

PAIN TOLERANCE AND SLEEP QUALITY IN WOMEN WITH MULTIPLE SCLEROSIS REFERRED TO GOLESTAN HOSPITAL, AHVAZ, IRAN.

Ghazaleh Shekasteband

M.Sc. in Clinical Psychology, Andimeshk Branch, Islamic Azad University,
Andimeshk, Iran.

Email: Ghazaleh.Shekastebandd@gmail (ORCID: 0009-0002-3219-4260)

<https://doi.org/10.5281/zenodo.20584977>

Abstract. *The aim of the present study was to determine the effectiveness of mindfulness training based on virtual reality on perceived stress, pain tolerance, and sleep quality in women with multiple sclerosis referred to Golestan Hospital. The statistical population of this study included all individuals who referred to Golestan Hospital in Ahvaz with multiple sclerosis in 2015. The sample size was 30 women with multiple sclerosis who were selected through purposive sampling and randomly assigned to an experimental group (15 people) who received mindfulness training based on virtual reality and a control group of 15 people who did not receive treatment. The research method was a quasi-experimental design with a pre-test-post-test design with a control group. The instruments used in this study included the Cohen et al.*

Perceived Stress Questionnaire (1983), the Pain Tolerance Questionnaire (McGill, 1997), the Boyce et al. Sleep Quality Questionnaire (1989), and the mindfulness training treatment protocol based on virtual reality by Pouyan et al. (1404). Univariate and multivariate analysis of covariance were used to analyze the data. The findings showed that the effectiveness of mindfulness training based on virtual reality had a different and significant effect on the three variables of perceived stress, pain tolerance, and sleep quality of women with multiple sclerosis referred to Golestan Hospital in the experimental and control groups.

Keywords: *mindfulness based on virtual reality, perceived stress, pain tolerance, sleep quality, multiple sclerosis.*

Introduction

Multiple sclerosis (MS), as a chronic, inflammatory, and demyelinating disease of the central nervous system, is one of the most common autoimmune diseases in young adults. This disorder, by destroying the myelin sheath and nerve damage, leads to a wide range of functional disorders, including motor, cognitive, and psychological problems. Although the exact etiology of MS is still associated with uncertainties such as the interaction of genetic and environmental factors, its prevalence is increasing in countries such as Iran, which imposes a significant economic and social burden on families and health systems.

The consequences of this disease are not limited to physical damage; they also severely affect the psychological and quality of life dimensions. Among the extensive symptoms of MS, the three components of "perceived stress", "chronic pain", and "sleep disorders" are among the most common and debilitating factors that, in a vicious cycle, exacerbate each other and reduce the patient's tolerance threshold. Uncertainty about disease progression and fear of disability greatly increase stress, which in turn disrupts sleep quality and pain management. In response to these challenges, non-pharmacological psychological approaches, especially mindfulness, have been considered as complementary interventions due to their ability to promote acceptance and non-judgmental awareness. However, movement limitations and extreme fatigue in MS patients make their continued participation in face-to-face meetings a challenge.

Therefore, virtual reality (VR) technology, as a new tool, can provide an engaging and accessible experience by creating three-dimensional and immersive environments that remove barriers to participation. Given these needs, the present study was designed and implemented to determine the effectiveness of virtual reality-based mindfulness on perceived stress, pain tolerance, and sleep quality in women with multiple sclerosis in Golestan Hospital, Ahvaz.

Background

On the present study entitled “Metaphor and Symbolism in the Divan of Shams Tabrizi; An Analysis of the Mysterious Language of Mysticism”, no independent and comprehensive research has been conducted so far, and only limited case studies and studies have been conducted on this subject. Therefore, the present study was conducted in line with this existing necessity. The studies that were used as references in this study and are relevant to the content of the present study are introduced. Derakhshan (1403) in a study investigating the effectiveness of mindfulness therapy in controlling stress and drug temptation in people with drug use disorder under treatment; Lotfinia et al. (1402) in a study investigating the effect of relaxation-based virtual reality on psychological and physiological stress in substance abusers undergoing detoxification; Soleimani (1402) in a study investigating the effectiveness of mindfulness-based relapse prevention intervention on craving and perceived stress in drug-dependent people in the non-drug rehabilitation phase; Khodai-Rad and Atta Dokht (1400) in a study investigating the effectiveness of virtual reality method on the treatment of mental problems; Nazemi et al. (1399) in a study investigating the effectiveness of exposure therapy based on virtual reality on reducing symptoms of avoidance and perceived stress in people with social anxiety disorder; Arabloo, (1403) in a study investigating the effectiveness of mindfulness-based stress reduction on negative mood and emotion regulation in people with generalized anxiety disorder; Foroughi, Menshei (1403) in a study investigating the effectiveness of combined therapy based on virtual reality and mindfulness on trait anxiety in people with panic disorder; Mohammadi (1403) in a study investigating the effectiveness of mindfulness-based stress reduction training on resilience and distress tolerance; Bagherzadeh et al. (1402) conducted a study to investigate the effectiveness of mindfulness-based cognitive therapy on sleep quality and pain intensity in women with migraine. Multiple sclerosis (MS) is an inflammatory, chronic, and debilitating disease of the central nervous system that occurs most often in young adults and is associated with sensory, motor, cognitive, and psychological disorders. Despite medical advances, this disease still has no definitive cause, and factors such as genetic backgrounds, viral infections, and psychological stress are considered to be effective in its occurrence. The most common consequences of MS include anxiety, depression, stress, fatigue, and sleep disorders, which seriously affect the quality of life of patients. Given the importance of mental health in patients with MS and the lack of empirical research on the effectiveness of mindfulness-based virtual reality, this study seems necessary. Also, sleep disorders, as one of the important factors affecting physical and mental health, are of particular importance in these patients. The results of this study can help mental and physical health therapists design more effective interventions.

