REVISTA SALUS
JOURNAL OF HEALTH SCIENCES

ORIGINAL ARTICLE

Balance in patients with multiple sclerosis

Mariangela Braga Pereira Nielsen[1]; Glesiane Justino Ferreira[2]; Letícia Marotto[3]; Nádia Iara Vieira dos Santos Ferreira[4]

[1]M.Sc. in Public Policy / EMESCAM - (Physiotherapist, Specialist in Respiratory and Neurofunctional Physiotherapy, Master in Public Policy.

[2,3]EMESCAM - (Undergraduate Student).

[4](Undergraduate Student).

Received on July 7, 2016

Approved on March 8, 2017

Keywords

Multiple Sclerosis; Postural Balance; Physical Therapy Modalities

Abstract

This study aims to characterize the epidemiological profile of MS patients, in addition to comparing the balance before and after physical therapy. The main objective of this study is to analyze the balance in patients with MS before and after physiotherapeutic intervention. For this purpose, initial evaluation and reevaluation after 12 physiotherapy sessions were used as methodology. The desire to perform the work is justified by the fact that multiple sclerosis is a progressive chronic disease that affects young adults at the peak of their productivity, triggering a series of complications, such as loss of balance, increase in the occurrence of falls, Biopsychosocial impact on society. In addition to that, it is also justified by the contribution to a greater knowledge about the clinical aspect of this disease. It can be noticed from the results obtained that there is a positive difference in the balance before and after the physiotherapeutic intervention, as shown by the DGI and BERG scores. Thus, it can be concluded that in order to improve the balance of MS patients, it is imperative that these patients use physiotherapy.

* Corresponding author: nadia-iara@hotmail.com

INTRODUCTION

Multiple Sclerosis (MS) is considered as one of the most common pathologies affecting the Central Nervous System (CNS). It is a chronic and progressive disease that reaches mainly young adults, in the age group of 20 to 40, more prevalent in females and white race[1-5].

It is estimated that, worldwide, more than two million people have MS[6,7]. In Brazil, approximately 10,376 patients are being treated. Data from the Brazilian Multiple Sclerosis Association register more than 30,000 individuals with MS[6].

MS is an autoimmune disease in which activated T cells cross the blood-brain barrier to initiate an inflammatory response, leading to demyelination and axonal injury[8]. The main mechanisms that trigger ME disease are still unknown.

Motor symptoms of MS include spasticity, reflex spasms, contractures, gait disturbances, and fatigue that may be persistent or related to physical activity or to lesser degrees of mental effort. These are often the initial symptoms of an exacerbation[9].

Cerebellar and bulbar symptoms may also be present and may be perceived as balance deficits, nystagmus, intention tremor difficulties in swallowing and breathing. Sensory symptoms resulting from MS present as numbness, paresthesia, dysesthesia, distortion of the superficial sensitivity and musculoskeletal pain[9].

Anatomically speaking, MS affects the central nervous system, especially the optic nerve, cervical cord, brain stem and periventricular white matter[9,10].

The literature presents different terms to classify MS, but, in general, the disease is subdivided into the different clinical types:

a) Sender-Recurrent (RR): Early in the disease there may be either a complete recovery, or residual sequels and deficits may start to accumulate by the repetition of the seizures.

b) Primary Progressive (PP): progression of the disease from the beginning, symptoms develop gradually and there are no outbreaks. Improvements occur in shorter time.

c) Secondary Progressive (PS): characterized initially by exacerbations-remissions, followed by progression of impairment and minimal remissions.

d) Progressive Exacerbation (PE): progressive disease from the beginning, but without clear acute exacerbations, which may or may not have some recovery or remission, which is less frequent[9,10].

According to Santos, 2010[11], since the initial phase of MS is characterized by transient symptoms that last from five days to one week, so subtle, these characteristics lead the individual not to give importance to the first clinical manifestations of the disease.

Balance

According to Tookuni et al. (2005)[12], Equilibrium is "the maintenance of the center of gravity, which must lie within the area of the base of support of the body and that receives constant adjustments of the musculoskeletal system".

