinde ve sonrasında çok bir fark olmuyor. Suyun içerisinde korkularımdan dolayı rahat değilim. Eskisi kadar sık gidemiyorum artık terapilere.

Suyun size sağladığı faydalar nelerdir?
Gerçekten suyun içinde özgürsün. Daha rahat hareket edebiliyorsun. Daha az yoruluyorsun. Karada çok çabuk yoruluyor insan. Ama suyun içinde fazla efor sarf etmeye gerek kalmadığından daha az yoruluyorsun.

APPENDIX D

HEIGHT AND WEIGHT AVERAGE

Table D.1. This graph shows the height average of men between 160 cm to 171 cm, from 59 countries.

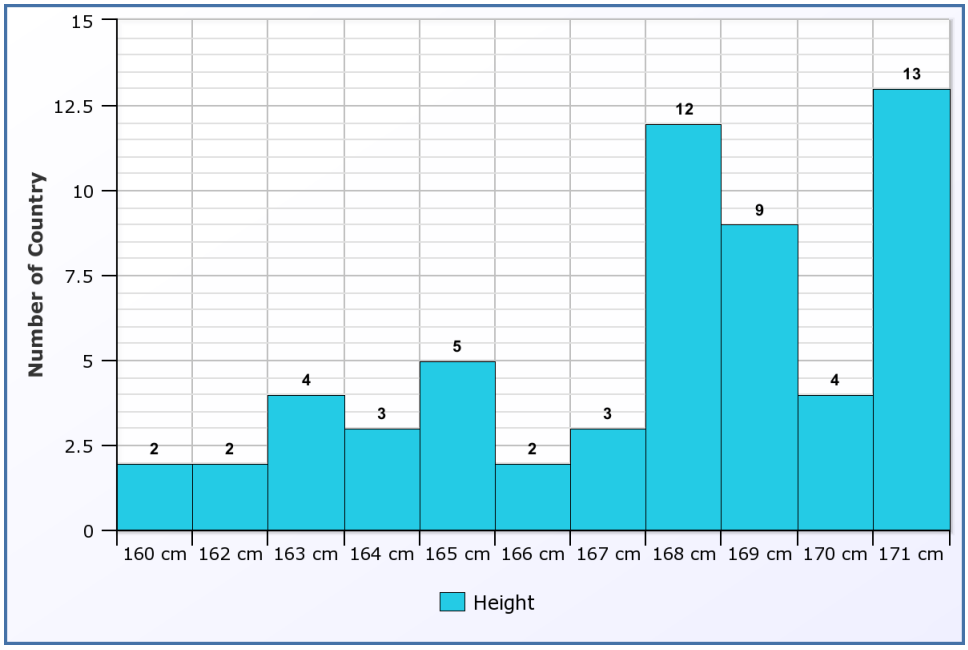


Table D.2. This graph shows the height average of men between 172 cm to 183 cm, from 71 countries.

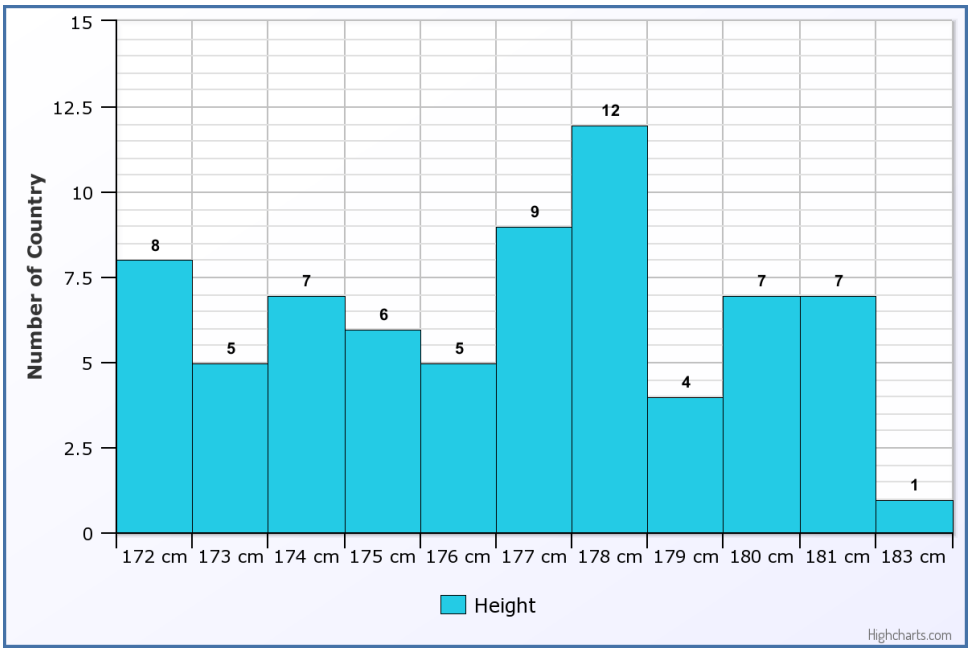


Table D.3. This graph shows the weight average of men between 54 kg to 65 kg, from 27 countries.

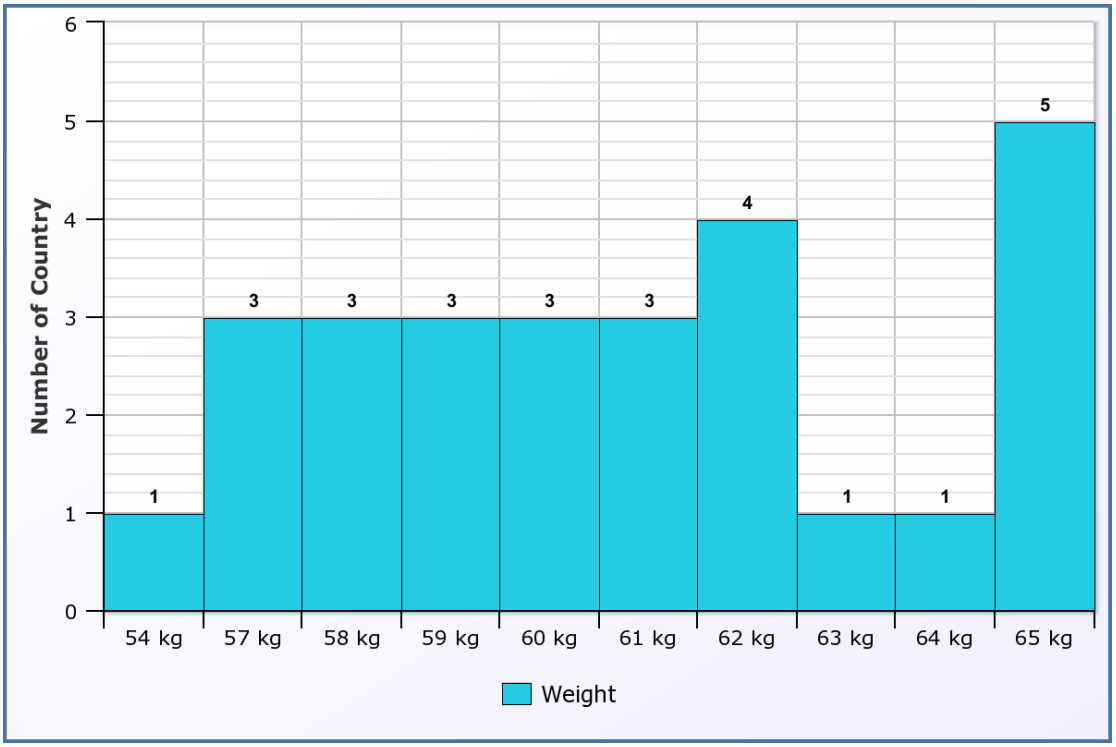


Table D.4. This graph shows the weight average of men between 66 kg to 77 kg, from 22 countries.

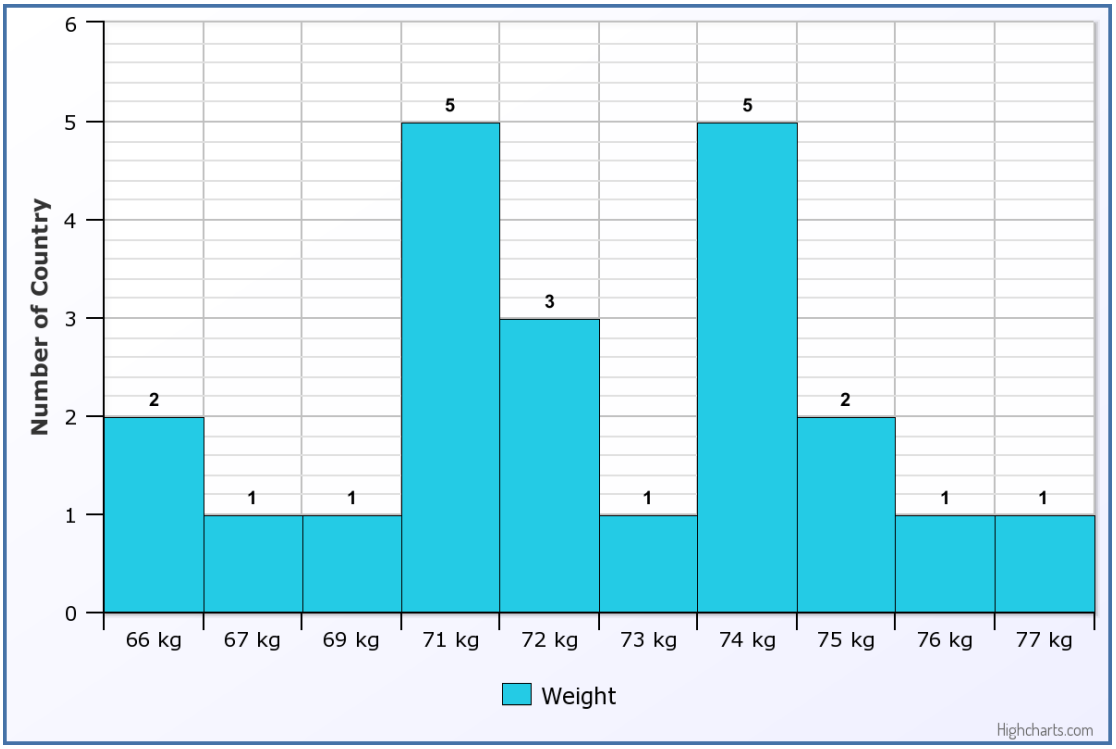


Table D.5. This graph shows the weight average of men between 78 kg to 87 kg, from 58 countries.

