THE ROLE OF ARCHITECTURE IN REDUCING SYMPTOMS OF MULTIPLE SCLEROSIS (MS) PATIENTS

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**Abstract.** Multiple sclerosis (MS) disease as a mental and physical illness which is related to environmental conditions and environmental factors are effective in the development or prevention of disease. Due to the high rates of the disease, the special condition of MS patients and the lack of specific rehabilitation centers for patients it is important to pay attention to proper environmental design to control behavior and improve their mental health. The purpose of this research is to design a rehabilitation center that is appropriate to the mental and emotional conditions of MS patients. Designing a space for MS patients by taking into account factors such as environment and architectural ones and proper use of these factors can reduce symptoms (stress, fatigue, depression and motor disorder). By investigating the research background and using the interviews, effective factors on stress reduction, depression and survival, and motor problems of patients are identified and using proper scientific methods appropriate physical and mental conditions were provided for patients. According to the results of the research, the design of outdoor space and the use of nature and green space inside and outside the complex, the access to natural light and the design of a suitable space for walking and sports and the use of rehabilitation facilities and appropriate geometry in the design of space and the avoidance of complexity, the use of appropriate color are effective in reducing the stress, depression and exhaustion and the motor's disorders in MS patients, which should be given special attention in design process.

**Key words:** Multiple sclerosis (ms), Stress, Depression, Fatigue, Architectural Design

**Introduction.** Multiple Sclerosis (MS) is one of the most common immunity system diseases affecting the central nervous system. MS reveals itself by three symptoms, namely inflammation, myelin destruction and scar (Kasper et al, 2005). MS is a complex disease featuring a vast spectrum of signs adversely influencing the patients’ abilities of performing the daily routine activities of life. The most prevalent symptoms reported are fatigue, dispositional disorders, changes in cognitive performance, sensory changes (numbness, pain and vibrations), motor change (loss of balance, muscle weakness and/or stiffness) or sensory and motor disorders, visual changes (diplopia, blurry vision, visual loss) and urinary bladder problems or intestinal dysfunction (Zimssen, 2011).

Amongst the most common psychological expressions of MS, anxiety, depression and stress can be pointed out. About 48% of the patients experience the anxiety, stress and depression during the very first year post-diagnosis (Mitchell et al, 2005). According to the various symptoms of MS and the various problems that these patients are inflicted with as a result of the disease and considering the great many of the symptoms and problems accompanied by drug therapy, the use of nonmedicinal treatment methods has drawn the MS patients’ attentions. These are recognized under the title of complementary treatments rendering possible the physical and psychological comfort improvement and enhancement of the MS patients (Halper June et al, 2006). The current research paper aims at the investigating the effect of environmental factors on the reduction of these patients’ symptoms like depression, stress and fatigue. It will be also examined that how would be the designing of the environment in the periphery of the MS patients via taking into account the environmental and architectural factors and pertinent and suitable use of these factors effective in reducing stress and fatigue and elimination of depression? It will be also surveyed that what are the characteristics of the space appropriate for MS patients?

**Study background.** MS is almost unknown in countries like Malaysia and Ecuador; but, it is relatively more common in England, Northern America, Canada and Scandinavian countries (Compston, 1997). The reason for such a finding is unclear but there might be an environmental factor, possibly a bacteria or a virus, playing a role therein (Oconnnor, 2002). Some researches, as well, have shown that Vitamin D, substantially obtained via being exposed to sunlight, can be a factor. Low Vitamin D levels in individuals’ bodies can be one of the numerous existent factors and the research is still being kept on in this regard (Ascherio and Munger, 2008). The disease is unpredictable and it is enumerated amongst the ailments causing a huge change in the individuals’ lives and harming the best period of human beings’ lives and gradually tending towards disability; and, unfortunately, there is no decisive treatment for it (Holland and Maddona, 2005). National American MS Association has announced that about 2.5 million individuals are afflicted with MS worldwide and 200 other individuals are being added to the group every week and that 80% of the individuals with MS have degrees of inability (Braunwald et al, 2001). The disease prevalence is about twice higher in women than men. MS lowers life expectancy by about ten years (Howarth, 2002). The disease most often begins in an age range between 20 and 40 and cases of its occurrence from 2 to 80 years of age have also been documented. Factors like trauma and genetic
immunological tensions and environmental factors are effective in MS expression (Huntley and Ernst, 2000). According to the problems of the MS patients, designing an appropriate environment for their life is deemed as one of the preliminary principles for the creation of a natural life for them within the society. Considering the symptoms of MS patients, including depression and stress, it is necessary to pay attention to the effect of environmental factors in the expression of stress, depression and, consequently, come up with patterns and elements for the optimization of the life environment of MS patients and this has to be also taken into consideration that how the proper designing and arrangement and other influential environmental factors can be rendered effective in reducing stress and depression and fatigue. The current research paper aims at designing an environment in proportion to the psychological and physical conditions of MS patients for a reduction in its symptoms (stress, fatigue and motor problems). But, the problem currently lies in the idea that no study has attended to the role and importance of environmental factors parallel to the reduction of MS symptoms and the environments designed for these patients do not feature a single difference from those designed for the others, healthy or sick and no environment has been designed proportionate to the psychological and physical status and situation of these patients.