For the accomplishment of activities of daily life, it is imperative that the individual affected by ME exercises the ability to balance. A study conducted by Rodrigues et al.[13], in 2008, showed that "imbalance is the biggest complaint of patients with multiple sclerosis, evidencing vestibular dysfunction in most cases". The main objective of this study was to evaluate the effects of physiotherapy on the Equilibrium and Quality of Life of patients with Multiple Sclerosis. The results indicated that "The balance and quality of life of individuals with MS improved significantly with targeted physiotherapeutic intervention"[13].

Multiple Sclerosis and Physiotherapy

Muscle weakness and fatigue are responsible for the decrease in the daily activities of MS patients, resulting in muscle impairment due to inactivity[14].

Physiotherapeutic interventions work towards the improvement of muscle strength and endurance in individuals with MS are limited. Therapeutic exercise was avoided for many years in these patients for the increasing in body temperature and fatigue that may act as a propellant for a new outbreak[15].

The practice of therapeutic exercises, one of the resources of Physiotherapy, boosts an increase in V02 max, better glycemic control, increase of muscle mass, improvement of self-esteem and self-confidence, and improvement of patients' quality of life[16].

Physiotherapy improves patients' quality of life, significantly improves balance and movement, promotes maintenance of muscle strength, thus minimizing the limitations, complications brought about by MS, and improves the functionality of these patients[16].

Exercises were avoided until recently, as they sought to conserve energy, control fatigue, and mitigate the risk of new outbreaks. Nevertheless, sedentary lifestyle has had negative repercussions, such as increased risk of heart disease and decreased functional capacity[17].

Thus, this study seeks to analyze the balance in patients with multiple sclerosis before and after physiotherapeutic intervention, to characterize the epidemiological profile of these patients, regarding gender, age, ethnicity, housing, socioeconomic status, and to investigate the interference of physiotherapy in the balance Of MS patients.

METHODS

Exploratory and quantitative case study with 10 participants in the research, 90% female and 10% male, with a mean age of 46.2 years, who underwent physiotherapy once a week for a total of 12 sessions of 40 minutes. The project of this research was authorized by the Ethics and Research Committee (CEP) in Human beings of the Superior School of Sciences of the Santa Casa de Misericórdia de Vitória EMESCAM under registry CAAE: 47027215.2.0000.5965.

The study included patients diagnosed with MS of both sexes, aged less than 65 years old, attending the Clinical School of Physiotherapy of EMESCAM, who agreed to do the research by signing a Free and Informed Consent Form (TCLE). The excluded patients were those with visual and auditory problems that affect the balance, wheelchair users, or any problem that could impede the active participation in the research, patients who lacked physiotherapy sessions more than three times. Firstly, a bibliographic search was carried out using as scientific data selected scientific papers published in Pubmed, Medline and Scielo, published in the period 2000-2015, publications in English and Portuguese.

Key-words: multiple sclerosis; quality of life; physiotherapy.

Before the physiotherapeutic intervention, evaluations were applied, such as the application of the Dynamic Marching Index (DGI) to evaluate the dynamic balance. Shumway-Cook et al., 1997 developed the DGI to assess peripheral vestibular changes, dynamic balance, mobility, daily life activities, and risk of falls[18]. The scale consists of dynamic tests that instigate vestibular stimuli of gait with obstacles, steps and etc., consisting of 8 items with 4 alternatives, ranging from 0 to 3 points, where 0 indicates severe impairment and 3 indicates normal performance of the Function; The scale has a maximum score of 24 points, being indicative of risk of falling when an index less than or equal to 19 points[18].