1- History of the subject

There is much debate about whether this disease has plagued mankind throughout history or whether it has only become a problem for humans about 200 years ago. Although there is evidence from ancient history that describes symptoms of a disease similar to MS, doctors are not sure whether what was described was the same disease as MS or another disease that was similar to MS in some features (Abramowitz, 2010).

For example, Augustus, a descendant of George III, King of England, described in his diary in 1822 the onset of his illness, which was accompanied by blurred vision. This blurred vision, which occurred immediately after returning from the funeral of a close relative, improved after two months, and this improvement was accompanied by the onset of double vision (Mirshafiei, 2010).

The disease had no official name until 1868, when Charcot of the Salpêtrière Hospital in Paris gave it the official name "sclerosing plaque". The name, which is still used in French-speaking countries, refers to the hardened spots or plaques that Dr. Jean-Martin Charcot found after the deaths of these patients and their autopsies. Dr. Charcot, who is now known as the father of neurology, also gave a detailed description of the damage that occurred in the nervous system of these patients. The articles that Dr. Charcot presented on these patients caused doctors around the world to be interested in the disease and, as a result, to classify it as an independent disease, like epilepsy or cerebral palsy. When doctors around the world became familiar with the disease, they chose other names than the name that the French had given to this disease. Dr. William Alexander Hammond, an American neurologist, chose the name multiple cerebral sclerosis for this disease, which was later shortened to multiple sclerosis, which is still used in English-speaking countries (Abramowitz, 2010).

2- Multiple sclerosis

In MS, the myelin of the central nervous system is inflamed and destroyed in the form of small or large, single or multiple plaques (Sultanzadeh, 2010). The presence of plaques disrupts the transmission of nerve impulses. It is said that myelin destruction causes the exposure of potassium channels located in the axon membrane (Sadeghi, 2010). Therefore, damage or destruction in any part of the myelin sheath causes irregularities in the transmission of incoming or outgoing messages from that part of the brain (Abramowitz, 2010; translated by Hemtkhah, 2010). Multiple sclerosis (MS) is a chronic progressive and destructive disease of the central nervous system, in which numerous demyelinated areas resulting from this disease cover the entire white matter and affect sensory and motor function (Ghaffari, 2010).

Inflammation, demyelination of nerves, and axonal degeneration are the main pathological mechanisms of MS. Demyelination, along with inflammation, causes the formation of specific lesions of MS or plaques. These lesions are especially seen in the brain, spinal cord, and optic nerves. Demyelination and axonal damage cause disruption in the transmission of nerve signals, resulting in the occurrence of neurological symptoms. Neurological symptoms reflect the affected area in the brain or spinal cord (Shafii Hanjani and Khoshnavis Ansari, 2010).

1-2- Diagnosis of MS

Although the diagnosis of MS is now much easier than a decade or two ago, its diagnosis has always been met with skepticism. The term MS or multiple sclerosis itself indicates that myelin destruction must be seen in at least two areas of the central nervous system (brain and spinal cord). In other words, more than one area of the brain and spinal cord must be involved in this process. New diagnostic methods such as MRI and VEP identify the damaged areas of myelin before the disease appears. In general, diagnosing MS is not an easy task, so a set of information must be used, including symptoms reported by the patient and the results of detailed clinical examinations, along with one or more tests, mainly MRI. In diagnosing brain and spinal cord lesions, at least one of the four tests MRI, VEP, MRS or Lumbar Puncture can help the doctor (Mirshafiei, 2010).

2-2- Types of MS

The clinical course of MS is divided into four groups:

1-1-2- Relapsing-remitting MS

RRMS accounts for 85% of MS cases in the early stages of the disease at the onset and manifests as isolated attacks that generally last for days to weeks. Often, complete recovery occurs over the following weeks to months, but during the attack, the person's ability to move is severely impaired; in about half of the cases, recovery does not occur. Patients are stable in terms of neurological symptoms during attacks (Pakzad et al., 2010).