Various Kinds of Multiple Sclerosis (MS) Patients’ Difficulties:
Multiple sclerosis is a chronic and progressive disease that destroys the myelin of the central nervous system. Besides somatic problems, it is known to be followed by numerous psychological and mental disorders, as well (Esma’eili et al, 2009).

1.1. Psychological Problems of MS Patients:

1.1.1. **Stress**: stress, as a multidimensional and multi-factored phenomenon can be a symptom of MS as well as a factor giving rise to the intensification and/or recurrence of the symptoms resulting thereof (Mitsonis C.I. et al, 2008).

1.1.2. **Depression**: depression and anxiety are amongst the most substantial psychological disorders in MS patients. The exact reason for the high rate of depression and anxiety in these patients is unknown and it is general held that a combination of psychological, social and neurological factors are possibly involved therein (Chwastiak L. et al, 2007). In a study that was performed by Thornton et al, the worriedness rates in MS patients and the relationship between worriedness with anxiety and depression in these patients were investigated in a case observation and it was shown that the scores of anxiety and depression in MS patients are higher than control group and the worries of MS patients were subsequently found belonging to two parts, i.e. worries about the effect of disease on the physical activity and worries about the effect intensity of the disease on their social actions and reactions and their familial relationships and daily activities at home or workplace (Thornton E. W. et al, 2006). Therefore, according to the results of some of the studies indicating that stress, depression and anxiety in patients with MS are closely associated with disease recurrence and reduction in quality of life in these patients (Johnson et al, 2007), enjoyment of psychological hygiene can prevent the emergence of anxiety, depression and stress in these patients thereby to improve their quality of life and satisfaction (Ackerman K. D. et al, 2006).

1.2. Physical and Somatic Problems of MS Patients:
The disease causes motor difficulties, blurred vision, diplopia, muscle weakness, fatigue, shakiness, dizziness, intestinal dysfunction, urinary bladder problems and sexual dysfunction in the patients (Guinness and Peter, 1999).

1.2.1. **Fatigue**: in 2003, the first issuance of the journal “MS in Focus” was dedicated to the effects of fatigue resulting from MS and the research in this regard has been continued up to now. At present, there are studies at hand that demonstrate nervous thread burnout, or the very preliminary fatigue in MS, is observed in more than 90% of the MS patients. About 50% of the MS patients have difficulty walking and the individual who cannot walk properly spends a lot of energy on movement. Another factor that contributes to the intensification of fatigue is depression that occurs in almost 40% of the patients with MS (Forwell, 2011). According to the relationship between depression and fatigue and considering the symptoms of MS patients, including depression and fatigue, and knowing that the MS patients are very susceptible in psychological aspect and their psychological conditions influence their physical status and also in regard of the role and importance of environmental factors in respect to the psychological and physical status of MS patients, the architects are required to pay a careful attention to the issue in their designing of structures and buildings for MS patients so that a step, even a small one, can be taken in line with the alleviation of the disease symptoms.

2. The Effect of Hydrotherapy on MS Patients’ Fatigue:
The results of the studies by Piton Vouyovitch (2006) and Mathewvitz indicated that fatigue, as one of the most common symptoms of MS, causes the lowering of the level of daily life activities and quality of life in MS patients (Vouyovitch, S. P., 2006). Fatigue influences the motor and cognitive abilities and restricts the individual’s physical and mental abilities. Supplementary treatments cause the trend of MS to be slackened as well as reduce the number of attacks and delay the inability commencement in these patients (Mills et al, 2000). Hydrotherapy, as a nonmedicinal treatment method can bring about an increase in the flexibility of the muscles and bones thereby to mitigate the muscular spasms and finally enhance the vigor and stamina of an individual and also reduce the amount of pain suffered (McIvteen and Robertson, 1998).