As to evaluate the balance and measure the risk of falls, the Berg Balance Scale

was created by Katherine Berg in 1992. Miyamoto et al. (2004) translated and adapted to the Portuguese language. Its main goal is to evaluate the static balance, indicating, this way, the risk of falls. It is composed of activities of coordination, balance, capacity of change of decubitus, evaluation of the transfers of patients, among others[19]. It is based on 14 common items of daily life, in which each item has 5 alternatives that range from 0 to 4 points, 0 being the inability to develop the requested action and 4 the total ability to perform the function. Berg's maximum scoring score is 56 points, where a cut-off value of 45 points is considered a drop predictor and an index of less than or equal to 36 points is associated with a 100% fall risk. Thus, the higher the score, the lower the risk of falls[19].

Once the balancing scales were applied, physiotherapeutic work was started, which included exercises for Swiss Ball Balance, Elastic Bed, Imbalance Board, gait training, circuits overcoming obstacles, strengthening of lower limb muscle groups such as quadriceps, Gluteus medius, vastus medialis, gluteus maximus, and trunk musculature such as straight and oblique abdominals, transverse abdominal, multifidus, specific muscle stretching, such as hamstrings, pectorals and paravertebral, Frenkel coordination exercises and Proprioceptive Neuromuscular Facilitation (NPF). After the physiotherapeutic work, the patients were reevaluated and the balance scales were applied one more time.

The research was implemented within the scope of the Multiple Sclerosis Extension Project that works in the Clinical School of Physical Therapy of EMESCAM of Vitória in Espirito Santo in the period of 12/11/2015 to 11/02/2016 once a week, with 40 minutes each session, Totaling 12 sessions.

Physiotherapy Intervention

Exercises for balance training, proprioception and muscular strength gain were performed, such as alternately positioning the feet to a specific target, with markings on the floor; Stand up and sit under a specific count; Rotate under a specific count; Weight transfer; Walking sideways and forward (parallel lines were used to control foot positioning, stride length and step width).

In order to improve Proprioception, exercises were performed with Swiss ball, elastic bed and imbalance board. Patients also performed stretching exercises of the posterior muscle chain. In order to gain overall range of motion (WMD), stretching exercises of the posterior muscle chain were included. Proprioceptive Neuromuscular Facilitation Exercises (FNP) were performed to improve muscle strength, since PNF has the capacity to teach and carry out a therapeutic program that not only stimulates the muscles, but also the whole body, since it has a range of richer and more elaborate exercises. Frenkel exercises were used to improve balance and gait. These exercises have a series of activities with progressive and rhythmic difficulty, aiming at a better proprioceptive control and, as a consequence, a better functional movement. Among the 10 initial patients, 4 were excluded due to lack of physical therapy sessions. Thus, only 6 were statistically analyzed.

RESULTS

Considering the characterization of the sample, the result was more predominant in females, representing 90%. With regard to ethnicity, the white race represented a predominance of 50% of the sample, then the brown race with 40% and, finally, the black race with 10%. As for marital status, married couples accounted for 60%, then singles, 30%, and then widowers representing 10% of those surveyed. Referring to profession, 50% are retired, 10% of the housewives and 40% are professionally active of various technical specialties; 30% of the sample live in the municipality of Serra, 30% in Vila Velha, 20% in Cariacica and 20% in the city of Vitória.

A descriptive analysis of mean and standard deviation data was performed to make it possible to compare the balance before and after treatment. The DGI and BERG test scores indicated that the therapeutic intervention produces an improvement in balance. The mean of the DGI before the physiotherapeutic intervention was 14.8 ± 7.0 and after the intervention was 17.8 ± 5.3. Berg's mean before physical therapy intervention was 40.2 ± 12.4 and after the physiotherapeutic intervention was 42.7 ± 12.1, indicating improvement in balance, as can be seen in the Table 1.

Table 1 – Comparison of balance before and after physiotherapeutic intervencion

	Mean	Median	Standard Deviation
DGI before	14,8	15,0	7,0
BERG before	40,2	44,0	12,4
DGI after	17,8	19,5	5,3
BERG after	42,7	46,0	12,1

DISCUSSION

Oliveira et al[20] affirm that the practice of physical activity by patients with MS has increased significantly in recent years. This practice improves the balance and functional capacity of patients, as several studies have shown, because the exercises provide positive effects on physical functioning, without any negative effects on the symptoms of Multiple Sclerosis. The result of the study showed that patient balance improved significantly, both when evaluated by the Berg scale when testing the static balance, and by the DGI when testing the dynamic balance.

