



ORIGINAL ARTICLE

Analysis of quality of life in patients with multiple sclerosis**Mariângela Braga Pereira Nielsen¹; Glesiane Justino Ferreira²; Letícia Marotto³; Nádia Iara Vieira dos Santos Ferreira⁴**

Submitted in 11/07/2016

Approved: 21/02/2017

KeywordsQuality of
Life; Multiple
Sclerosis;
Physical
Therapy
Modalities**Abstract**

Purpose: Characterize the epidemiological profile of patients with MS and verify the interference of physical therapy on quality of life of these individuals, analyzing the quality of life in patients with MS before and after physical therapy intervention. Method: Pre-and post-intervention physiotherapeutic evaluation was used with the application of the Functional Determination of Quality of Life Scale in the MS (DEFU). Results: There was no statistically significant difference with respect to quality of life after 12 therapy sessions. It follows a longer intervention is required to parse as physical therapy interferes with the QOL of these patients

* Correspondence: nadia-iara@hotmail.com

¹ M.S. in Public Policies/ Emescam - (Physiotherapist, expert in Respiratory and Neurofunctional Physiotherapy, M.S. in Public Policies).

² Undergraduate - (Undergraduate Student).

³ Undergraduate - (Undergraduate Student).

⁴ Undergraduate - (Undergraduate Student).

INTRODUCTION

Multiple sclerosis (MS) is a chronic and progressive disease affecting mainly young adults between the ages of 20 and 40, most prevalent in females and whites. It is considered as one of the most common pathologies affecting the Central Nervous System (CNS)¹⁻⁵.

There is a worldwide estimate of more than two and a half million people affected by MS. According to data from the Brazilian Multiple Sclerosis Association, there are records in Brazil of more than 30,000 individuals with MS, and yet only approximately 1/3 are in treatment^{6,7}.

MS is considered an autoimmune disorder in which activated T cells cross the blood-brain barrier to initiate an inflammatory response, leading to demyelination and axon injury. The main mechanisms that trigger MS remain unknown⁸.

MS motor symptoms typically involve spasticity, reflex spasms, contractures and gait disturbances as well as fatigue. The fatigue is often the initial symptom of an exacerbation and may be persistent or related to physical activity or to lower degrees of mental effort⁹.

Other characteristic symptoms are cerebellar and bulbar ones such as balance deficit, nystagmus, intention tremors, difficulty swallowing and breathing. MS sensory symptoms include numbness, paresthesia, dysesthesia, distortion of the superficial sensitivity and musculoskeletal pain⁹.

Anatomically speaking, MS affects the central nervous system, especially the optic nerve, cervical spine, brain stem and periventricular white matter^{9,10}.

The World Health Organization defines Quality of Life (QOL) as "the individual's

perception of his or her position in life, in the cultural context and in the value system in which he lives and in relation to his goals, expectations, concerns and desires"¹¹. In biomedical area, the health-related QOL (HRQoL) refers to the individual's satisfaction and well-being in the physical, psychological, social, economic and spiritual domains in relation to health status, ie a combination of health status with the affective response to this condition¹².

The health and well-being of these individuals may be strongly impacted by disease and / or drug side effects, with significant interference with quality of life (QoL)¹².

Quality of life concept is multidimensional, encompassing the physical, psychological, socio-cultural, economic and spiritual domains with respect to the state of health and well-being of individuals. That is, it addresses various aspects of human life. This term was expanded and modified over the years and currently it means social development in terms of education, health and leisure as well as economic issues¹³.

Quitaniha¹³, applying the Functional Determination Scale of Quality of Life in MS (DEFU) in his study performed of 13 patients, concluded that those with MS have an important negative impact on Quality of Life.

Pereira et al.¹⁴ applied Berg Balance Scale and DEFU in 4 individuals with MS, and an improvement in balance was observed through the Frankel exercises, however, there was no improvement in quality of life. This can be explained by the fact that individuals do not accept their disease because they are young in full productive activity.