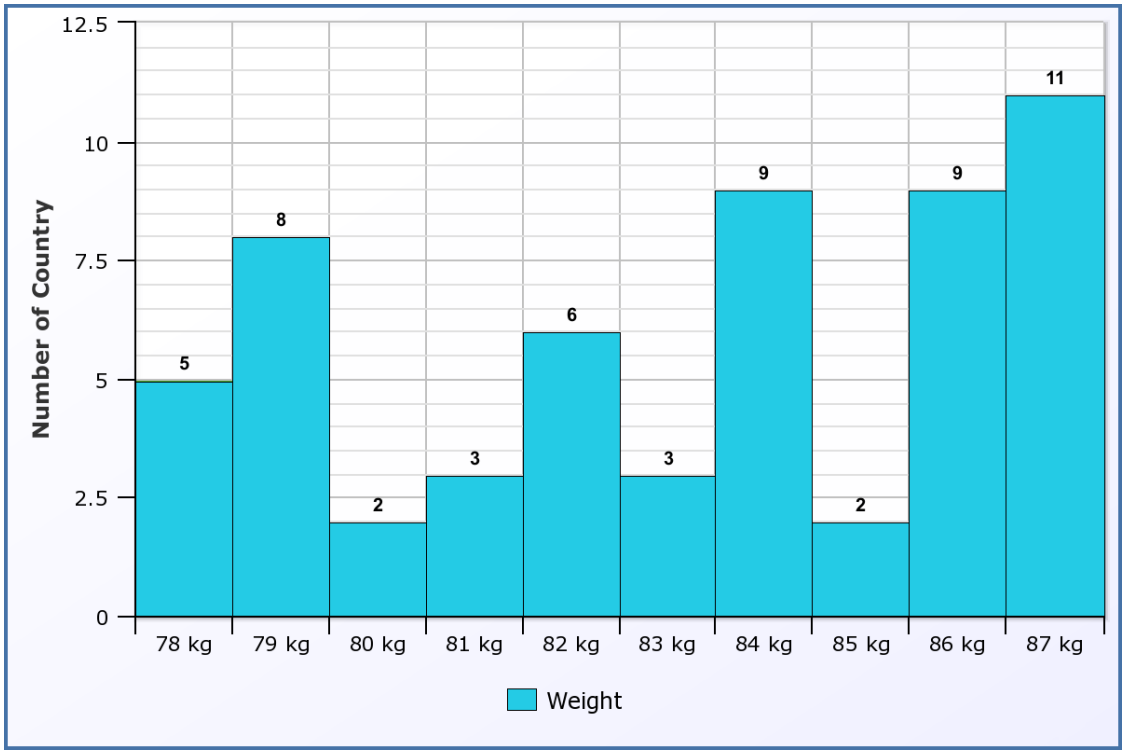


Table D.6. This graph shows the weight average of men between 88 kg to 103 kg, from 23 countries.

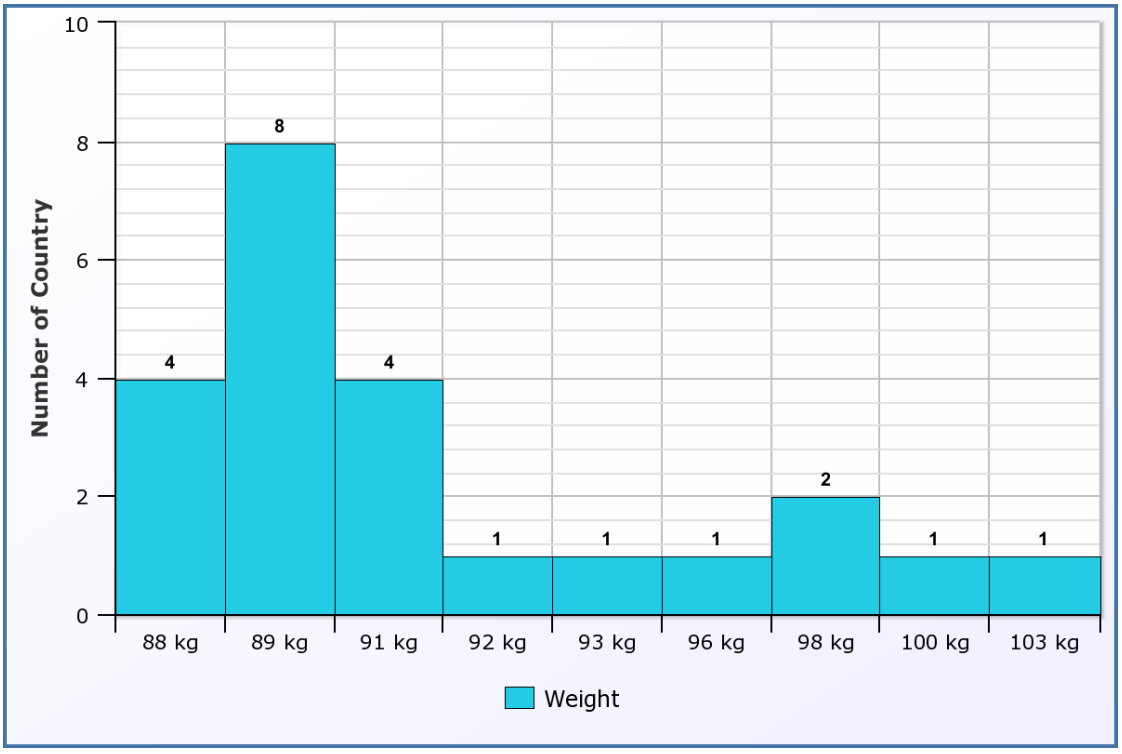


Table D.7. This graph shows the height average of women between 149 cm to 159 cm, from 61 countries.

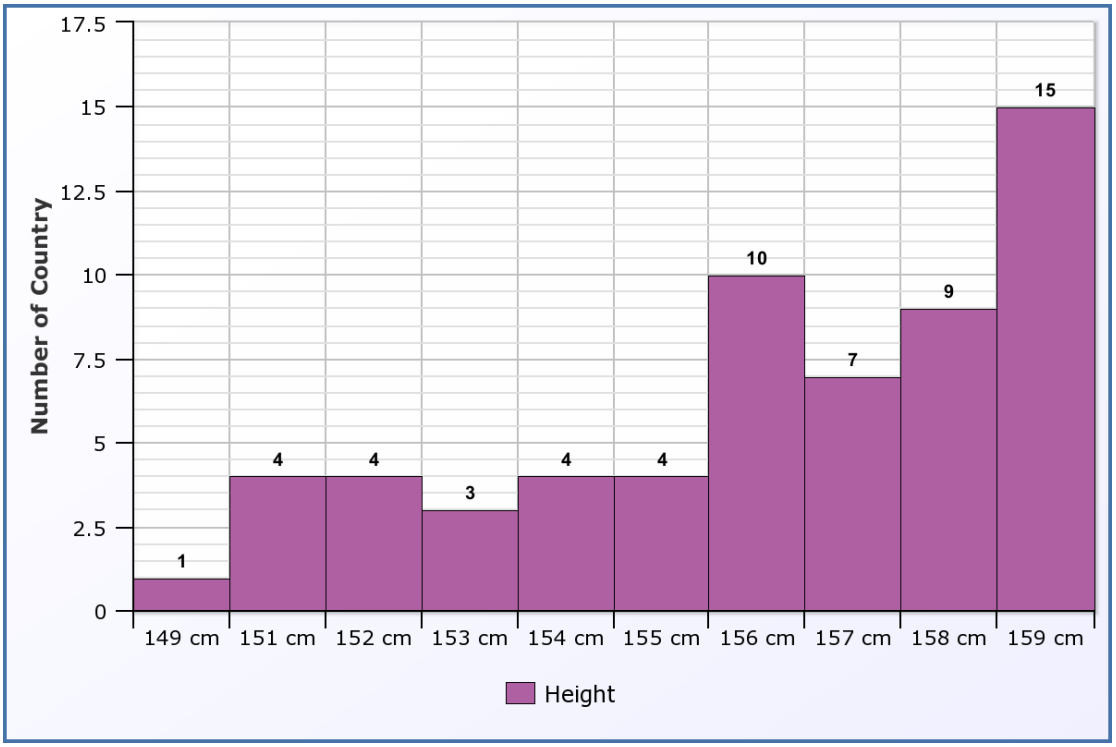


Table D.8. This graph shows the height average of women between 160 cm to 169 cm, from 69 countries.