The greatest complaint of patients with multiple sclerosis is related to the imbalance, as the studies of Rodrigues et al, 2008 also attested[13]. This suggests that targeted physiotherapeutic intervention significantly improves the balance and quality of life of individuals with MS. Hence, the studies of Mann et al., 2009[21], and the study by Almeida et al[22], 2007, demonstrated that conventional physiotherapy associated with balance training is essential in the physiotherapeutic protocols for MS patients. Paltamaa et al [23], 2012, demonstrated the reason why patients with mild or moderate deficiency levels showed improved balance with progressive resistance exercises and balance training.

This study described the sample considering the following variables: sex, age, ethnicity, Marital Status, kind of job, number of children, outbreaks number and municipality of origin. The predominance was female, representing 90%. With regard to ethnicity, the predominance was white, 50%. The epidemiological study of Flores et al[1], (2014) showed a predominance of the white and female race in people affected with MS, thus substantiating the data of this research. As for age, the study obtained a mean age of 46.2 ± 15.14 years, as well as studies by Willis et al[3], 2014, which attest that MS is a disease that affects young adults. As for the professional activity, 50% of the patients studied are retired and the retired patients, 80% of them are retired due to disability. This result is equivalent to that found by Oliveira et al[24] in 2013, when attested that 38% of patients with MS were retired due to disability and 24% were professionally active.

CONCLUSION

The study evidenced that in order for patients with MS to achieve better balance and functional independence, it is of paramount importance that they benefit from physiotherapy. This fact was measured by the Berg balance scale and the Dynamic Marching Index (DGI). In addition, this study further asserted that women, white race and young adults are the most affected

by MS. It was also noticed that such patients are mostly inactive and retired.

REFERENCES

1. Flores FM, Sousa LS, Menezes KM, Copetti F, Trevisan CM. Quality of life in multiple sclerosis patients participating in therapeutic horseback riding. ConScientiae Saúde [Internet] 2014[acesso 15 de maio 2016]; 13(1):39-46. Disponível em: http://www.redalyc.org

2. Seixas D, Galhardo V, Sá MJ, Guimarães J, Lima D. Pain in multiple sclerosis: characterization of a Portuguese population of 85 patients. Acta Médica Portuguesa [Intenet]. 2009[acesso 15 de maio 2016];22(3):233-240. Disponível em: http//www.actamedicaportugues.com

3. Willis MK, Robertson NP. Alemtuzumab for the treatment of multiple sclerosis. Ther Clin Risk Manag [Internet] 2015[acesso 21 de maio 2016];11:525–534. Disponível em: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4386803/

4. Grzesiuk K. Clinical and epidemiologic characteristics of 20 patients with multiple sclerosis in Cuiabá Mato Grosso, Brazil. Arq. Neuro-Psiquiatr. 2006;64(3):635-638.

5. Browne P. et al .Atlas of Multiple Sclerosis 2013: A growing global problem with widespread inequity. Neurology. 2014; 83(11):1022-1024.

6. Kingwell E, Marriott JJ, Jetté N, Pringsheim T, Makhani N, Morrow SA, et al. Incidence and prevalence of multiple sclerosis in Europe: a systematic review. BMC Neurology [Internet]. 2013[acesso 14 abril 2016];13:128 Disponível em: www.bmcneuro.biomedcentral.com

7. Zeqiraj, K., Kruja, J., Kabashi, S., & Muçaj, S. Epidemiological Characteristics and Functional Disability of Multiple Sclerosis Patients in Kosovo. Med Arch. 2014; 68(3) 178–181.