3. The Effect of Sports on MS Patients:
In the past, the physicians recommended the MS patients not to play sports for the reason that they imagined the reason for the fatigue and elevation of body temperature is the performing of sport exercises leading to the exacerbation of the MS patients’ status. But, it has been recently observed that the opposite holds. Sport therapy is a treatment specific to MS patients and, besides causing the improvement of the MS patients’ physical situation, improves their psychological and mental health in them (Hale et al, 2003). Therefore, it is better in designing a compound for the improvement of the physical and psychological health of MS patients to consider a space for their playing sports and walking.

4. The Importance and Role of Natural Light in the MS Patients’ Peripheral Space Parallel to Reduction of Stress, Depression and Fatigue:

One of the most essential physical and psychological needs of the human beings is light that causes comfort and enhances output and, meanwhile preserving health, provides the individuals with more favorable and more pleasant conditions due to its creation of a feeling of association and familiarity with the natural environment (Miller, 1994). Natural light or daylight exerts a positive effect on the improvement of the psychological and physical diseases and accelerates the improvement pace of these diseases (Phiri, 2003). Investigations have demonstrated that being exposed to the natural light and sunlight and enjoying it is of a considerable effect on the reduction of stress and depression as well as improvement of sleep and decrease in the use of sleeping pills (Sherman et al, 2005). Therefore, the sunlight has a positive effect on the psyche and mind of the patients when their withered soul craves for comfort. Moreover, appropriate use of natural light during the day better helps increase energy productivity. So, the proper design of the windows (dimensions, forms and orientations) can provide for the highest rate of gain of the sunlight. But, unfortunately, such an important issue has been left unnoticed in the treatment spaces and the importance and role of light in such spaces has been ignored.

5. The Effect of Sunlight and Heat on MS Patients:

5.1. The Effect of Sunlight on MS Patients:

Vitamin D deficiency causes the emergence of MS (Diego et al, 2017).

5.2. The Effect of Heat on MS Patients:

Heat sensitivities are very common in MS patients. Worsening of the nervous signs (fatigue included) with heat was even used in the past for confirming MS diagnosis. Avoidance of heat, such as not taking hot water bath, is the first defensive order. Fans and air conditioners help controlling of the temperature inside houses (Betox, 2012). According to the necessary needfulness of MS patients for sunlight and, on the other hand, their sensitivity to heat, the environment should be designed in such a way that, meanwhile providing them with sufficient exposure to sunlight, fans and air conditioners enable the controlling of the temperature inside the houses.

6. The Effect of Rooms with Natural Light Reception Parallel to Reduction of Patients’ Depression:

The time duration of the depressed patients’ stays in bright rooms is shorter than that of the patients hospitalized in dark rooms. In fact, the treatment results of the hospital rooms illuminated by sunlight are better than those of the less bright and dark rooms. Therefore, the light-reception way of the patients’ rooms is of a considerable importance. The windows of the patient rooms providing a view of aarium with limited sun reception through roof and also blurring the window of patient rooms for respecting the patients’ privacy are amongst the other factors that need to be considered in treatment environments (in regard of both color and quality) (Kolanowski, 1992). The results of the studies are expressive of the reality that the use of light is a cost-effective and less expensive method for mitigating depression in depressed and other patients and it has been verified with positive results (Walch, 2005).

Therefore, sunlight has a positive effect on the patients’ psyche and mind when their wilted soul is in need of tranquility. Furthermore, appropriate use of natural light during the day better aids energy productivity at no cost. So, the proper designing of the windows (dimensions, forms and orientations) can provide for the highest rate of sunlight gains whereas the artificial light exerts a positive effect on the enhancement of the patients’ health and staff’s productivity via creation of a comfortable environment (Dutro, 2007). But, unfortunately, the issue has been left unnoticed in treatment spaces for MS patients and the role and importance of the light in these spaces have not been taken into account.

7. The Effect of Color from Psychological Perspectives:

Since long time ago, scientists have paid attentions to the effect colors have on human beings’ psyche. Colors constitute one scale of assessing personality in new psychology because each color has a special effect on the psyche and physique of a given person and it can reveal the psychological and physical status of an individual (Itten, 2005). This is while it has been recently concluded that inappropriate and incorrect use of colors in certain places causes intensive psychological harms to these individuals (Dee and Taylor, 2008). Therefore, considering the positive effects that color have on the humans’ lives, the proper and pertinent use of colors and their correct application can cause positive effects on the psychological status of the patients.