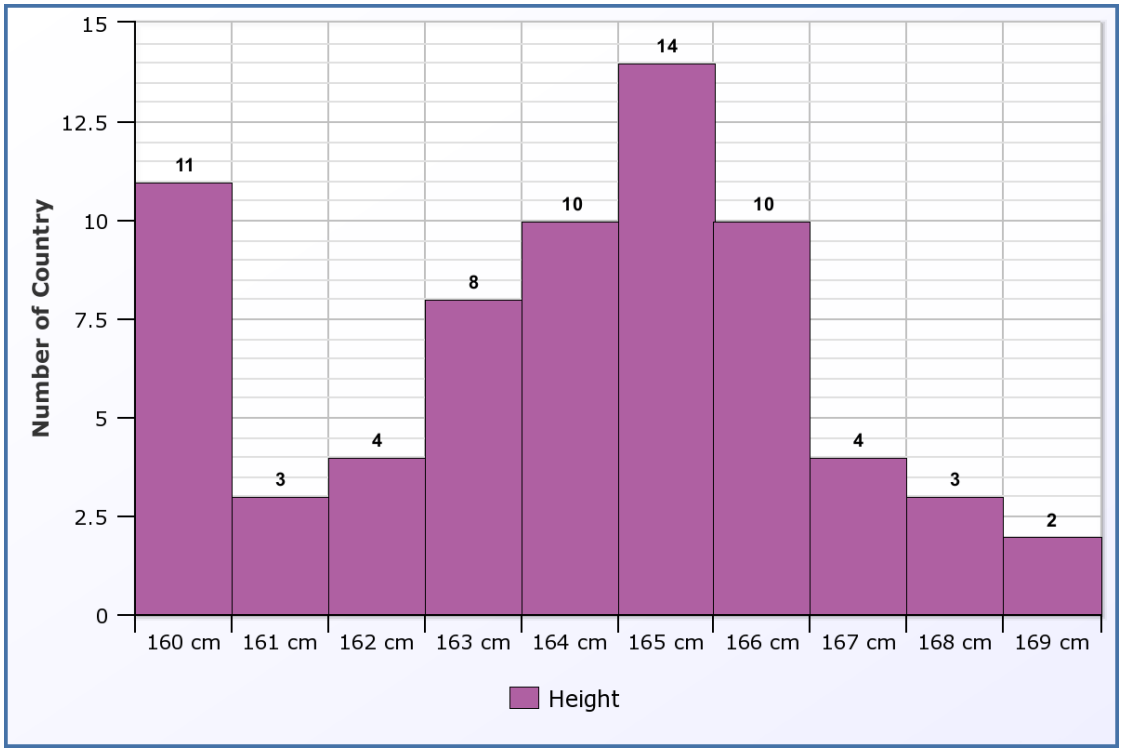


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Table D.9. This graph shows the weight average of women between 48 kg to 61 kg, from 32 countries.

Table D.10. This graph shows the weight average of women between 62 kg to 73 kg, from 63 countries.

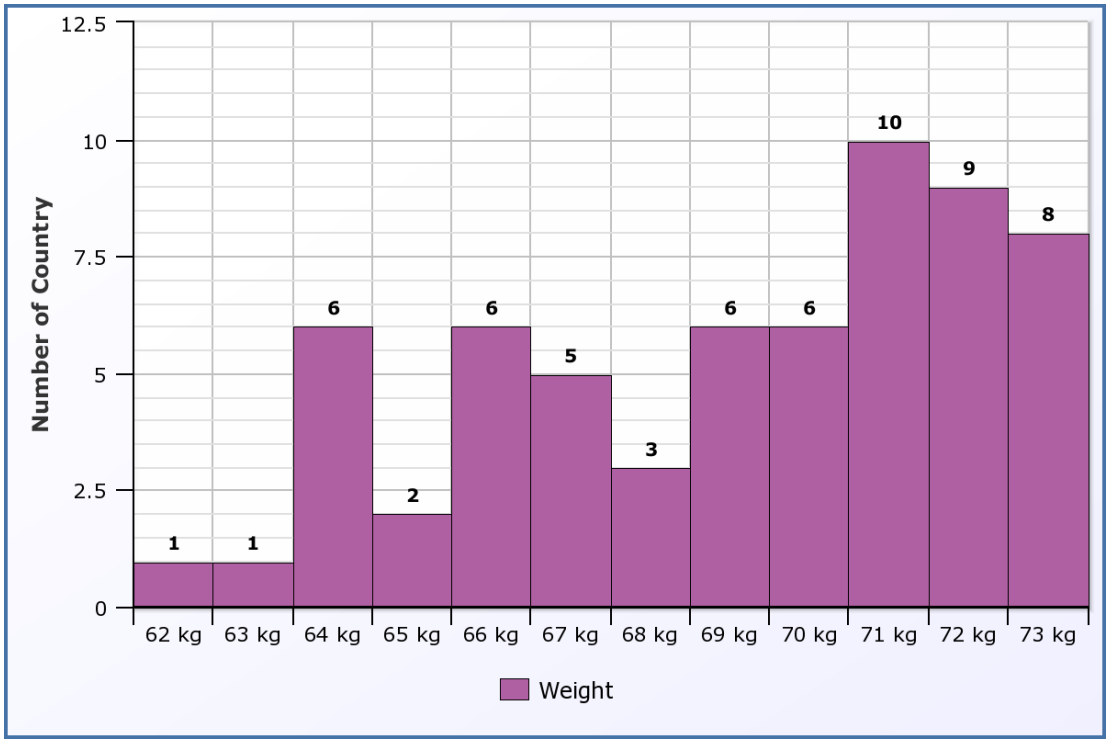

Table D.11. Graph shows the weight average of women between 74 kg to 96 kg, from 63 countries.

APPENDIX E

SURVEY QUESTIONS (TURKISH)

Table E.12. Turkish version of survey questions.

Construct	Variables (item)	No	Türkçe
cnO	cnO		Cevap No
Gender	Gender	1	Cinsiyetiniz
Age	Age	2	Yaşınız
Edu_Level	Edu_Level	3	Eğitim Durumunuz
Occupation	Occupation	4	Mesleğiniz
Income	Income	5	Aylık net geliriniz
Proxy	Proxy	6	Hasta yakınıyım
PatientYear	PatientYear	7	Kaç senedir MS hastalığı ile mücadele etmektesiniz?
Weight_Prob	Weight_Prob	8	Kilomun fazla olduğunu düşünüyorum
FLocation	Location	9	Oturduğum yer tedavi merkezlerine uzak
Assistant	Assistant	10	Tedavi merkezlerine giderken size yardımcı olan birisi var mı?
Therapy	Therapy1	11	Düzenli olarak fiziksel alıştırmalarımı yapıyorum
Therapy	Therapy2	12	İlaç kullanmak dışında uyguladığınız tedavi yöntemleri nelerdir? (Fizik tedavi, su içerisinde egzersiz, yoga vs.)
AquaTherapy	AquaTherapy	13	Su içerisinde egzersiz/suda tedavi hakkında ne düşünüyorsunuz?
Difficulty	Difficulty1	14	Tedavilere giderken zorlanıyor musunuz?
Difficulty	Difficulty2	15	Aşağıdaki seçeneklerden hangileri sizi zorluyor?
	Dif_Giy		Giyinmek
	Dif_Cik		Evden çıkmak
	Dif_Arac		Toplu taşıma araçlarını kullanmak
	Dif_Trafik		Trafiğe maruz kalmak
	Dif_Kalabalik		Tedavi merkezlerinde bulunan kalabalık
	Dif_Bekle		Tedavi merkezlerinde sıra beklemek
	Dif_Zaman		Tedavi süreci haricinde harcanan zaman kaybı
Difficulty	Difficulty3	16	Tedavi merkezlerindeki aletlerin kullanımının rahat olduğunu düşünüyorum
Innovativeness	Innovativeness	17	Yeni çıkan ürünleri benimsemede temkinli yaklaşırım
Self_efficacy	Self_efficacy1	18	Bu tür ürünleri tek başıma rahatlıkla kullanabilirim
Self_efficacy	Self_efficacy2	19	Bu tür ürünleri kullanabileceğimden emin değilim
Concern_Health	Concern_Health1	20	Fiziksel alıştırmalarımı yapmadığımda kendimi suçlu hissederim

(cont. on the next page)

Table E.12. (Cont.)

Concern_Health	Concern_Health2	21	İhtiyacım olduğunda iyi bir sağlık bakımı bulmam zordur
Concern_Health	Concern_Health3	22	Sağlık problemi yaşadığımda sorun karşısında güçsüz hissediyorum
Flexibility	Flexibility	23	Ürünün gerekli gördüğüm bir takım işlevleri ekleme esnekliğine sahip olmasını isterim
Personalization	Personalization	24	Ürününün en, boy, yükseklik gibi özelliklerini kendim belirlemek isterim
Triability	Triability	25	Ürünün özelliklerini anlamama yetecek kadar süre deneme amaçlı kullanabilmem önemlidir.
Image	Image	26	Bu ürünü kullanarak benzer durumdaki arkadaşlarım arasında daha farklı bir imaja sahip olacağımı düşünüyorum
Pleasure	Pleasure	27	Bu ürünü kullanmaktan keyif alırım
Compatability	Compatability	28	Benim tarzıma, yaşayışıma uygundur
FacilitatingCond	FacilitatingCond	29	Kullanım kılavuzunun olması işimi kolaylaştıracaktır
InternalInfluence	InternalInfluence1	30	Yakınlarımın bu konudaki görüşlerini önemserim
InternalInfluence	InternalInfluence2	31	Doktorumun tavsiye etmesi benim için önemlidir
ExternalInfluence	ExternalInfluence	32	Bu tür ürünlerin tanıtım yazı ya da reklamları beni etkiler
Storage	Storage	33	Evimde bu ürünü koyabileceğim yeterli alanım yok
Regulation	Regulation	34	Bu ürünün ücretinin bir kısmının devlet/özel sağlık sigortaları tarafından karşılanmasını isterim
Support	Support	35	Hızlı ve kolayca teknik destek alabilirim
Security	Security1	36	Kullanım esnasında tehlike yaşayabilirim
Security	Security2	37	Kullanımını güvenli buluyorum
Security	Security3	38	Kayma sorunu yaşayacağımı düşünmüyorum
Privacy	Privacy	39	Tedavi merkezlerinden farklı olarak bu ürün sadece bana ait olacağı için herhangi bir hijyen problemi yaşamayacağım
Quality	Quality	40	Tedavi merkezlerindeki tedaviye kıyasla daha kaliteli bir tedavi almış olurum
Size	Size1	41	İçinde rahat hareket edebilirim.
Size	Size2	42	Boyutlarını yeterli buluyorum
Usability	Ergonomic1	43	Kullanışlı olduğunu düşünüyorum
Ergonomic	Ergonomic2	44	Ürünü ergonomik buluyorum
CostExist	CostExist1	45	Tedaviler size maddi açıdan zorluk yaşatıyor mu?
CostExist	CostExist2	46	Tedavi merkezlerine gitmenin maliyeti yüksektir
CostProduct	CostProduct1	47	Ürünün satınalma maliyeti yüksektir (6500 TL)
CostProduct	CostProduct2	48	Bu ürünü satın almaya mali gücüm yeter
CostChange	CostChange	49	Tedavi masraflarını daha aza indirgeyeceğini düşünüyorum.