2-1-2- Primary progressive MS

PPMS accounts for about 15% of cases. These patients do not experience attacks, but only experience a steady decline in function from the time of disease onset. This type of disease has a uniform gender distribution and begins on average at the age of 40 and progresses rapidly.

It is unclear whether MS is a rare form of the same underlying disease as MS or a distinct disease (Pakzad et al., 2010).

3.1.2- Secondary progressive MS

The course of SPMS symptoms always begins as RRMS, but the clinical course changes in such a way that the patient experiences a steady worsening process without any association with acute attacks. Fixed neurological deficits are more common than in the previous type, and the risk of developing this type is 2.5%.

4.1.2- Progressive relapsing-remitting MS

PRMS includes about 50% of patients and overlaps with PRMS and SPMS. These patients, like PRMS patients, show a uniform worsening process at the onset of the disease, and at the same time, like SPMS patients, they also experience occasional attacks of a progressive course of the disease (Pakzad et al., 2010).

3- Etiology of MS

In recent years, the prevalence of MS has increased worldwide. The main cause of this disease is unknown, but some sources believe that its cause is the joint role of genetics and the immune system with the presence of infectious agents, although there are still no definitive reasons to prove this hypothesis (Najafi Dolatabadi et al., 2010).

4- Etiology

The etiology of this disease is not precisely known, but a process consisting of genetic and environmental factors plays a role in it, and for this reason, individual susceptibility to this disease varies among patients.

1- 4- Immune system deficiency

Although the function of the immune system is to defend the body against external factors such as bacteria, in a group of diseases called autoimmune diseases, the immune system acts against the body's own organs (Adibnejad, 2010). In this disease, the immune system becomes overactive and sends a specific type of white blood cell to the myelin surrounding the nerve fibers and the nerve cells containing myelin. These cells attack myelin as if it were a foreign body (Nabavi and Iranpour, 2010). A group of scientists also consider MS to be a type of autoimmune disease (Adibnejad, 2010).

2- 4- Infectious factors

So far, several bacteria and viruses have been proposed as the cause of MS, including measles, rabies, hepatitis, Epstein-Barr virus, human herpes virus type 6, or chlamydia or pneumonia infection (Adibnejad, 2010).

It is likely that some viral diseases that occur in childhood play a role in the development of MS later. In the serum and cerebrospinal fluid, a number of MS patients have antibodies to measles, mumps, chickenpox, rubella, and influenza viruses more than other people.

3- 4- The role of heredity

Therefore, although MS is not hereditary, it may contribute to the onset or progression of the disease (Nabavi and Iranpour, 2010). However, the number of people who develop MS by chance is much higher. The probability of developing MS in relatives of a person with MS is 2%.

If one of the parents has MS, the probability of a daughter getting the disease is 4%, while the chance of a son is 2% (Nabavi and Iranpour, 2010).

4- 4- Pathology

In other words, myelin consists of 70% lipid and 30% protein, which is wrapped in a multilayer membrane around types of axons called myelinated axons. These axons have a high speed of transmitting nerve signals due to the presence of myelin. In other words, myelin plays an important role in accelerating the conduction of nerve current (Nabavi and Iranpour, 2010).

Myelin production in the central nervous system is carried out by oligodendrocyte cells in the peripheral nervous system by Schwann cells. It seems that both oligodendrocyte and myelin are damaged in MS. Due to damage to these components, the nerve fibers located under the myelin may also be damaged, which is called axonal damage (Nabavi and Iranpour, 2010).

5- 4- Neuroglia

The neurons of the central nervous system are protected by cells that are not excitable and do not transmit nerve impulses. These cells are collectively called neuroglia. These cells are smaller than neurons and are 5 to 10 times more numerous than neurons and constitute approximately half of the total volume of the brain and spinal cord. These cells are of four different types (Etmadifar and Ashtari, 2010).

A. Astrocytes

These are cells with a small cell volume and numerous branches in different directions, many of which are scattered around blood vessels, ependymal cells, and the pia mater. What is seen in the white matter of the central nervous system is the fibrous type of astrocyte, for which various functions have been described, for example, if nerve cell damage occurs in the white matter, it leads to the development of sclerosis due to the high repair power of astrocytes (Etmadifar and Ashtari, 2010).

B. Oligodendrocytes

These cells, which are smaller and less branched than astrocytes, are located in regular layers around nerve fibers and the cell body of neurons. It is believed that the myelin of the central nervous system is made by these cells. In diseases such as MS, these cells are targeted by the body's immune cells, and since the repair of these cells is slow, MS plaques are formed (Etmadifar and Ashtari, 2010).

C. Microglia

These are the smallest neuroglia cells that act like macrophages. In the normal and healthy brain and spinal cord, these cells are not active (Etamadi Far and Ashtari, 2010).