8. Nali LHS, Moraes L, Fink MCD, Callegaro D, Romano CM, Oliveira ACP. Natalizumab treatment for multiple sclerosis: updates and considerations for safer treatment in JCV positive patients. Arq. Neuro-Psiquiatr. [Internet]. 2014 [acesso 2016 June 12]; 72(12):960-965. Disponível em: www.scielo.br/scielo doi.org

9. O´Sullivan SB, Schmitz,TJ. Fisioterapia: Avaliação e Tratamento. 4°ed. Barueri: Manole, 2004 p. 844-876.

10. Cardoso FAG. Atuação fisioterapêutica na esclerose múltipla: forma recorrente remitente. Rev. Movimenta [Internet]. 2010 [acesso 17 maio 2016];3(2). Disponível em: www.nee.ueg.br/seer/index.php/movimenta/article/download/336/314

11. Santos FLS, Corrêa NMH, Leal RMP, Monteiro CFS. A vivência do cônjugue/companheiro de portador de esclerose múltipla. Rev.enferm.UERJ. 2010; 18(2):229-234.

12. Tookuni S, Bolliger Neto R, Pereira CAM, Souza DR; D' Andrea Greve JM; D' Agosto Ayala A. Análise Comparativa do Controle Postural de Indivíduos com e sem lesão do ligamento cruzado anterior do joelho. Acta Ortop Bras. 2005; 13(3):115-119.

13. Rodrigues IF, Nielson MBP, Marinho AR. Avaliação da fisioterapia sobre o equilíbrio e a qualidade de vida em participantes com esclerose múltipla. Rev Neurocienc. 2008;16(4):269-274.

14. Gulik EE, Goodman S. Physical activity among people with multiple sclerosis. International Journal of MS Cares. 2006; 8(4):121-129.

15. Induruwa I, Constantinescu CS, Gran B. Fatigue in multiple sclerosis: a brief review. J Neurol Sci. 2012 15; 323(1-2):9-15

16. Moradi M et al. Effects of Eight-week Resistance Training Program in Men With Multiple Sclerosis. Asian journal of sports medicine. 2015; 6(2):1-7

17. Gutierrez GM, Chow JW, Tillman MD, McCoy SC, Castellano V, White LJ. Resistance training improves gait kinematics in persons with multiple sclerosis. Arch Phys Med Rehabil. 2005; 86(9):1824-1829.

18. Castro. S. M, Perracini M.R, Ganança F.F. Versão brasileira do Dynamic Gait Index. Rev Bras Otorrinolaringol. 2006; 72(6):817-825.

19. Miyamoto S.T., Lombardi Junior I., Berg K.O., Ramos L.R., Natour J. Brazilian version of the Berg balance scale. Braz J Med Biol Res [Internet]. 2004 [acesso 2016 June 12]; 37(9): 1411-1421. Disponível em: www.scielo.br/scielo. doi.org/10.1590/S0100-879X2004000900017

20. Oliveira N.G, Bofi T.C, Barbatto L.M, Carvalho A.C. "Analysis of a physiotherapy program in a group of patients with multiple sclerosis." MTP&RehabJournal. 2014;12(1):831-845.

21. Mann L, Kleipaul J.F, Mota C.B, Santos S.G. Equilíbrio corporal e exercícios físicos: uma revisão sistemática. Motriz rev. educ. fís. 2009;15(3):713-722.

22. Almeida SRM, Bersuaski K, Cacho EWA, Oberg TD. Eficiência do treino de equilíbrio na Esclerose Múltipla. Fisioterapia em movimento. 2007; 20(2): 41-48.

23. Paltamaa J, Sjogren T, Peurala SH, Heinonen A. EFFECTS of physiotherapy interventions on balance IN multiple sclerosis: A systematic review and META-analysis of randomized controlled trials J Rehabil Med. 2012; 44(10):811–823.

24. Oliveira ACFR, Andrade VS, Gontijo DT, Barroso SM. Caracterização e queixas relacionadas ao desempenho ocupacional: considerações de indivíduos com esclerose múltipla. Rev. Ter. Ocup. Univ. São Paulo. 2013 mai/ago; 24(2):112-120.