(cont. on the next page)

Table E.12. (Cont.)

EoL	EoL1	50	Kullanmayı öğrenmem zaman alır
EoL	EoL2	51	Kullanımını kolayca öğrenebilirim
EoU	EoU1	52	Kullanımda zorluk yaşamam
EoU	EoU2	53	Kullanımını kolay ve pratik buluyorum
Usefulness	Usefulness1	54	Yararlı olduğunu düşünüyorum
Usefulness	Usefulness2	55	Günlük hayatımı kolaylaştırır
Usefulness	Usefulness3	56	Olumsuz hava koşullarından etkilenmem
Usefulness	Usefulness4	57	Trafikte vakit harcamama gerek kalmaz
Usefulness	Usefulness5	58	Bu ürünü evde kullanmak bana zaman kazandırır
Usefulness	Usefulness6	59	Yardımcıya ihtiyacım azalır
Usefulness	Usefulness7	60	Bu ürün sayesinde suyu klorlamadan kullanırım
Usefulness	Usefulness8	61	Tedavilerime bu ürün sayesinde evde devam edebilirim.
Usefulness	Usefulness9	62	Bu ürün sayesinde istediğim zaman suda egzersiz yapabilirim.
Usefulness	Usefulness10	63	Bu ürün bana daha fazla hareket özgürlüğü sağlar.
Usefulness	Usefulness11	64	Ürün herkesin evinde kullanılabilecek bir düzene sahip.
Attitude	Attitude1	65	Kullanmak bence iyi fikir
Attitude	Attitude2	66	Başkalarına tavsiye ederim
Attitude	Attitude3	67	Kullanmayı düşünürüm
Intention	Intention1	68	Almaya niyetim var
Intention	Intention2	69	Yakın zamanda edinmeyi planlıyorum
KW	KW	70	Bu ürünü aşağıdaki kelimelerden hangilerinin temsil ettiğini belirtin (3-4 adet seçim yapınız)
faydali	faydali		faydalı
guvenilir	guvenilir		güvenilir
hayati	hayati		hayati
pratik	pratik		pratik
rahatlatici	rahatlatici		rahatlatıcı
saglam	saglam		sağlam
kullanisli	kullanisli		kullanışlı
saglikli	saglikli		sağlıklı
asamali	asamali		aşamalı
Animal	Animal	71	Eğer bu uygulama için bir logo yapıyor olsaydınız hangi hayvanı temsili olarak kullanmayı tercih ederdiniz?
Car	Car	72	Bu uygulamayı, hangi araba marka-model ile benzer yakın bulursunuz?
Improvement	Improvement	73	Bu ürünün daha kullanışlı olması için ne önerirsiniz?
Comment	Comment	74	Eklemek istediğiniz bir şey var mıdır?

APPENDIX F

CORRELATION ANALYSES

Table F.13. Correlation Analyses

Variables		EoU	Usefulness	Attitude	Intention
Proxy	Pearson Correlation	0,10	0,20	0,06	-0,13
	Sig. (2-tailed)	0,357	0,082	0,595	0,260
	N	80	80	80	80
PatientYear	Pearson Correlation	-0,14	-0,11	0,01	-0,16
	Sig. (2-tailed)	0,216	0,320	0,927	0,166
	N	80	80	80	80
Weight_Prob	Pearson Correlation	-0,04	-0,03	-0,01	0,02
	Sig. (2-tailed)	0,737	0,777	0,945	0,868
	N	80	80	80	80
Location	Pearson Correlation	0,06	0,14	0,13	0,03
	Sig. (2-tailed)	0,607	0,205	0,246	0,785
	N	80	80	80	80
Assistant	Pearson Correlation	-0,06	-0,08	0,01	0,09
	Sig. (2-tailed)	0,612	0,503	0,916	0,415
	N	80	80	80	80
Therapy1	Pearson Correlation	-0,06	-0,01	-0,06	0,15
	Sig. (2-tailed)	0,601	0,931	0,622	0,171
	N	80	80	80	80
Therapy2	Pearson Correlation	.[a]	.[a]	.[a]	.[a]
	Sig. (2-tailed)				
	N	0	0	0	0
AquaTherapy	Pearson Correlation	0,10	0,22	0,22	0,01
	Sig. (2-tailed)	0,372	0,046	0,052	0,952
	N	80	80	80	80
Difficulty1	Pearson Correlation	0,01	0,10	0,07	0,16
	Sig. (2-tailed)	0,916	0,377	0,550	0,145
	N	80	80	80	80
Difficulty2	Pearson Correlation	.[a]	.[a]	.[a]	.[a]
	Sig. (2-tailed)				
	N	0	0	0	0
Dif_Giy	Pearson Correlation	0,05	0,14	0,05	0,09
	Sig. (2-tailed)	0,635	0,206	0,686	0,445
	N	80	80	80	80

(cont. on the next page)

Table F.13. (Cont.)

Dif_Cik	Pearson Correlation	-0,13	0,03	0,03	0,05
	Sig. (2-tailed)	0,266	0,804	0,819	0,649
	N	80	80	80	80
Dif_Arac	Pearson Correlation	-0,13	0,02	-0,03	0,08
	Sig. (2-tailed)	0,264	0,882	0,765	0,506
	N	80	80	80	80
Dif_Trafik	Pearson Correlation	0,00	-0,05	-0,08	0,02
	Sig. (2-tailed)	0,984	0,652	0,476	0,857
	N	80	80	80	80
Dif_Kalabalik	Pearson Correlation	-0,08	-0,04	-0,09	0,16
	Sig. (2-tailed)	0,487	0,732	0,412	0,167
	N	80	80	80	80
Dif_Bekle	Pearson Correlation	-0,08	-0,07	-0,03	-0,02
	Sig. (2-tailed)	0,502	0,532	0,772	0,861
	N	80	80	80	80
Dif_Zaman	Pearson Correlation	0,05	0,16	0,08	0,08
	Sig. (2-tailed)	0,659	0,153	0,454	0,468
	N	80	80	80	80
Difficulty3	Pearson Correlation	0,01	-0,02	0,06	0,15
	Sig. (2-tailed)	0,925	0,877	0,596	0,196
	N	80	80	80	80
Innovativeness	Pearson Correlation	0,03	0,07	0,05	0,04
	Sig. (2-tailed)	0,825	0,513	0,656	0,740
	N	80	80	80	80
Self_efficacy1	Pearson Correlation	0,21	0,25	0,18	0,17
	Sig. (2-tailed)	0,059	0,026	0,101	0,142
	N	80	80	80	80
Self_efficacy2	Pearson Correlation	0,22	0,13	0,23	0,21
	Sig. (2-tailed)	0,046	0,237	0,036	0,063
	N	80	80	80	80
Concern_Health1	Pearson Correlation	0,08	0,22	0,09	-0,04
	Sig. (2-tailed)	0,465	0,046	0,440	0,703
	N	80	80	80	80
Concern_Health2	Pearson Correlation	-0,02	0,18	0,08	0,00
	Sig. (2-tailed)	0,849	0,105	0,459	0,983
	N	80	80	80	80
Concern_Health3	Pearson Correlation	-0,10	0,16	0,04	0,00
	Sig. (2-tailed)	0,364	0,161	0,709	0,965
	N	80	80	80	80
Flexibility	Pearson Correlation	0,13	0,34	0,30	0,06
	Sig. (2-tailed)	0,258	0,002	0,008	0,579
	N	80	80	80	80

(cont. on the next page)

Table F.13. (Cont.)