D. Appendages

are cells that cover the cavities of the brain and spinal cord and play a role in the secretion of cerebrospinal fluid (Etamadi Far and Ashtari, 2010). In the white matter of the central nervous system of MS patients, two events occur that do not occur normally. The first event is that fine spots of inflammation are created in the myelin.

The second event is called demyelination or loss of myelin. The above two events are not the same in two patients with MS, which is why the symptoms of the disease are different in different patients. Inflammation of the white matter causes the release of inflammatory cells and fluid from the blood vessels in the white matter and causes the destruction of myelin. When this happens, the transmission of nerve messages along the fibers in the areas where the inflammation has occurred is difficult. After a few weeks, the inflammation of the white matter subsides and it is possible for myelin to form again. This phenomenon is called remyelination. However, when inflammation is widespread, it leaves scars in the nervous system, which are called plaques. The size of plaques varies from the size of a pinhead to several centimeters (Etemadifar and Chitsaz, 2010).

5- Myelin and its repair

Certainly, the attempt to definitively cure MS and restore all its symptoms to their original state will be successful when the repair of myelin and the nerve fibers of the central nervous system is possible, and of course, these efforts will also be completely successful when the processes that cause myelin damage can be stopped. Extensive studies have been conducted on myelin and its reconstruction, showing that there is a natural ability to regenerate and repair myelin (of course, at a limited speed), and this repair is carried out by spontaneously stimulating myelin-forming cells called oligodendrocytes. Currently, several studies are being conducted to identify these stimulating factors, and it is hoped that by identifying these factors and reconstructing them artificially, this repair can be completed.

6- Epidemiology of MS

1- 6- Geographical distribution

In all studies conducted on MS, a geographical gradient has been seen, such that the prevalence rate increases at higher altitudes. The highest known prevalence of MS (250 cases per 100,000 population) is in northern Europe, while the northern United States and Canada have similarly high rates. In contrast, the prevalence of the disease is low in Japan (6 cases per 100,000 population), other parts of Asia, tropical Africa, and the Middle East. A possible explanation for the influence of latitude on the incidence of MS could be exposure to sunlight and its protective effect. Ultraviolet radiation from the sun is the most important source of vitamin A in most people, and vitamin A levels are low at high latitudes, where exposure to sunlight is low, especially during the winter months.

2- 6- Race

MS occurs in the three main races (black, yellow, and white) but is less common in Orientals or yellows, regardless of geographic region or country of residence. Most likely, the reason for this low prevalence is the protective effect of genetic-racial factors of these individuals against the disease (Etemadifar and Chitsaz, 2010).

3- 6- Age

The risk of MS gradually increases with age from childhood and reaches a maximum at the age of thirty and gradually decreases and reaches a minimum at the age of sixty and thereafter (Adibnejad, 2010).

4- 6- Gender

According to various studies, this disease is more common in women than men. The incidence of MS in women is 2 to 4 times that of men. The definitive reason for this difference has not yet been stated. However, interactions between hormonal factors and the immune system may be effective. The onset of the disease in old age is almost the same in women and men.

The duration of illness or death from this disease does not differ significantly between men and women (Etemadifar and Chitsaz, 2010; Etemadifar and Ashtari, 2010).

5- 6- Immigration

Surprising results have been obtained regarding the incidence of MS in people who migrate from one point to another in the world. It seems that the risk of developing this disease in migration is determined according to the new place of residence. This strengthens the hypothesis of the involvement of an environmental factor in the occurrence of this disease. If a person migrates from one country to another at a young age (under 15 years old), the risk of developing this disease in this person will ultimately be equivalent to that of people who reside in the destination country, but if this migration is done at an age older than 15 years old, the risk of developing MS in the person will remain equivalent to the risk of developing it in his or her original compatriots (parents) (Adebnejad, 2010).

6- 6- Socio-economic factors

MS is more common in higher socioeconomic classes (Etemadifar and Ashtari, 2010). It is probably more prevalent in urban communities than in rural communities (Etemadifar and Chitsaz, 2010). This is due to better health conditions and, as a result, delayed exposure to infectious agents (if the initial infection with some viruses such as polio and measles occurs later and at an older age, the likelihood of developing neurological complications increases) (Emami Mobidi, 2005).

7- Signs and symptoms

This disease threatens the individual's independence and ability to participate effectively in the family and society and leads patients to feel a lack of self-confidence (Payamani and Miri, 2010).

1- 7- Fatigue

Fatigue is one of the most common symptoms in patients with MS and for which they refer to the doctor. Fatigue is an emotion that is expressed by the patient in various ways, including lethargy, boredom, early fatigue, lack of motivation and energy, and hopelessness.

Approximately 85% of patients have experienced some form of fatigue during the course of the disease.