8. The Effect of Effective Colors Parallel to the Reduction of Stress, Depression and Psychological Disorders:

In an investigation by Isen (2006) for the reduction of stress, anxiety and depression via taking advantage of diverse and happy colors, it was pointed out that a happy and exhilarating environment serving well the hospitalization rooms
can be created via making use of colors (Daykin, 2008). According to Carol and Vernolia (1988), red provokes and strengthens the body. These colors speed up the pace of muscular activities. Yellow can lower depression, fear and tension and soothe psychological pains and reduce fatigue. Orange neutralizes depression and drowsiness. Green directly influences the whole nervous system, especially central nervous system. Green has a pacifying effect and lowers fatigue and balances emotions. Permanent use of blue outfits can cause constipation and tiredness. Purple features a feeling of rest and sleepiness; it lowers body temperature and lessens sensitivity to pain (Luscher, 2010). Therefore, according to the properties of colors and their therapeutic applications as well as the positive effects of some colors on the psyche and physique of the patients, it is necessary in designing the space in the periphery of the patients to make use of colors that cause reductions in stress, depression and fatigue. For example, considering the properties of green that is known to reduce worry, the spaces in the MS patients’ perimeter can be decorated using green accessories such as home and apartment plants or a large wall painting can be used for reducing depression and corroborating the relationship of the patient with the natural environment so that it can effectively reflect the outside environment. In addition, to better enjoy the green natural color of the exterior environments, large windows can be taken into account in designing of the spaces and the use of thick and heavy curtains can be subsequently withdrawn. Also, in order to reduce depression, blue can be used in the decoration of the space in the periphery of the MS patients, such as when choosing the color for canopy and pillows, the walls as well as the floor and/or carpet and the entire existent instruments and elements so as to induce tranquility or also proportionate use can be made of yellow and orange. Or, as another instance, several colorful books can be placed on the bookshelf and provide the patients with instruments colored in paints appropriate for these patients.

9. **Application of Color in Treatment Centers:**

Besides having treatment effects, use of diverse colors in treatment centers causes non-uniformity in the environment that can per se save users the boredom. This section introduces the use of colors in some parts of treatment centers wherein color plays a significant role in terms of its physical and psychological effects as well as its other usabilities. In decorating such spaces as entrances, happy and fascinating colors should be used. The entrance should induce a sense of hope and trust. Yellow serves indication of a warm and sunny entrance (Minnaert, 1995). Reception desk is required to have a clear-cut contrast with the environment in its periphery for its being the first contact point of the patient and his or her companions and it is also better to make use of neutral colors in these regions. But, sharp colors should be used for marking the path and zoning the space. Little use of warm colors like golden, orange and red in clinic halls and lobbies is deemed appropriate for providing a warm and somewhat luxury space. Besides taking advantage of these colors in clinic spaces, ornamental tableaus and statues and colorful and pictured sofas can be employed to add to the attractiveness of these spaces. Additionally, it is necessary in line with providing for eye rest in such decorative arrangements to also make use of simple and light surfaces. Thus, to do so, a combination of light and plain colors can be used on the walls (Ardalani, 2010). The use of cold colors in physiotherapy environments causes decline in patients’ movement. Conversely, warm colors that emit light and brilliance cause a sense of consciousness in human beings and this makes muscles get ready for performing physical movements. Hence, application of these colors in physiotherapy centers and exercise therapy salons is envisaged to be very appropriate (Todwiler, 1985). Proper color and lighting in waiting halls and rooms exert a specific effect on the reduction of stress and elevation of patients’ spirit. In designing patios, use of cold and sharp colors like white adds to the light reflections while cream and light colors contribute to the light reflection and shining. It is better to have halls’ floors painted with light colors, preferentially cream; mild gray coloring of the walls is pacifying and pleasant (Barker and Fraser, 2004). Designing the WC should be always done with the consideration of granting them a proper contrast between the sanitary instruments and the walls. The corridors constitute the main highly congested network of routes in a building. In case of making use of colorful and inscribed surfaces, the individuals may lose their way. The use of a single color for a long corridor is not recommended especially when the inscriptions and paintings are not completely matched with the intersection points. The use of many colors causes confusion and perplexity. Thus, it is better to make use of color-coded papers and zoning to provide for better navigation (Schuschke and Christiansen, 1994). The majority of the building surfaces should be painted with bright colors so as to provide for light reflections and help moderating the light patterns. The contrast difference in reflecting color between the walls and floor should be at least in a range from 15 to 20% for individuals with weak sight (Wijk et al, 1999). It is better to use colors that induce friendliness, hopefulness, improvement and happiness in parts of the hospitals specific to short-term stay and cold colors can be applied in parts specific to long-term stays for the fact that these latter colors have pacifying effects on eye and that they are preferred by most of the people. These colors prevent from the contrast between physical inability and mental consciousness, as well, and warm and cold colors should be used in the vicinity of the patients’ beds (Schuschke and Christiansen, 1994). Shiny colors should not be used in designing hospitalization rooms for the fact that these colors might appear annoying during resting (Gill, 2000). The pavilion of the staff rooms should be similar to the domestic spaces as much as possible. In order to reduce stress and provide the possibility of a place for resting and reaching immediate peace, it is better to make use of a series of coordinate colors featuring variegated capabilities. The color of the furniture coating
should go with the color of the interior spaces so that a sense of a room with an appropriate design can be associated in the viewers’ minds (Ford, 2002). Moreover, the choice of colors should not be purposeless. As a specimen, extreme use of blue and green, as colors having tranquilizing effects, might intensify depression (Birren, 2013). Selection of an appropriate color for the life spaces of these patients is of a particular sensitivity. Therefore, it is better to use happy, mild and pacifying colors in the living places of these patients parallel to the reduction of depression, stress and fatigue and the use of boring and sharp colors should be avoided. Also, use of cream colors in places receiving direct and intense sun irradiations causes over-warming of the building. According to the sensitivity of MS patients to heat and the problems they are afflicted with as a result of being exposed to heat, due care should be exercised in proportionate use of colors in the environment.