Personalization	Pearson Correlation	-0,02	0,07	0,03	-0,09
	Sig. (2-tailed)	0,852	0,513	0,805	0,424
	N	80	80	80	80
Triability	Pearson Correlation	0,07	0,34	0,22	-0,17
	Sig. (2-tailed)	0,538	0,002	0,054	0,121
	N	80	80	80	80
Image	Pearson Correlation	0,27	0,40	0,32	0,32
	Sig. (2-tailed)	0,017	0,000	0,004	0,004
	N	80	80	80	80
Pleasure	Pearson Correlation	0,51	0,64	0,57	0,30
	Sig. (2-tailed)	0,000	0,000	0,000	0,007
	N	80	80	80	80
Compatability	Pearson Correlation	0,50	0,63	0,52	0,35
	Sig. (2-tailed)	0,000	0,000	0,000	0,001
	N	80	80	80	80
FacilitatingCond	Pearson Correlation	0,38	0,55	0,54	0,14
	Sig. (2-tailed)	0,000	0,000	0,000	0,227
	N	80	80	80	80
InternalInfluence1	Pearson Correlation	-0,06	0,06	0,10	0,03
	Sig. (2-tailed)	0,590	0,587	0,370	0,787
	N	80	80	80	80
InternalInfluence2	Pearson Correlation	0,08	0,24	0,30	0,09
	Sig. (2-tailed)	0,475	0,033	0,006	0,437
	N	80	80	80	80
ExternalInfluence	Pearson Correlation	0,19	0,35	0,35	0,12
	Sig. (2-tailed)	0,089	0,001	0,001	0,275
	N	80	80	80	80
Storage	Pearson Correlation	-0,37	-0,21	-0,32	-0,37
	Sig. (2-tailed)	0,001	0,065	0,003	0,001
	N	80	80	80	80
Regulation	Pearson Correlation	-0,15	-0,04	0,01	-0,22
	Sig. (2-tailed)	0,187	0,712	0,928	0,050
	N	80	80	80	80
Support	Pearson Correlation	0,32	0,24	0,29	0,40
	Sig. (2-tailed)	0,004	0,033	0,009	0,000
	N	80	80	80	80
Security1	Pearson Correlation	0,21	0,08	0,22	0,18
	Sig. (2-tailed)	0,063	0,484	0,055	0,119
	N	80	80	80	80
Security2	Pearson Correlation	0,71	0,68	0,62	0,37
	Sig. (2-tailed)	0,000	0,000	0,000	0,001

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Table F.13. (Cont.)

	N	80	80	80	80
Security3	Pearson Correlation	0,38	0,35	0,31	0,14
	Sig. (2-tailed)	0,001	0,001	0,005	0,230
	N	80	80	80	80
Privacy	Pearson Correlation	0,58	0,60	0,63	0,33
	Sig. (2-tailed)	0,000	0,000	0,000	0,003
	N	80	80	80	80
Quality	Pearson Correlation	0,48	0,42	0,52	0,31
	Sig. (2-tailed)	0,000	0,000	0,000	0,006
	N	80	80	80	80
Size1	Pearson Correlation	0,53	0,58	0,64	0,50
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Size2	Pearson Correlation	0,46	0,53	0,65	0,43
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Ergonomic1	Pearson Correlation	0,61	0,66	0,81	0,50
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Ergonomic2	Pearson Correlation	0,58	0,63	0,74	0,45
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
CostExist1	Pearson Correlation	-0,07	0,20	0,06	-0,09
	Sig. (2-tailed)	0,524	0,070	0,603	0,412
	N	80	80	80	80
CostExist2	Pearson Correlation	-0,01	0,21	0,05	-0,01
	Sig. (2-tailed)	0,922	0,065	0,648	0,902
	N	80	80	80	80
CostProduct1	Pearson Correlation	-0,06	0,11	-0,05	-0,37
	Sig. (2-tailed)	0,627	0,320	0,652	0,001
	N	80	80	80	80
CostProduct2	Pearson Correlation	0,32	0,17	0,21	0,50
	Sig. (2-tailed)	0,003	0,123	0,060	0,000
	N	80	80	80	80
CostChange	Pearson Correlation	0,53	0,43	0,41	0,58
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
EoL1	Pearson Correlation	0,12	0,07	0,13	-0,02
	Sig. (2-tailed)	0,271	0,511	0,252	0,864
	N	80	80	80	80
EoL2	Pearson Correlation	0,72	0,46	0,41	0,36

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Table F.13. (Cont.)

	Sig. (2-tailed)	0,000	0,000	0,000	0,001
	N	80	80	80	80
EoU1	Pearson Correlation	0,93	0,64	0,57	0,33
	Sig. (2-tailed)	0,000	0,000	0,000	0,003
	N	80	80	80	80
EoU2	Pearson Correlation	0,93	0,62	0,68	0,48
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	78	78	78	78
Usefulness1	Pearson Correlation	0,62	0,84	0,70	0,30
	Sig. (2-tailed)	0,000	0,000	0,000	0,008
	N	80	80	80	80
Usefulness2	Pearson Correlation	0,59	0,74	0,71	0,47
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Usefulness3	Pearson Correlation	0,62	0,86	0,68	0,33
	Sig. (2-tailed)	0,000	0,000	0,000	0,003
	N	80	80	80	80
Usefulness4	Pearson Correlation	0,65	0,86	0,66	0,26
	Sig. (2-tailed)	0,000	0,000	0,000	0,019
	N	80	80	80	80
Usefulness5	Pearson Correlation	0,46	0,76	0,63	0,23
	Sig. (2-tailed)	0,000	0,000	0,000	0,037
	N	80	80	80	80
Usefulness6	Pearson Correlation	0,59	0,85	0,63	0,41
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Usefulness7	Pearson Correlation	0,43	0,78	0,61	0,40
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Usefulness8	Pearson Correlation	0,56	0,84	0,66	0,38
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Usefulness9	Pearson Correlation	0,46	0,84	0,66	0,18
	Sig. (2-tailed)	0,000	0,000	0,000	0,107
	N	80	80	80	80
Usefulness10	Pearson Correlation	0,50	0,86	0,67	0,30
	Sig. (2-tailed)	0,000	0,000	0,000	0,007
	N	80	80	80	80
Usefulness11	Pearson Correlation	0,51	0,66	0,70	0,41
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80

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Table F.13. (Cont.)

Attitude1	Pearson Correlation	0,59	0,86	0,89	0,30
	Sig. (2-tailed)	0,000	0,000	0,000	0,007
	N	80	80	80	80
Attitude2	Pearson Correlation	0,54	0,64	0,89	0,44
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Attitude3	Pearson Correlation	0,65	0,70	0,90	0,58
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Concern_Health	Pearson Correlation	-0,07	0,19	0,07	0,00
	Sig. (2-tailed)	0,552	0,084	0,518	0,992
	N	80	80	80	80
InternalInfluence	Pearson Correlation	0,00	0,16	0,21	0,06
	Sig. (2-tailed)	0,989	0,168	0,057	0,580
	N	80	80	80	80
Security	Pearson Correlation	0,62	0,58	0,53	0,28
	Sig. (2-tailed)	0,000	0,000	0,000	0,011
	N	80	80	80	80
Size	Pearson Correlation	0,52	0,59	0,68	0,50
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Ergonomic	Pearson Correlation	0,63	0,68	0,82	0,50
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
CostExist	Pearson Correlation	-0,04	0,22	0,06	-0,06
	Sig. (2-tailed)	0,697	0,047	0,598	0,617
	N	80	80	80	80
EoU	Pearson Correlation	1,00	0,68	0,66	0,44
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Usefulness	Pearson Correlation	0,68	1,00	0,82	0,42
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80
Attitude	Pearson Correlation	0,66	0,82	1,00	0,49
	Sig. (2-tailed)	0,000	0,000	0,000	0,000
	N	80	80	80	80

APPENDIX G

ANOVA ANALYSES (GENDER)

Table G.14. ANOVA Analyses of gender.

Gender			**Women**	**Men**	
					Total
		N=	59	21	80
Variables	**F**	**Sig.**	**Mean**	**Mean**	**Mean**
Pleasure	10,613	0,002	**4,39**	**3,43**	**4**
Usefulness3	9,926	0,002	**4,39**	**3,52**	**4**
Triability	9,134	0,003	**4,76**	**4,05**	**5**
AquaTherapy	9,011	0,004	**4,41**	**3,62**	**4**
FacilitatingCond	8,730	0,004	**4,90**	**4,43**	**5**
Flexibility	7,595	0,007	**4,49**	**3,81**	**4**
Ergonomic2	7,454	0,008	**4,29**	**3,57**	**4**
CostExist1	7,112	0,009	**4,19**	**3,33**	**4**
Ergonomic	6,496	0,013	**4,31**	**3,69**	**4**
Usefulness4	6,129	0,015	**4,49**	**3,86**	**4**
Personalization	5,161	0,026	**4,59**	**4,10**	**4**
Usefulness2	4,933	0,029	**4,27**	**3,71**	**4**
Attitude	4,855	0,031	**4,49**	**4,00**	**4**
Attitude2	4,830	0,031	**4,46**	**3,90**	**4**
Usefulness1	4,796	0,032	**4,31**	**3,76**	**4**
Privacy	4,732	0,033	**4,73**	**4,24**	**5**
CostExist	4,297	0,041	**4,07**	**3,43**	**4**
Ergonomic1	4,281	0,042	**4,32**	**3,81**	**4**
Compatability	4,069	0,047	**4,10**	**3,43**	**4**
Self_efficacy1	3,944	0,051	**4,00**	**3,29**	**4**
Usefulness9	3,660	0,059	**4,66**	**4,24**	**5**
Size1	3,619	0,061	**4,20**	**3,71**	**4**
Usefulness	3,430	0,068	**4,33**	**3,93**	**4**
Attitude3	3,415	0,068	**4,49**	**4,05**	**4**
Attitude1	3,302	0,073	**4,51**	**4,05**	**4**
Innovativeness	3,211	0,077	**3,64**	**3,10**	**4**
EoU	2,892	0,093	**3,98**	**3,50**	**4**
Security2	2,494	0,118	**3,88**	**3,43**	**4**
Size	2,298	0,134	**4,13**	**3,76**	**4**
Assistant	2,228	0,140	**3,14**	**3,76**	**3**
Regulation	2,007	0,161	**4,90**	**4,76**	**5**

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Table G.14. (Cont.)