2- 7- Primary fatigue

Occurs due to damage to the myelin sheath of the central nervous system and leads to a decrease in central excitation, followed by lethargy, which can manifest itself in the following ways:

1. Short-term and localized lethargy and lethargy, severe fatigue, especially when a group of muscles is moving, such as walking
2. Fatigue due to sensitivity to heat, which is produced due to an increase in body temperature, such as changes in weather.

3- 7- Secondary Fatigue

Fatigue can be caused by other factors that are not necessarily related to MS. These factors include the following: Depression: It can be caused by damage to the central nervous system or due to the psychological effects of MS or the side effects of using medication to treat depression. Sleep disturbance: Often caused by symptoms such as spasms, depression, anxiety, pain. Medication: Some medications can directly and indirectly cause fatigue, such as sedatives.

Inadequate nutrition: Lack of adequate and proper nutrition causes a decrease in basic metabolism and makes the person face problems, such that they experience fatigue when

performing simple daily activities. Infections: Can cause some symptoms to worsen in people with MS and cause fever and increased body temperature, resulting in fatigue in MS patients.

4- 7- Ankle swelling

Lack of movement and impaired circulation of the lymphatic system lead to the accumulation of lymph fluid around the ankle. In summer, swelling increases due to heat. The use of diuretic drugs does not play a role in reducing edema (swelling) (Yekta Maram and Nazm Deh, 2019).

5- 7- Tremor (Shaking)

Tremor refers to rhythmic, shaking, or shaking movements that a person cannot control voluntarily. About 75 percent of MS patients have experienced tremor at some time, which can be affected in various ways in terms of speed, intensity, and duration. In some people, tremor is very weak (mild) and cannot be seen by others. But in some people it is so severe that it is clearly visible (these people are not even able to pour water into a glass). In some, the tremor is even more severe and causes shaking of the hands and feet. These people may face many problems in carrying out their daily activities such as eating, drinking and even getting dressed, which is not possible without the help of others. Tremor can gradually make the person frustrated, upset and tired of life (Yektamram and Nemzeh Deh, 2019).

6- 7- Motor tremor

When patients want to do something or reach for something, it causes shaking of the hands and arms. Most MS patients face this type of tremor (Yektamram and Nemzeh Deh, 2019).

7- 7- Postural tremor

This tremor occurs when a person wants to sit or stand. None of these tremors occur at rest or during sleep in MS patients (the presence of tremors at rest or during sleep may be due to medication or other complications other than MS, which requires further investigation).

8-7- Spasm

One of the common symptoms in MS patients is spasm, which is characterized by involuntary muscle stiffness of varying degrees and at different times. 80% of people with MS have experienced varying degrees of spasticity. Spasticity can range from muscle stiffness to painful spasms that usually occur in the legs. The following factors can lead to spasticity (Yektamram and Nazmedeh, 2019).

Sudden body movements, cold air, humidity, wearing tight clothing and shoes, constipation, infections such as viral infections (colds, flu) and bacterial infections (bladder infections and bedsores).

9- 7- Bedsores

Bedsores are a common problem in people with physical disabilities that occur in some MS patients at high risk. Bedsores usually occur when a part of the body's skin is under pressure for a while. The resulting pressure leads to reduced blood supply and skin damage, and ultimately infection may occur.

10- 7- Stress

Everyone experiences stress in some way or another throughout their lives. MS patients experience stress due to physical or mental symptoms and failure to accept reality. MS disease analysts believe that there is a direct relationship between stress and relapse in MS patients.

11- 7- Sexual disorders

Obviously, different people have different sexual desires. Sometimes a woman's desire may be much less than her wife's. Of course, there are also men whose sexual desires are much less than their wives'. This lack of desire has different reasons, including improper nutrition, lack of sleep, emotional anxiety, past emotional trauma, situational problems, and various diseases, including MS. Whatever the reason, inconsistency in expressing sexual desires usually causes a lot of discomfort for couples, especially the one who has a stronger desire.

Statistics and information show that 63 percent of people with MS have decreased sexual activity at the time of diagnosis. Studies have shown that 91 percent of men and 72 percent of women with MS have some kind of sexual disorder. It is argued that this will have adverse effects on the quality of marital life in the long term (ibid). 12- 7- Intestinal Disorder

Motility problems in the digestive system in people with MS can lead to constipation or diarrhea.

13- 7- Constipation

Constipation means hard and dry stools accompanied by a decrease in the frequency of bowel movements. Constipation is actually one of the stressful problems in the digestive system that may cause spasms or exacerbations in these people or may even lead to pressure on the person's bladder and produce pain or urinary problems. In many people, constipation is not dangerous, but sometimes it may indicate an underlying disease (Yekta Maram and Nazm Deh, 2019).

14- 7- Diarrhea

Passing three or more watery or loose stools during the day is called diarrhea. Diarrhea occurs when the intestinal muscles are more active. Diarrhea may be caused by specific reasons that need to be investigated, such as food poisoning, parasites, or intestinal inflammation (ibid.).