The evaluation of QoL in patients with Multiple Sclerosis is extremely important, for it encompasses social, physical and mental aspects related to individual's

perception of his condition, including the treatment of his disease. Therefore, QoL Measurement Scales have been considered increasingly important in relation to assessment, disease progression, treatment and management of care provided to MS patients¹⁵.

Studies with Multiple Sclerosis patients have shown that there is a decrease in QoL in all its dimensions. This affirmation corroborates the concept that, in the rehabilitation of these patients is imperative the interaction of a multidisciplinary team that attends to patients in all their demands, going beyond the drug treatment, that is, it is important to elaborate a treatment program that attends the individual in their bodily, cognitive, emotional and social functions¹⁶.

There is a consensus that when physical activity is performed properly, it promotes health and improvement of practitioners' QoL. In addition to improving the psychic side of individuals, it still provides physical conditioning, which is an important factor in the performance of daily activities¹⁷.

The main objective of this study was to analyze the quality of life in patients with multiple sclerosis, before and after physiotherapeutic intervention. The specific objectives were to characterize the epidemiological profile of patients with multiple sclerosis regarding sex, age, ethnicity, housing and socioeconomic status, as well as to verify the interference of physiotherapy in the quality of life of patients with MS.

METHOD

This is a descriptive and quantitative case study, using a sample initially of 10 patients. Among them, 90% female and 10% male, with a mean age of 46.2 years, who underwent physiotherapy once a week for a totaling 12 sessions of 40 minutes

each one. This research had its project authorized by the Ethics and Research Committee (CEP) in Human beings from College of Sciences of the Santa Casa de Misericórdia de Vitória, EMESCAM under the registry CAAE: 47027215.2.0000.5965.

Patients with a diagnosis of MS with less than 65 years of age, of both sexes, attended at the Clinical School of Physiotherapy of EMESCAM, who agreed to do the research by signing the Free and Informed Consent Form (TCLE), were included in the study. Patients with visual and auditory problems, which affect the balance, the wheelchair users, or patients with any problem that could impede the active participation in the research as well as the patients who had missed the physiotherapy sessions more than three times along the study were excluded. The research was carried out in two moments. In the first moment a bibliographical research was carried out, using, as source of data, scientific papers selected in Pubmed, Medline and Scielo Data banks and published in the period 2000-2015, with publications in the English and Portuguese languages.

In the second moment the epidemiological profile of the selected patients was drawn. For that, we used the data collection form prepared by the researchers, from which data such as age, race, sex, housing, date of diagnosis and socioeconomic status were collected. In sequence, the Multiple Sclerosis (DEFU) functional quality of life Rating Scale was applied. After the first evaluation, physiotherapeutic intervention was started at the Clinical School of Physical Therapy at EMESCAM.

Statistical analysis: data collected regarding the patients epidemiological profile were analyzed using descriptive statistics methods. The presentation occurred by means of percentages and the summary of data through statistical measures such as mean, median and

standard deviation. The comparison of Quality of Life before and after physiotherapeutic intervention was descriptively performed, not considering the statistical inference.

The methodology consisted of a quality of life assessment before and after physiotherapeutic intervention with the application of the Functional Determination of Quality of Life Scale in MS (DEFU). This scale was translated and adapted to the Portuguese language in 1996. It presents as base a generic questionnaire developed for cancer patients, with questions about symptoms and problems related to MS. The DEFU consists of 6 sub-items valid for analysis: mobility (7 items), symptoms (7 items), emotional state (7 items), personal satisfaction (7 items), thinking and fatigue (9 items) and social and family situation (7 items). The format of the responses allows scores from 0 to 4 for each item, and the reverse score is considered for the negatively constructed questions. In such manner, the larger scores reflect a better quality of life¹⁸.