EoU1	1,916	0,170	**3,95**	**3,52**	**4**
InternalInfluence2	1,799	0,184	**4,64**	**4,38**	**5**
EoU2	1,759	0,189	**4,00**	**3,60**	**4**
Location	1,696	0,197	**3,22**	**2,71**	**3**
Usefulness7	1,616	0,207	**4,19**	**3,81**	**4**
Dif_Giy	1,595	0,210	**0,24**	**0,38**	**0**
CostExist2	1,496	0,225	**3,95**	**3,52**	**4**
Intention	1,444	0,233	**3,15**	**3,57**	**3**
Concern_Health1	1,434	0,235	**3,76**	**3,33**	**4**
Usefulness6	1,424	0,236	**4,12**	**3,76**	**4**
CostProduct1	1,279	0,261	**4,31**	**3,95**	**4**
Usefulness10	1,136	0,290	**4,46**	**4,19**	**4**
Dif_Arac	1,125	0,292	**0,39**	**0,52**	**0**
Dif_Bekle	1,125	0,292	**0,61**	**0,48**	**1**
ExternalInfluence	1,117	0,294	**3,78**	**3,43**	**4**
Usefulness5	1,091	0,299	**4,54**	**4,29**	**4**
Security1	1,078	0,302	**3,31**	**2,95**	**3**
Dif_Kalabalik	1,049	0,309	**0,44**	**0,57**	**0**
Self_efficacy2	1,024	0,315	**3,58**	**3,19**	**3**
Size2	0,901	0,345	**4,05**	**3,81**	**4**
Concern_Health3	0,870	0,354	**4,02**	**3,71**	**4**
Image	0,746	0,390	**3,19**	**2,86**	**3**
Dif_Cik	0,726	0,397	**0,24**	**0,33**	**0**
Dif_Trafik	0,677	0,413	**0,37**	**0,48**	**0**
EoL1	0,667	0,417	**3,42**	**3,14**	**3**
CostChange	0,611	0,437	**3,29**	**3,00**	**3**
Weight_Prob	0,603	0,440	**2,66**	**2,95**	**3**
EoL2	0,588	0,445	**3,97**	**3,71**	**4**
Dif_Zaman	0,571	0,452	**0,53**	**0,43**	**1**
Security	0,543	0,463	**3,70**	**3,50**	**4**
InternalInfluence	0,399	0,530	**4,42**	**4,29**	**4**
Storage	0,380	0,539	**3,10**	**2,86**	**3**
Concern_Health	0,203	0,653	**3,69**	**3,55**	**4**
Proxy	0,117	0,733	**1,66**	**1,62**	**2**
CostProduct2	0,116	0,734	**2,56**	**2,43**	**3**
Usefulness11	0,075	0,785	**3,90**	**3,81**	**4**
Support	0,047	0,829	**4,08**	**4,14**	**4**
PatientYear	0,046	0,831	**3,61**	**3,52**	**4**
Therapy1	0,028	0,867	**2,56**	**2,62**	**3**
Security3	0,016	0,898	**3,53**	**3,57**	**4**
Difficulty1	0,006	0,941	**3,31**	**3,33**	**3**
Concern_Health2	0,004	0,947	**3,36**	**3,38**	**3**

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Table G.14. (Cont.)

Quality	0,003	0,955	**4,25**	**4,24**	**4**
Difficulty3	0,001	0,977	**2,85**	**2,86**	**3**
InternalInfluence1	0,000	0,988	**4,19**	**4,19**	**4**
Usefulness8	0,000	0,993	**4,29**	**4,29**	**4**

APPENDIX H

ANOVA ANALYSES (AGE)

Table H.15. ANOVA Analyses of age.

Age			24 or below	25-34	35-44	45 or above	
							Total
		N=	2	32	24	22	80
Variables	**F**	**Sig.**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**
CostProduct2	3,50	0,011	**3,00**	**2,78**	**1,92**	**2,77**	**2,53**
Usefulness3	3,91	0,012	**4,50**	**4,34**	**3,54**	**4,55**	**4,16**
PatientYear	2,26	0,071	**1,50**	**2,94**	**4,08**	**4,18**	**3,59**
Usefulness1	2,39	0,075	**5,00**	**4,34**	**3,75**	**4,27**	**4,16**
Usefulness4	2,24	0,090	**4,50**	**4,53**	**3,88**	**4,50**	**4,33**
CostChange	2,05	0,096	**4,50**	**3,63**	**2,58**	**3,18**	**3,21**
Concern_Health	1,93	0,114	**3,75**	**3,28**	**3,67**	**4,16**	**3,65**
Dif_Cik	1,84	0,129	**0,50**	**0,16**	**0,33**	**0,32**	**0,26**
AquaTherapy	1,81	0,135	**4,00**	**4,00**	**4,17**	**4,55**	**4,20**
Usefulness	1,79	0,156	**4,73**	**4,28**	**3,92**	**4,43**	**4,22**
Intention	1,73	0,168	**5,00**	**3,44**	**3,19**	**2,93**	**3,26**
Concern_Health3	1,65	0,170	**4,50**	**3,59**	**3,92**	**4,41**	**3,94**
Triability	1,62	0,178	**3,50**	**4,44**	**4,54**	**4,91**	**4,58**
Security2	1,57	0,190	**5,00**	**4,00**	**3,38**	**3,73**	**3,76**
Ergonomic2	1,54	0,200	**5,00**	**4,09**	**3,83**	**4,32**	**4,10**
CostProduct1	1,53	0,203	**2,00**	**4,34**	**3,79**	**4,68**	**4,21**
Image	1,51	0,207	**5,00**	**3,03**	**2,88**	**3,27**	**3,10**
CostExist1	1,51	0,207	**3,00**	**4,13**	**3,67**	**4,14**	**3,96**
Concern_Health2	1,50	0,212	**3,00**	**2,97**	**3,42**	**3,91**	**3,36**
Self_efficacy2	1,45	0,225	**4,50**	**3,66**	**3,63**	**2,95**	**3,48**
InternalInfluence	1,45	0,228	**4,50**	**4,36**	**4,27**	**4,52**	**4,38**
Ergonomic	1,35	0,260	**5,00**	**4,17**	**3,96**	**4,23**	**4,14**
Usefulness8	1,35	0,265	**4,50**	**4,22**	**4,04**	**4,64**	**4,29**
Usefulness5	1,32	0,276	**5,00**	**4,56**	**4,17**	**4,64**	**4,48**
Compatability	1,30	0,278	**5,00**	**4,00**	**3,54**	**4,14**	**3,93**
InternalInfluence1	1,28	0,286	**4,00**	**4,22**	**4,13**	**4,23**	**4,19**
Self_efficacy1	1,28	0,287	**4,00**	**3,69**	**3,92**	**3,86**	**3,81**
Attitude1	1,24	0,300	**5,00**	**4,28**	**4,21**	**4,68**	**4,39**
CostExist	1,23	0,305	**3,25**	**4,16**	**3,60**	**3,91**	**3,90**
Security	1,22	0,311	**5,00**	**3,78**	**3,42**	**3,59**	**3,65**

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Table H.15. (Cont.)

Usefulness9	1,18	0,322	**5,00**	**4,59**	**4,29**	**4,73**	**4,55**
Usefulness2	1,18	0,324	**4,50**	**4,09**	**3,88**	**4,41**	**4,13**
Usefulness7	1,17	0,326	**4,50**	**4,13**	**3,75**	**4,36**	**4,09**
CostExist2	1,17	0,329	**3,50**	**4,19**	**3,54**	**3,68**	**3,84**
Support	1,16	0,334	**4,50**	**4,03**	**4,08**	**4,18**	**4,10**
Usefulness6	1,14	0,337	**4,50**	**4,03**	**3,71**	**4,32**	**4,03**
Usefulness10	1,14	0,337	**5,00**	**4,41**	**4,13**	**4,59**	**4,39**
Location	1,14	0,344	**3,00**	**3,22**	**3,00**	**3,00**	**3,09**
Ergonomic1	1,13	0,351	**5,00**	**4,25**	**4,08**	**4,14**	**4,19**
Size1	1,11	0,357	**5,00**	**4,09**	**4,04**	**4,00**	**4,08**
EoL2	1,09	0,368	**5,00**	**4,13**	**3,75**	**3,64**	**3,90**
EoU	1,02	0,387	**4,75**	**3,98**	**3,58**	**3,89**	**3,86**
Innovativeness	1,04	0,393	**2,00**	**3,25**	**3,58**	**3,91**	**3,50**
EoU1	1,01	0,395	**4,50**	**3,97**	**3,50**	**3,95**	**3,84**
Difficulty3	1,02	0,401	**3,00**	**2,72**	**3,00**	**2,86**	**2,85**
InternalInfluence2	1,01	0,406	**5,00**	**4,50**	**4,42**	**4,82**	**4,58**
Personalization	0,99	0,416	**4,50**	**4,16**	**4,67**	**4,68**	**4,46**
Difficulty1	0,95	0,438	**3,00**	**2,97**	**3,33**	**3,82**	**3,31**
Weight_Prob	0,92	0,457	**2,50**	**2,81**	**2,67**	**2,73**	**2,74**
Proxy	0,89	0,475	**1,00**	**1,69**	**1,58**	**1,73**	**1,65**
EoU2	0,84	0,477	**5,00**	**4,00**	**3,78**	**3,76**	**3,90**
Dif_Zaman	0,88	0,478	**0,50**	**0,47**	**0,54**	**0,50**	**0,50**
Quality	0,88	0,483	**5,00**	**4,16**	**4,13**	**4,45**	**4,25**
Assistant	0,85	0,499	**4,00**	**2,88**	**3,88**	**3,23**	**3,30**
Dif_Trafik	0,79	0,533	**0,50**	**0,34**	**0,38**	**0,50**	**0,40**
Dif_Giy	0,79	0,537	**0,50**	**0,28**	**0,21**	**0,32**	**0,28**
Size	0,75	0,564	**4,75**	**4,00**	**4,00**	**4,05**	**4,03**
Privacy	0,70	0,596	**5,00**	**4,63**	**4,29**	**4,86**	**4,60**
Usefulness11	0,63	0,601	**5,00**	**3,81**	**3,96**	**3,77**	**3,88**
Attitude	0,61	0,608	**5,00**	**4,33**	**4,24**	**4,47**	**4,36**
Security3	0,65	0,626	**5,00**	**3,56**	**3,46**	**3,45**	**3,54**
Pleasure	0,61	0,655	**5,00**	**4,31**	**3,58**	**4,41**	**4,14**
Dif_Kalabalik	0,53	0,713	**0,50**	**0,38**	**0,63**	**0,45**	**0,48**
FacilitatingCond	0,48	0,751	**5,00**	**4,72**	**4,75**	**4,86**	**4,78**
Attitude2	0,39	0,759	**5,00**	**4,34**	**4,21**	**4,32**	**4,31**
Therapy1	0,45	0,775	**3,50**	**2,66**	**2,63**	**2,32**	**2,58**
Attitude3	0,34	0,794	**5,00**	**4,38**	**4,29**	**4,41**	**4,38**
Security1	0,41	0,799	**4,50**	**3,06**	**3,50**	**3,00**	**3,21**
Regulation	0,41	0,802	**4,00**	**4,75**	**4,96**	**5,00**	**4,86**
Flexibility	0,41	0,803	**4,50**	**4,13**	**4,21**	**4,68**	**4,31**
Size2	0,41	0,803	**4,50**	**3,91**	**3,96**	**4,09**	**3,99**
Dif_Arac	0,35	0,844	**0,50**	**0,47**	**0,42**	**0,36**	**0,43**

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Table H.15. (Cont.)