15- 7- Hearing impairment

Hearing loss is a rare symptom in patients with MS, with about 6 percent of MS patients having some kind of hearing impairment and often recovering. These patients rarely develop hearing loss. Hearing loss is usually accompanied by other symptoms such as vision problems and loss of balance control, which may be caused by damage to the central nervous system (brain stem). It is generally assumed that hearing impairment in patients with MS occurs due to inflammation or damage around the eighth central nerve, which is the location of the auditory nerve (ibid.).

16- 7- Respiratory impairment

The main cause of respiratory impairment in MS patients is muscle weakness in the respiratory muscles. This muscle weakness occurs at the beginning of the disease and progresses over time. Since more energy is needed to inhale and exhale in people with MS, such people will face the problem of early fatigue (ibid.).

17- 7- Numbness

Numbness in the face and other parts of the body is one of the most common symptoms of MS, which is often one of the first symptoms of this disease and can eventually lead to MS. Numbness can manifest itself in a mild or severe form, which also disrupts the activities of other organs (ibid.).

For example, numbness in the legs may cause problems in walking, or numbness in the hands may cause the inability to perform daily activities such as writing, dressing, and other things (ibid.).

18- 7- Pain

Pain is common in 50% of MS patients, and its severity is greater in women than in men.

Pain may also occur in the face or back of the head towards the spine, similar to an electric shock. Burning, pain in various parts of the body, muscle cramps, back and joint pain can be reduced with proper management (Yektamram and Nazmedeh, 2019).

19- 7- Dizziness

Dizziness is a common symptom in MS patients. These people have a feeling of lightness in the head, blackness in the eyes, inability to maintain balance, dizziness or fainting. Very rarely, they experience complications such as thinking that the earth is spinning and seeing all the objects around them spinning. These patients will also feel their surroundings spinning if they move their head or body (ibid.).

20- 7- Muscle weakness and flaccidity

Muscle weakness is a common symptom in MS patients, which can cause many problems, including difficulty standing and walking. Muscle weakness in the upper limbs, such as the hands and arms, may prevent them from performing daily activities (ibid.).

21- 7- Depression

Depression is a very common disease of our time and is increasing worldwide. However, about half of people with depression are either unaware of their illness or have been diagnosed with something else. Depression is not a specific disease, but appears in all ages and all races (both women and men). Depression is not a simple disease, but has various types, so that in some people it appears in forms that we generally do not recognize as depression. Depression often returns after it is treated. Depression is a disease that involves the body, mood, and thoughts and affects daily activities. It is one of the most common mood disorders in people with MS, occurring in approximately 50% of patients (ibid.).

22- 7- Genetic considerations

Genetics play a prominent role in the development of MS. Caucasians are inherently more susceptible to developing MS than Africans or Asians, even when they live in the same environment. The incidence of MS is more widespread and concentrated in some families, and under the same environmental conditions, this increased chance of developing it indicates the influence of hereditary and genetic factors of individuals. It is also possible that various genetic factors play a role in the susceptibility to MS, meaning that different genes affect the development of MS in different people. Some genes may be involved in the main course of the onset of disease symptoms, while other genes may affect the development and progression of the disease (Pakzad et al., 2010).

8- Diagnosis

Diagnosing MS is not an easy task because there is no diagnostic test to prove it and a set of information that includes symptoms that the person reports himself, as well as the results of a careful clinical examination by the doctor, along with one or more tests and imaging, must be used to prove the presence of MS.

1- 8- Laboratory examination

The most important laboratory method is the examination of the spinal fluid, which in the presence of the disease, the number of mononuclear cells increases by 5 to 50% and sometimes up to 500 per cubic millimeter.

2- 8- Clinical characteristics

In fact, there is no neurological disorder that is not considered a symptom of MS. The onset of MS may be sudden or gradual, and sometimes its symptoms are so mild that the person

does not see a doctor or may be observed accidentally on MRI. The symptoms of MS are highly variable and depend on the location and severity of CNS lesions. Limb weakness may cause fatigue or difficulty walking. A feeling of weakness with physical activity is a characteristic of MS. Spasticity is often accompanied by spontaneous muscle spasms that are triggered by movement. More than 30% of patients have moderate to severe spasms, especially in the legs.

This condition is often accompanied by painful spasms that interfere with movement and work. Optic neuritis manifests with symptoms such as decreased visual acuity, blurred vision, or decreased color vision in the center of the visual field. These symptoms range from mild to complete loss of vision. Symptoms occur mainly in one eye, but may also affect both eyes. Pain around the eye, double vision may occur due to paralysis of the sixth cranial nerve. Common eye disorders in MS include: 1- Horizontal visual paralysis 2- One and a half syndrome 3- Acquired nystagmus (involuntary shaking and movement of the eyeball) (Pakzad et al., 2010).