10. The Effect of Nature Presence Parallel to Reduction of Stress, Depression and Fatigue in MS Patients:
Since long ago, the relationship between the natural landscapes and healthiness has been the focal point of attentions in various cultures and communities (Ward Thompson, 2011). Mc Andrew showed that sight-seeing causes reduction in psychological pressure and that watching the natural landscapes incites positive feelings and moods and accelerates the disease improvement and this has been described by him as green experience (Mc Andrew, 2013). It was made clear in extensive research in the US that the good design, green space and lighting with proper angles causes speeding up of the rehabilitation and increase in happiness and joyfulness of the patients (Alireza’ei, 2010). One effective way for reducing stress in patients considering the potential properties of the nature and in addition to hospitalization is that the patients should be provided with exposure to the natural elements but, unfortunately, many of the treatment centers in urban environments lack the required conditions (Dijkstra et al, 2008). In addition, the results obtained by Lohr and Pearson-Mims indicated that patients’ pain tolerance is increased with their being exposed to plants inside buildings and also that the rooms decorated with plants are happier, more peaceful and more pleasant than the controlled rooms (Lohr, 2000). Thus, it is necessary to use plans inside buildings in the spaces in the periphery of MS patients for overcoming the psychological and physical problems and elevating their pain tolerance threshold. So, considering the patients’ will and consent regarding the watching of natural landscapes as well as the effect of the nature on depression reduction, besides constructing terraces providing a view of the green spaces and nature, the patients should be provided with the possibility of close enjoyment and touching of the nature. There is another study that has dealt with the patients’ improvement in hospital as a result of paying attention to the vegetative cover outside the buildings. In this study, the individuals who had shown interests in watching the natural landscapes were found with faster recovery. Moreover, the individuals who took part in gardening activities had more positive changes in their dispositions and temperaments (Marcus and Barnes, 1995). It can be concluded in a general look at the present study that the quality of life in patients with MS is reduced during the treatment course. Paying attention to the exterior and interior design can play an important and essential role in the enhancement of MS patients’ quality of life. In designing an environment for MS patients, it is suggested that the designers should devote a specific and specialized space to them and the patients should be provided with direct and immediate connection with the natural environment in this space. Also, the existence of a central yard is suggested in such environments because it is more possible to take care of the patients in such spaces and simultaneously the patients become capable of sitting, establishing social relationships with other individuals and/or having a private and noise-free space in the vicinity of the nature for obtaining tranquility. Furthermore, based on the studies carried out in this regard, enjoyment of music and natural sounds like those of the birds as well as the odor of the plants and flowers in the interior environments are suggested for the acquisition of peace and reduction of anxiety in patients.

11. Creation of an Environment for Gathering Around and Social Interaction:
“The investigations signify that the individuals having higher social relations are healthier and feel more peaceful in comparison to those who are secluded. That is because the strong social relations eases their improvement and relieve of the disease. Due to the same reason, there is observed a large deal of tendency for spaces for long visiting hours, chatting gatherings and fascinating waiting places in treatment precincts” (Ulrich, 1999, 42). According to the psychological and physical problems of MS patients and their need for conversation and confabulation for soothing of the disease pains, it is better for the architects and designers to consider a space for gathering around and social interaction inside and outside the healthcare and treatment centers for MS patients. Thus, to provide the gathering space in the interior places, lobbies enjoying a great deal of natural light coming through large windows providing for direct view of the nature can be used or a central yard or a garden pit can be designed providing for the direct view of the nature and individual or group gathering therein.