Dif_Bekle	0,28	0,890	**0,50**	**0,53**	**0,63**	**0,59**	**0,58**
Concern_Health1	0,21	0,934	**4,50**	**3,66**	**3,46**	**3,77**	**3,65**
Storage	0,15	0,962	**2,00**	**2,94**	**3,00**	**3,32**	**3,04**
EoL1	0,15	0,962	**4,00**	**3,00**	**3,96**	**3,14**	**3,35**
ExternalInfluence	0,09	0,986	**5,00**	**3,78**	**3,46**	**3,68**	**3,69**

APPENDIX I

ANOVA ANALYSES (EDUCATION LEVEL)

Table I.16. ANOVA Analyses of education level.

Education Level			Primary school	High school	University	Master	Doctorate	
								Total
		N=	4	20	29	23	4	80
Variables	**F**	**Sig.**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**
CostProduct2	3,501	0,011	2,00	1,95	2,59	2,65	4,75	2,53
Usefulness5	3,132	0,019	3,00	4,40	4,62	4,52	5,00	4,48
PatientYear	2,259	0,071	4,25	4,10	3,76	2,83	3,50	3,59
Intention	2,133	0,085	3,13	2,65	3,57	3,24	4,38	3,26
CostChange	2,046	0,096	4,00	2,75	3,24	3,17	4,75	3,21
Concern_Health	1,930	0,114	3,00	3,95	3,84	3,17	4,13	3,65
EoU2	1,849	0,129	4,75	3,45	4,07	3,82	4,67	3,90
Dif_Cik	1,844	0,129	0,25	0,35	0,17	0,22	0,75	0,26
AquaTherapy	1,813	0,135	5,00	4,25	4,31	3,78	4,75	4,20
Concern_Health3	1,653	0,170	3,00	4,25	4,07	3,57	4,50	3,94
Triability	1,621	0,178	4,00	4,85	4,66	4,26	5,00	4,58
Security2	1,573	0,190	3,75	3,25	4,00	3,83	4,25	3,76
Ergonomic2	1,538	0,200	4,75	3,70	4,21	4,09	4,75	4,10
CostProduct1	1,526	0,203	4,00	4,40	4,07	4,48	3,00	4,21
Image	1,513	0,207	4,00	2,85	3,34	2,70	4,00	3,10
CostExist1	1,513	0,207	3,00	3,75	3,86	4,30	4,75	3,96
Concern_Health2	1,496	0,212	3,00	3,65	3,62	2,78	3,75	3,36
Self_efficacy2	1,453	0,225	4,00	2,85	3,48	3,87	3,75	3,48
InternalInfluence	1,445	0,228	5,00	4,60	4,21	4,35	4,13	4,38
Ergonomic	1,348	0,260	4,88	3,88	4,17	4,11	4,75	4,14
Usefulness2	1,345	0,261	5,00	3,95	4,10	4,04	4,75	4,13
Compatability	1,301	0,278	4,00	3,40	4,07	4,04	4,75	3,93
InternalInfluence1	1,279	0,286	5,00	4,40	3,97	4,22	3,75	4,19
Self_efficacy1	1,277	0,287	4,00	3,40	4,10	3,61	4,75	3,81
CostExist	1,230	0,305	3,38	3,53	3,90	4,24	4,38	3,90
Security	1,216	0,311	3,50	3,28	3,79	3,70	4,38	3,65
CostExist2	1,174	0,329	3,75	3,30	3,93	4,17	4,00	3,84
Support	1,164	0,334	4,50	3,90	4,00	4,17	5,00	4,10
Location	1,141	0,344	3,75	3,35	3,10	2,96	1,75	3,09
Ergonomic1	1,126	0,351	5,00	4,05	4,14	4,13	4,75	4,19
Size1	1,113	0,357	4,75	3,85	4,07	4,04	4,75	4,08

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Table I.16. (Cont.)

EoL2	1,089	0,368	3,50	3,55	3,90	4,13	4,75	3,90
EoU	1,053	0,386	4,13	3,53	3,98	3,80	4,63	3,86
Attitude3	1,046	0,390	4,75	4,10	4,55	4,26	4,75	4,38
Innovativeness	1,038	0,393	4,25	3,40	3,69	3,17	3,75	3,50
Usefulness9	1,026	0,400	4,00	4,35	4,62	4,65	5,00	4,55
Difficulty3	1,024	0,401	3,50	2,80	2,59	2,96	3,75	2,85
InternalInfluence2	1,014	0,406	5,00	4,80	4,45	4,48	4,50	4,58
Personalization	0,995	0,416	5,00	4,35	4,59	4,26	4,75	4,46
Difficulty1	0,953	0,438	4,00	3,35	3,34	2,96	4,25	3,31
Weight_Prob	0,920	0,457	3,00	3,25	2,48	2,61	2,50	2,74
Proxy	0,889	0,475	1,75	1,60	1,69	1,70	1,25	1,65
Attitude2	0,883	0,478	5,00	4,10	4,34	4,26	4,75	4,31
Dif_Zaman	0,883	0,478	0,25	0,45	0,45	0,61	0,75	0,50
Quality	0,876	0,483	5,00	4,10	4,31	4,09	4,75	4,25
Assistant	0,848	0,499	4,00	2,95	3,66	3,09	3,00	3,30
Dif_Trafik	0,794	0,533	0,25	0,30	0,52	0,39	0,25	0,40
Dif_Giy	0,787	0,537	0,25	0,40	0,17	0,30	0,25	0,28
Size	0,746	0,564	4,50	3,90	4,03	3,96	4,63	4,03
Usefulness3	0,727	0,576	4,00	3,85	4,24	4,26	4,75	4,16
Privacy	0,698	0,596	5,00	4,50	4,69	4,43	5,00	4,60
Usefulness10	0,683	0,606	4,00	4,15	4,52	4,52	4,25	4,39
Usefulness	0,680	0,608	3,98	4,02	4,34	4,23	4,59	4,22
Usefulness4	0,655	0,625	4,00	4,10	4,48	4,30	4,75	4,33
Security3	0,654	0,626	3,25	3,30	3,59	3,57	4,50	3,54
Attitude	0,648	0,630	4,58	4,17	4,44	4,30	4,83	4,36
Usefulness8	0,617	0,652	4,00	4,10	4,45	4,22	4,75	4,29
Usefulness6	0,616	0,652	3,75	3,85	4,28	3,87	4,25	4,03
Pleasure	0,612	0,655	4,00	4,05	4,21	4,00	5,00	4,14
EoU1	0,591	0,670	3,50	3,60	3,90	3,91	4,50	3,84
Usefulness11	0,584	0,675	4,00	3,50	4,03	3,96	4,00	3,88
Attitude1	0,542	0,705	4,00	4,30	4,41	4,39	5,00	4,39
Dif_Kalabalik	0,531	0,713	0,25	0,50	0,55	0,39	0,50	0,48
FacilitatingCond	0,478	0,751	5,00	4,75	4,83	4,65	5,00	4,78
Therapy1	0,446	0,775	2,50	2,30	2,55	2,87	2,50	2,58
Usefulness1	0,424	0,791	4,00	4,05	4,17	4,17	4,75	4,16
Security1	0,413	0,799	3,75	2,95	3,31	3,26	3,00	3,21
Regulation	0,409	0,802	5,00	4,90	4,83	4,83	5,00	4,86
Flexibility	0,408	0,803	4,50	4,35	4,34	4,13	4,75	4,31
Size2	0,407	0,803	4,25	3,95	4,00	3,87	4,50	3,99
Dif_Arac	0,348	0,844	0,25	0,40	0,48	0,43	0,25	0,43
Dif_Bekle	0,280	0,890	0,75	0,50	0,59	0,61	0,50	0,58
Usefulness7	0,276	0,893	4,00	3,90	4,24	4,04	4,25	4,09

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Table I.16. (Cont.)

Concern_Health1	0,207	0,934	3,50	3,55	3,66	3,65	4,25	3,65
Storage	0,152	0,962	3,00	3,15	3,14	2,87	2,75	3,04
EoL1	0,150	0,962	3,00	3,40	3,41	3,35	3,00	3,35
ExternalInfluence	0,087	0,986	3,50	3,65	3,72	3,65	4,00	3,69

APPENDIX J

ANOVA ANALYSES (INCOME)

Table J.17. ANOVA Analyses of income.