3- 8- MS and fatigue

One of the most common symptoms of this disease is fatigue. Fatigue in MS refers to both local muscle aches and general lethargy and weakness of the body. This symptom is present in 95-67% of affected patients. Of these, about 50-60% consider this symptom to be the worst symptom and 15-40% consider it the most disabling symptom of their disease.

Regardless of whether it is a primary or secondary symptom and is caused by complications, fatigue can have a negative impact on a wide range of aspects, including employment, the socialization process, adaptation to the disease, and other factors affecting daily life activities. Therefore, fatigue is one of the main reasons for the reduction in quality of life and unemployment in these patients. Impaired transmission of signals from demyelinated cells, the presence of cytokines in plasma and cerebrospinal fluid may be factors associated with fatigue.

In addition, many symptoms associated with the disease also lead to fatigue, including depression, pain, insomnia, and movement problems (Bahrini et al., 2010). Feelings of fatigue often occur at the onset of the disease and persist throughout the course of the disease and can be mild or severe. The fatigue syndrome is described in several ways: unbearable lethargy, fatigue, a tendency to premature fatigue, and lack of energy. The mechanism of fatigue in MS patients is still unclear. However, researchers believe that neurohormonal and immune factors can be factors in the development of fatigue. Unfortunately, about 75-95 percent of MS patients complain of fatigue, while fatigue is the most important factor in reducing personal independence and quality of life in MS patients and is considered one of the most important reasons for patients not participating in physical activities (Kargar Fard, 2010).

4- 8- MS and balance

Patients have problems with their balance, and this causes consecutive falls and injuries in these patients, and lack of coordination of movements is observed in these patients, because these patients have to perform many additional movements to maintain their balance (Kordi,; Khodadad, Khosravi, Sangelakhi, 2010). MS is unpredictable and is one of the most important life-changing diseases for individuals. Because it affects the best period of a person's life and gradually leads the person towards disability. This disease threatens the individual's independence and ability to participate in family and community activities and leads them to feel a lack of competence and self-confidence (Najafi Dolatabadi, 2010).

9- Treatment

The treatment of MS is divided into three parts: symptomatic treatment, treatment of acute attacks, and disease-modifying treatments.

The goal of symptomatic treatment is to maintain the patient's quality of life. Acute treatment reduces the duration and possibly the severity of attacks. Disease-modifying treatments, by affecting the course of the disease, are effective in reducing progressive disability over time (Shafii Henjani, 2010).

1-9- Rehabilitation Activities and Supportive Techniques

In recent years, non-pharmacological methods have attracted the attention of all patients, including those with multiple sclerosis, and are known as complementary therapies.

Complementary therapies are holistic treatments that are used to increase the physical and mental well-being of the patient. Complementary therapies have many benefits for patients with MS and are widely used by these patients. A study stated that nearly one-third of MS patients benefit from complementary therapies in addition to conventional treatments. The acceptance of complementary therapies in the health system has also increased, and the use of non-pharmacological interventions to complement advanced medicine is expanding among nurses in clinical practice. Complementary therapies can slow the progression of MS, reduce the number of attacks, and delay the onset of permanent disability (Ghaffari, 2010).

2-9- MS and exercise

Exercise is part of the rehabilitation of MS patients, which helps improve the symptoms of the disease and, as a result, the patient's general health, and helps improve their mental states and depression (Ritberg et al., 2005, Petajan et al., 1996). Regular and balanced exercise programs that are carried out on a daily basis can reduce the incidence of cardiovascular disease.

Usually, inactivity or its reduction in patients with MS provides the basis for increasing cholesterol and triglyceride levels and ultimately prepares the right ground for the possibility of a number of diseases. Therefore, exercise is one of the important pillars of treatment programs for patients with MS (Mirshafiei, 2010). When choosing the type of exercise in MS, special attention should be paid to certain points because the type of exercise that can be suitable for a person with MS depends on the severity and extent of the disease, as well as the age and other health characteristics of the person (Mirshafiei, 2010).

Conclusion

In this study, the effectiveness of mindfulness training based on virtual reality on three important psychological and physical components of patients with multiple sclerosis, namely perceived stress, pain tolerance and sleep quality, was examined. The findings showed that this intervention was able to create significant changes in the experimental group compared to the control group. This means that using mindfulness in the context of virtual reality is an effective approach to reduce patients' psychological stress. Since MS patients often face stress, anxiety and worry due to the progression of the disease, this method can help to modulate their negative emotions. Also, mindfulness exercises improve pain tolerance in patients by increasing attention to the present moment and reducing mental involvement with pain. Improving pain tolerance can play an important role in increasing the ability of patients to adapt to chronic disease conditions.