12. The Role of Window View in Physical and Psychological Health of MS Patients:
The possibility of viewing the natural elements or landscapes through the window has a subtle effect on the reduction of stress levels (Ulrich, 1984). Ulrich performed the preliminary studies in treatment environments regarding the physical-psychological advantages of a view of the nature and it was shown that the view of the green spaces, unlike brick walls, exerts positive effects on the disease improvement trend. Furthermore, it was also demonstrated that window can provide the required opportunity for the psychological revitalization of the individuals inside the home
environment considering the fact that the view of the natural landscape and elements has positive physical and psychological effects and exerts positive influences on health promotion (Ulrich et al, 1991). “While watching through the window can happen repeatedly in the course of the daily activities, the mental tiredness and psychological problems can be reduced before being transformed to serious problems” (Kaplan, 2001, 511). Therefore, enjoyment of window providing for natural view in the daily life environment is necessary, particularly for the city-dwelling people and residents of apartment buildings (Kaplan, 2001). Therefore, it is necessary to construct large windows and terraces in the environment in the periphery of MS patients so that their stress, depression and fatigue can be reduced and also to make them enjoy green spaces and natural views.

13. Establishment of Security and Peace for MS Patients:
The exterior precinct or garden should have the required security and peacefulness. The garden’s tranquility should be in a level that the patients or personnel, going out to the exterior precinct and/or garden, they can sit in complete tranquility, close their eyes or lie down in the sun and take a short nap. They should not be threatened of their physical and psychological health by such risks as getting lost, falling down and other dangerous cases (Marcus and Barnes, 1995). It is worth mentioning that an old age healthcare center in England has used Iranian garden patterns in designing a treatment-specific green space. Creation of security and high tranquility are amongst the important necessities of designing precinct in this set of treatment edifices and this is reflective of the high capabilities of Iranian garden in providing for such characteristics (Cooper Marcus, 2005). According to the aforesaid materials and considering the problems of MS patients, including stress depression and fatigue and imbalance and motor disorders, it is necessary for the architects and designers to set the ground for security and tranquility via making proper designing of green spaces or open spaces for MS patients.

14. Legibility:
In treatment environment and parallel to the reduction of stress and anxiety to, it is necessary for the garden elements to have positive and clear-cut message for the patients (Ulrich, 1999). An individual suffers stress as a result of disorder in perception process for which reason legible and tranquilizing spaces should be designed in a garden (Cooper Marcus, 2003). Based thereon, the architects and designers are required to design tranquilizing and legible spaces in open precincts of treatment and healthcare centers for MS patients. According to the fact that the Iranian garden is more prominent in contrast to the other patterns for its transparency and legibility, thus, it can be utilized in designing spaces serving the tranquilizing effects and reduction of stress and enhancement of satisfaction in MS patients.

15. The Effect of Music Therapy on Reduction of Stress, Depression and Fatigue and Motor Disorders of MS Patients:
The studies conducted during the recent decades are indicative of the idea that motor performance is eased via various ways (Bateman and Bale, 2009). As a tranquilizing factor, music causes the patients with pain and fatigue to have their attentions shifted towards external factors like music (Dave, 2007). In studies carried out on various diseases under different pathological conditions, it has been shown that music boosts walking progress in the majority of diseases, including Parkinson, Huntington and cerebellar stroke (Arias and Cudeiro, 2010). Deniz et al (2011) announced in their studies that the use of auditory stimulation methods has been followed by positive results in the improvement of motor disorders of MS patients. The researches signify that stress, anxiety and depression are amongst the factors accompanied by higher likelihoods of MS attacks and disease intensification. Music therapy should be given a room in the treatment programs of the individuals with MS for it is known to facilitate messaging process in the nervous system of these individuals following which the disease progress can be slackened.

16. The Effect of Sports on Physical and Psychological Health Improvement in MS Patients:
Playing sports and being physically active as important and nonmedicinal treatment methods cause improvements in the MS patients’ statuses. In the past, physicians imagined that the main reason for fatigue and increase in body temperature is playing sports that result in exacerbation of the MS patients’ situation. But, it has been recently concluded that playing sports and performing physical activities and the other rehabilitation techniques can be effective in patients’ recovery and cause the betterment of their psychological and mental health (Hale et al, 2003). Therefore, it is better to consider spaces for sports and walking in designing a complex for the improvement of MS patients’ physical and psychological health.