Income			0-1000 TL	1001-2000TL	2001-3000TL	3001-4000TL	4001TL and over	
								Total
		N=	9	12	18	18	23	80
Variables	**F**	**Sig.**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**
EoL2	4,966	0,001	**3,78**	**3,92**	**2,89**	**4,33**	**4,39**	**3,90**
CostProduct2	4,935	0,001	**1,56**	**2,00**	**1,89**	**3,00**	**3,30**	**2,53**
Storage	4,096	0,005	**2,56**	**3,58**	**3,72**	**2,00**	**3,22**	**3,04**
Innovativeness	4,033	0,005	**2,33**	**3,92**	**3,78**	**3,11**	**3,83**	**3,50**
Compatability	3,987	0,005	**3,22**	**4,25**	**3,11**	**4,39**	**4,30**	**3,93**
Intention	3,048	0,022	**3,17**	**2,79**	**2,56**	**3,67**	**3,78**	**3,26**
Pleasure	2,601	0,043	**3,78**	**4,42**	**3,44**	**4,39**	**4,48**	**4,14**
ExternalInfluence	2,590	0,043	**2,78**	**4,33**	**3,61**	**3,39**	**4,00**	**3,69**
EoU1	2,454	0,053	**3,56**	**3,58**	**3,28**	**4,33**	**4,13**	**3,84**
EoU	2,441	0,054	**3,61**	**3,67**	**3,31**	**4,28**	**4,15**	**3,86**
InternalInfluence1	2,427	0,055	**3,33**	**4,50**	**4,22**	**4,00**	**4,48**	**4,19**
Weight_Prob	2,230	0,074	**4,00**	**2,83**	**2,39**	**2,44**	**2,70**	**2,74**
Flexibility	2,221	0,075	**4,11**	**4,33**	**4,56**	**3,78**	**4,61**	**4,31**
FacilitatingCond	2,219	0,075	**4,22**	**5,00**	**4,89**	**4,78**	**4,78**	**4,78**
Support	2,212	0,076	**4,33**	**3,75**	**3,67**	**4,56**	**4,17**	**4,10**
Dif_Zaman	2,089	0,091	**0,11**	**0,50**	**0,44**	**0,56**	**0,65**	**0,50**
Dif_Kalabalik	2,089	0,091	**0,33**	**0,58**	**0,22**	**0,56**	**0,61**	**0,48**
InternalInfluence	2,074	0,093	**3,78**	**4,67**	**4,44**	**4,25**	**4,52**	**4,38**
Usefulness8	2,037	0,098	**3,78**	**4,00**	**4,11**	**4,78**	**4,39**	**4,29**
Self_efficacy1	1,981	0,106	**4,56**	**3,75**	**3,28**	**3,50**	**4,22**	**3,81**
Usefulness6	1,970	0,108	**3,67**	**4,00**	**3,56**	**4,56**	**4,13**	**4,03**
Dif_Giy	1,920	0,116	**0,11**	**0,33**	**0,17**	**0,50**	**0,22**	**0,28**
Usefulness9	1,884	0,122	**4,22**	**4,83**	**4,17**	**4,67**	**4,74**	**4,55**
Attitude1	1,882	0,122	**4,22**	**4,58**	**3,89**	**4,72**	**4,48**	**4,39**
Self_efficacy2	1,857	0,127	**4,33**	**3,08**	**2,89**	**3,67**	**3,65**	**3,48**
CostExist1	1,731	0,152	**3,11**	**4,58**	**3,89**	**3,94**	**4,04**	**3,96**
Difficulty1	1,704	0,158	**2,22**	**3,83**	**3,28**	**3,39**	**3,43**	**3,31**
Image	1,647	0,171	**3,44**	**3,08**	**2,50**	**2,89**	**3,61**	**3,10**
Usefulness4	1,629	0,176	**4,00**	**4,42**	**3,89**	**4,61**	**4,52**	**4,33**
Dif_Bekle	1,605	0,182	**0,33**	**0,75**	**0,44**	**0,56**	**0,70**	**0,58**

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Table J.17. (Cont.)

AquaTherapy	1,581	0,188	**4,33**	**4,67**	**4,33**	**3,72**	**4,17**	**4,20**
Usefulness5	1,547	0,197	**4,22**	**4,17**	**4,22**	**4,78**	**4,70**	**4,48**
Usefulness	1,463	0,222	**3,99**	**4,20**	**3,91**	**4,53**	**4,34**	**4,22**
Concern_Health3	1,419	0,236	**3,22**	**4,42**	**3,72**	**3,94**	**4,13**	**3,94**
Security2	1,387	0,247	**3,44**	**3,75**	**3,33**	**4,00**	**4,04**	**3,76**
EoU2	1,300	0,278	**3,67**	**3,75**	**3,47**	**4,22**	**4,14**	**3,90**
Assistant	1,278	0,286	**2,44**	**2,75**	**3,44**	**3,56**	**3,61**	**3,30**
Quality	1,266	0,291	**3,89**	**4,67**	**3,94**	**4,17**	**4,48**	**4,25**
Usefulness11	1,250	0,297	**3,56**	**3,67**	**3,50**	**4,28**	**4,09**	**3,88**
Privacy	1,246	0,299	**4,22**	**4,42**	**4,44**	**4,72**	**4,87**	**4,60**
Proxy	1,206	0,315	**1,56**	**1,58**	**1,78**	**1,78**	**1,52**	**1,65**
Attitude	1,162	0,335	**4,11**	**4,47**	**4,06**	**4,61**	**4,43**	**4,36**
Triability	1,150	0,340	**4,11**	**4,92**	**4,44**	**4,50**	**4,74**	**4,58**
CostExist	1,128	0,350	**3,17**	**4,29**	**3,86**	**3,97**	**3,96**	**3,90**
Security1	1,117	0,355	**3,67**	**2,67**	**3,17**	**3,56**	**3,09**	**3,21**
CostChange	1,111	0,358	**2,56**	**2,92**	**3,11**	**3,67**	**3,35**	**3,21**
Attitude3	1,046	0,389	**4,00**	**4,33**	**4,17**	**4,67**	**4,48**	**4,38**
PatientYear	1,034	0,395	**3,67**	**3,08**	**4,17**	**3,33**	**3,57**	**3,59**
Concern_Health	1,030	0,397	**3,17**	**4,17**	**3,58**	**3,50**	**3,74**	**3,65**
Ergonomic2	1,021	0,402	**3,67**	**4,00**	**3,89**	**4,39**	**4,26**	**4,10**
Usefulness2	1,008	0,409	**4,11**	**4,08**	**3,83**	**4,50**	**4,09**	**4,13**
Regulation	0,998	0,414	**5,00**	**4,92**	**4,89**	**4,89**	**4,74**	**4,86**
Ergonomic	0,956	0,437	**3,78**	**4,17**	**3,92**	**4,42**	**4,24**	**4,14**
Usefulness10	0,933	0,450	**4,22**	**4,42**	**4,11**	**4,72**	**4,39**	**4,39**
CostProduct1	0,924	0,454	**3,89**	**4,67**	**4,44**	**4,11**	**4,00**	**4,21**
InternalInfluence2	0,899	0,469	**4,22**	**4,83**	**4,67**	**4,50**	**4,57**	**4,58**
Dif_Arac	0,899	0,469	**0,22**	**0,42**	**0,33**	**0,56**	**0,48**	**0,43**
Personalization	0,867	0,488	**4,44**	**4,83**	**4,50**	**4,22**	**4,43**	**4,46**
Location	0,857	0,494	**3,00**	**3,58**	**3,28**	**3,17**	**2,65**	**3,09**
Ergonomic1	0,834	0,508	**3,89**	**4,33**	**3,94**	**4,44**	**4,22**	**4,19**
Security	0,780	0,542	**3,61**	**3,54**	**3,33**	**3,94**	**3,74**	**3,65**
Usefulness1	0,720	0,581	**4,11**	**4,33**	**3,83**	**4,33**	**4,22**	**4,16**
Concern_Health2	0,701	0,593	**3,11**	**3,92**	**3,44**	**3,06**	**3,35**	**3,36**
Usefulness3	0,686	0,604	**4,00**	**4,17**	**3,83**	**4,28**	**4,39**	**4,16**
Size1	0,602	0,663	**4,11**	**3,92**	**3,83**	**4,11**	**4,30**	**4,08**
CostExist2	0,547	0,701	**3,22**	**4,00**	**3,83**	**4,00**	**3,87**	**3,84**
Security3	0,524	0,719	**3,78**	**3,33**	**3,33**	**3,89**	**3,43**	**3,54**
Dif_Trafik	0,518	0,723	**0,33**	**0,33**	**0,39**	**0,33**	**0,52**	**0,40**
EoL1	0,493	0,741	**3,56**	**3,08**	**3,17**	**3,67**	**3,30**	**3,35**
Attitude2	0,439	0,780	**4,11**	**4,50**	**4,11**	**4,44**	**4,35**	**4,31**
Size	0,364	0,833	**4,06**	**3,88**	**3,86**	**4,17**	**4,13**	**4,03**
Size2	0,357	0,838	**4,00**	**3,83**	**3,89**	**4,22**	**3,96**	**3,99**

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Table J.17. (Cont.)

Difficulty3	0,310	0,870	**2,44**	**2,75**	**2,83**	**2,94**	**3,00**	**2,85**
Therapy1	0,305	0,874	**2,89**	**2,67**	**2,44**	**2,72**	**2,39**	**2,58**
Concern_Health1	0,271	0,895	**3,44**	**3,50**	**3,72**	**3,50**	**3,87**	**3,65**
Usefulness7	0,211	0,931	**4,00**	**4,17**	**3,94**	**4,28**	**4,04**	**4,09**
Dif_Cik	0,098	0,983	**0,33**	**0,25**	**0,28**	**0,22**	**0,26**	**0,26**