On the other hand, the results of the study showed that sleep quality also improved after the intervention. This finding suggests that stress reduction and better pain management indirectly provide the basis for more optimal sleep. Virtual reality also enables patients to participate more effectively in the treatment process by creating an engaging, interactive, and accessible environment. This feature is especially important for patients who are unable to attend in-person sessions regularly due to fatigue or mobility limitations.

Therefore, the combination of mindfulness and virtual reality can be considered as a new and effective intervention alongside conventional treatments. From a clinical perspective, this method can help reduce the mental and physical burden of the disease. From a psychological perspective, it promotes acceptance, relaxation, and emotion regulation. From a quality of life perspective, it can also lead to improved daily functioning and increased patient satisfaction.

The findings of this study show that interventions based on new technologies have a high capacity to support chronic patients. Also, the results obtained can be useful for therapists, psychologists, and treatment centers. Overall, VR-based mindfulness is a promising method for reducing perceived stress, increasing pain tolerance, and improving sleep quality in women with MS. Therefore, the use of this intervention in treatment and rehabilitation programs can help improve the mental health and quality of life of these patients.

References

1. Abramowitz, Melissa (2010). MS. Translated by Farhad Hematkhah (2010). Tehran: Asr Ketab Publications.
2. Mirshafiei, Seyed Abbas (2010). "Multiple Sclerosis Disease", First Edition. Tehran: Hayan Publications.
3. Soltanzadeh, Akbar (2010). "Diseases of the Brain and Nervous System". Second Edition. Tehran: Jafari Publications.
4. Karivand, Behzad and Vaziri Goodarzi, Bahareh and Ghaffari, Mozghan, 2016, Predicting the Happiness of Mothers of Children with Mental Retardation Based on Their Mental Health, Third International Conference on Psychology, Educational Sciences and Lifestyle, Mashhad.
5. Shafiei Hanjani, Leila and Khoshnavis Ansari, Shiva (2010). Multiple Sclerosis Disease. Razi Publishing Journal, 22(5), .17-30
6. Mirshafiei, Seyed Abbas (2019). "Multiple Sclerosis Disease", First Edition. Tehran: Hayan Publications.
7. Bakhtiari-Pakzad, Faezeh and Hamidreza Ghanbari, 2019, Investigating the Relationship between Quality of Life and Cognitive Emotional Regulation and Executive Actions in Students of Khorasan Institute of Higher Education, First Conference on Psychology, Educational Sciences, Social Sciences and Counseling, Istanbul, Turkey, Permanent Secretariat of the Conference.
8. Najafi Dowlatabad, Shahla; Noorian, Khairollah; Najafi Dowlatabad, Ardavan and Mohebbi, Zeinab (2019). The Effect of Yoga Techniques on the Quality of Life of Women with Multiple Sclerosis. Hormozgan Medical Journal, 16(3), .143-150
9. Nabavi, Seyed Masoud and Iranpour, Afshin (2019). Symptomatic Treatments in MS. A Comprehensive Review of the Treatment of Symptoms and Complications of MS. Tehran: Gisum Publications.
10. Adibnejad, Saeed (2019). Comprehensive guide to living with MS. Tehran: Hayan Institute Publications.
11. Kargarfard, Mehdi; Etemadifar, Masoud; Esfarjani, Fahimeh; Mehrabi, Maryam and Kordvani, Laleh (2019). Changes in quality of life and fatigue in female patients with multiple sclerosis after 8 weeks of aquatic exercise. Journal of Principles of Mental Health, 12(3): .573-562

12. Payamani, Firouzeh and Miri, Majid (2019). Investigation of symptoms and complications of MS in patients with multiple sclerosis. *Journal of Nursing Development in Health*, 2(2), .45-50
13. Yekta Maram, Yaseed Ali Mohammad; Nazmdeh, Kazem (2019), Timely rehabilitation in people with multiple sclerosis, Tehran: Public Relations Department of the National Welfare Organization.
14. Bahreini, Saina; Naji, Seyed Ali; Manani, Reza and Bekherdi, Reza (2019). The effect of aromatherapy massage on the severity of fatigue in women with multiple sclerosis, *Journal of Sabzevar University of Medical Sciences and Health Services*, 18(3): 178-171
15. Kordi, Mohammad Reza; Anousheh, Leila; Khodadad, Sara; Khosravi, Niko and Sangelakhi, Bahram (2019). The effect of a selected combination training course on strength, balance and quality of life in MS patients. *Sports Medicine*, 5: .51-64
16. Najafi Dowlatabad, Shahla; Noorian, Khairollah; Najafi Dowlatabad, Ardavan and Mohebi, Zeinab (2019). The effect of yoga techniques on the quality of life of women with multiple sclerosis. *Hormozgan Medical Journal*, 16(3), .150-143
17. Rietberg, M. B., Brooks, D., Uitdehaag, B. M., & Kwakkel, G. (2005). Exercise therapy for multiple sclerosis. *Cochrane Database Syst Rev.*, 25(1): .3980