17. Study Method:
In the present study, descriptive method was employed in the first stage and the information was collected via investigation of the credible articles and books on relevant subjects. Considering the fact that many psychologists and psychiatrists are in touch with MS patients who become worsened in their psychological conditions following the development of multiple sclerosis and the subsequent disabilities in physical and motor terms, the following sections take advantage of qualitative methods and interview with psychiatrists and psychologists working in MS patients’ treatment and healthcare centers and MS Patients Association and Rehabilitation Centers and investigation of the information obtained from content analysis to identify their problems and needs. In line with this, 30 psychiatrists and
18. **Field Study Method:**
Next, 30 psychologists and psychiatrists were asked five questions and interviewed via attending the MS patients’ healthcare and treatment center.

19. **Interview Analysis:**
After investigating the interviews using content analysis, the common points between the study background and the psychologists’ sayings were figured out. In the present study, the effective environmental factors, including sunlight, color, music, gathering spaces, open spaces and nature, space fitting, sport, hydrotherapy and rehabilitation facilities were investigated. The importance of the points underlined by the psychologists was also verified. Diagrams (1), (2), (3) and (4) illustrate these points along with the emphasis rates and the total emphasis numbers in all 30 interviews. The following table presents the answers of the interviewees in regard of the importance degree of the effective environmental factors contributing to the reduction of MS patients’ symptoms (fatigue, depression and anxiety).

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<th>Sunlight</th>
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Table 1: the number of times that the effective environmental factors giving rise to the reduction of sensory and motor disorders have been pointed out (Source: Author)
After gathering the number of times that each of the environmental factors have been pointed out as shown in the table related to the environmental factors influencing the reduction of sensory and motor disorders, n=12 was considered as the mean value of the number of times, cutpoint and, resultantly, the environmental factors that had been pointed out more than 12 times were recognized as the environmental factors influencing the reduction of sensory and motor disorders. Three environmental factors were selected as the environmental factors effective in the reduction of sensory and motor disorders. These three factors are rehabilitation facilities, hydrotherapy and space fitting as depicted in the following diagram.

Diagram (1): number of times that the environmental factors effective in reducing sensory-motor disorders have been pointed out (Source: the author)

After preparing the table and interviewing with 30 psychologists and psychiatrists who answered the questions in regard of the importance of environmental factors influencing stress reduction in MS patients and, as it can be seen, preparing a gathering space was pinpointed as the most effective factor contributing to the reduction of stress in MS patients and sunlight and color and rehabilitative facilities were selected as the factors with lowest effect on stress reduction in MS patients, n=12 was considered as the mean of the number of times, cut point in the following diagram (diagram 2).

Diagram (2): environmental factors influencing stress reduction in MS patients (source: the author)
After preparing the table and interviewing with 30 psychologists and psychiatrists who answered the questions in regard of the importance of environmental factors influencing stress reduction in MS patients and, as it can be seen, preparing an open and natural space was pinpointed as the most effective factor contributing to the reduction of depression in MS patients and sunlight was selected as the factors with lowest effect on depression reduction in MS patients studied herein and following collecting the number of times each of the environmental factors were pointed out as shown in the above table presenting the environmental factors influencing depression reduction in these patients, n=12 was considered as the mean of the number of times, cut point, and the environmental factors that had been pointed out more than 12 times were recognized as environmental factors influencing depression reduction in these patients.

Diagram (3): environmental factors influencing the depression reduction in MS patients (source: the author)

After preparing the table and interviewing with 30 psychologists and psychiatrists who answered the questions in regard of the importance of environmental factors influencing fatigue reduction in MS patients and following collecting the number of times each of the environmental factors were pointed out as shown in the above table presenting the environmental factors influencing fatigue reduction in these patients, n=12 was considered as the mean of the number of times, cut point, and the environmental factors that had been pointed out more than 12 times were considered as the most effective environmental factors in reduction of fatigue in these patients and, as it can be observed, hydrotherapy was pinpointed as the most influential in fatigue reduction in MS patients.

Diagram (4): environmental factors influencing the fatigue reduction in MS patients (source: the author)

Eventually, after preparing the table and performing summation based on the importance degree of all environmental factors in all completed questions, a range of 14 to 69 times of emphasis on the subject was figured out in the entire questions and interviews. It is up to the author to choose a boundary limit so 28 was selected as the boundary limit and it means that the choices that have been emphasized more than 28 times possess a higher position in the designing of such a compound as displayed in diagram (5). Considering the importance degree of environmental factors influencing the general reduction of MS symptoms, such environmental factors as light and color were found with less accentuated roles as evidenced herein; open spaces and nature and space fitting and preparation of a gathering space were found with the highest scores in reducing the general MS symptoms of the patients.
Analyzing the Data Obtained from Interviews and Study Method:
From the beginning, the primary goal of the present study has been the identification of environmental factors giving rise to the reduction of MS patients’ symptoms (fatigue, stress and depression). At first, the problems of the MS patients were investigated as shown in the study background. The problems of MS patients include physical and psychological aspects as summarized in the depiction below.

21. Conclusion:
Analyzing the information obtained from the interviews and study background, the data required for designing the MS patients-specific spaces are tabulated below.

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<th>Number</th>
<th>Points that should be observed in designing</th>
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<td>1</td>
<td>Creation of spaces for social relations as well as preparation of meeting spaces serving the reduction in depression and stress of the patients inside and outside the complex via designing green precincts and spaces based on Iranian garden pattern due to its healing properties or making use of such environmental factors like tree, water, plant and flower and grass as well as designing gathering spaces inside the precinct of MS patients' treatment and healthcare centers and also designing lobbies enabling direct view of the nature via devising large windows capable of giving a view of the green spaces and exterior precinct and, additionally, designing a garden pit and central yard for more exposure of the patients to the complex or nature and green spaces</td>
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</table>
2. Designing residence spaces in proportion to MS patients’ conditions for their special conditions and their needs for enjoying some facilities in regard of establishing better communication with the peripheral environment; thus, it is necessary in designing of spaces for these patients to prepare some required facilities and make the space fit as much as possible parallel to provide these patients with a peaceful place and reduce their motor-sensory disorders and depression and stress. MS patients do not have the required ability for making optimum use of their peripheral environment due to their motor problems thus it is necessary to make a series of preparatory works in line with providing them with comfort and tranquility including designing of ramps alongside the stairs and use of rehabilitative handles and utilization of suitable furniture for better handling by MS patients as well as designing of large elevators specific to the carrying of patients with motor and sensory difficulties and devising of large entrances and doors for the easier coming and going of the patients on wheelchairs and/or other ambulation aids.

3. Designing hydrotherapy centers specific to MS patients in line with reduction of their fatigue problems or making use of at least a swimming pool or the other facilities and instruments required for the enjoyment of MS patients parallel to the reduction of spasm and muscle cramps along with the alleviation of their fatigue.

4. Existence of specific treatment and rehabilitation facilities, including devoting physiotherapy, electrotherapy and mega-therapy spaces and the other requirements needed by MS patients parallel to the establishment of peace and tranquility and improvement of their health status.

5. The existence of a regular geometry in the space and prevention of the garden’s complexity: the Iranian garden features transparency and legibility for its being constructed in adherence to geometrical regulations and based on regular forms and shapes and it can provide the patients with tranquility and have considerable effect on the reduction of symptoms in these patients. Therefore, it is necessary to make use of these regular forms in designing of healthcare and treatment centers for MS patients.

6. Use of appropriate masonry and materials with proper color and lighting in line with establishment of tranquility: considering the properties of green, the decoration of the spaces in the periphery of MS patients along with green attachments like home and apartment plants for the reduction of depression and use of blue, as documented in the results obtained in various studies, parallel to the acquisition of tranquility and use of yellow and orange for balancing for the purpose of curing depression.

7. Designing of spaces appropriate for sport and recreation inside and outside the compound’s space.

Summary. Designing proportionate environment according to the psychological and mental and physical conditions of MS patients can physically and psychologically support these patients and considerably assist their improvement trend. Every space is in need of special designing considering the special conditions of these patients. To provide appropriate environment for the improvement of the patients or at least prevention of the disease worsening too acute conditions, it is necessary to eliminate the environmental factors that cause elevation of stress, fatigue and depression in them.

Suggestions for Future Research. It is suggested that the society should be mentally made familiar with MS and the required infrastructure for the identification of the MS patients’ psychological and physical needs be prepared. It has to be also accepted that disease occurrence does not mean end of life rather it is a beginning of a new stage and that the MS patients have the right to enjoy their lives. It is hoped that the MS patients’ symptoms can be decreased day after day via infirming proper culture and setting the appropriate grounds in proportion to the MS patients’ needs.

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