PHYSIOTHERAPY INTERVENTION

Some exercises were performed for balance training, proprioception and gain of muscular strength, such as: Alternate positioning of the feet to a specific target, by using markings on the floor; lifting and sitting exercises under a specific count; rotation under a specific count; weight transfer, sideways and forward walking exercises (parallel lines were used to control foot positioning, length of strides and width of steps). Exercises by using Swiss ball, trampoline and imbalance board were also performed to improve Proprioception. For the amplitude of movement gain (WMD), the patients performed stretching exercises. In order to improve muscle strength, Proprioceptive Neuromuscular Facilitation exercises (NPF) were performed, which have the capacity to teach and to perform a

therapeutic program with richer and more elaborate exercises, stimulating not only the muscles but also the body as a whole. For progression of balance and gait, Frenkel coordination and proprioception exercises were performed, besides a series of activities with progressive and rhythmic difficulty, in an effort to improve proprioceptive control and, consequently, functional movement.

This study was performed in Multiple Sclerosis Extension Project, in the Clinical School of Physiotherapy at College of Sciences of Santa Casa de Misericórdia de Vitória, ES (EMESCAM), between 12/11/2015 and 11/02 / 2016, once a week, totaling 12 sessions of 40 minutes each one. Out of the 10 initial patients, 4 gave up the survey and only 6 were for statistical analysis. At the end of the last session, the patients were reevaluated, applying the DEFU once more.

RESULTS

Applying the DEFU, we noted in this study that 80% of the participants had a rather good quality of life index. Barely 20% presented lower scores, which indicates a poor QoL index. After 12 sessions of physiotherapy, the participants were reassessed and, based on the results of the DEFU, the quality of life did not present any difference, as can be noted in table 1. resultados da DEFU, a qualidade de vida não apresentou diferença, conforme pode ser observado na tabela 1.

Table 1. Comparison of Quality of Life before and after Physical Therapy Intervention

	Mean	Median	Standard Deviation
DEFU_ before	74,3	76,5	11,4
DEFU_ after	72,3	72,5	10,6

INTRODUCTION

Multiple sclerosis (MS) is a chronic and progressive disease affecting mainly

young adults between the ages of 20 and 40, most prevalent in females and whites. It is considered as one of the most common pathologies affecting the Central Nervous System (CNS)¹⁻⁵.

There is a worldwide estimate of more than two and a half million people affected by MS. According to data from the Brazilian Multiple Sclerosis Association, there are records in Brazil of more than 30,000 individuals with MS, and yet only approximately 1/3 are in treatment^{6,7}.

MS is considered an autoimmune disorder in which activated T cells cross the blood-brain barrier to initiate an inflammatory response, leading to demyelination and axon injury. The main mechanisms that trigger MS remain unknown⁸.

MS motor symptoms typically involve spasticity, reflex spasms, contractures and gait disturbances as well as fatigue. The fatigue is often the initial symptom of an exacerbation and may be persistent or related to physical activity or to lower degrees of mental effort⁹.

Other characteristic symptoms are cerebellar and bulbar ones such as balance deficit, nystagmus, intention tremors, difficulty swallowing and breathing. MS sensory symptoms include numbness, paresthesia, dysesthesia, distortion of the superficial sensitivity and musculoskeletal pain⁹.

Anatomically speaking, MS affects the central nervous system, especially the optic nerve, cervical spine, brain stem and periventricular white matter^{9,10}.

The World Health Organization defines Quality of Life (QOL) as "the individual's perception of his or her position in life, in the cultural context and in the value system in which he lives and in relation to his goals, expectations, concerns and

desires"¹¹. In biomedical area, the health-related QOL (HRQoL) refers to the individual's satisfaction and well-being in the physical, psychological, social, economic and spiritual domains in relation to health status, ie a combination of health status with the affective response to this condition¹².

The health and well-being of these individuals may be strongly impacted by disease and / or drug side effects, with significant interference with quality of life (QoL)¹².

Quality of life concept is multidimensional, encompassing the physical, psychological, socio-cultural, economic and spiritual domains with respect to the state of health and well-being of individuals. That is, it addresses various aspects of human life. This term was expanded and modified over the years and currently it means social development in terms of education, health and leisure as well as economic issues¹³.

Quitaniha¹³, applying the Functional Determination Scale of Quality of Life in MS (DEFU) in his study performed of 13 patients, concluded that those with MS have an important negative impact on Quality of Life.

Pereira et al.¹⁴ applied Berg Balance Scale and DEFU in 4 individuals with MS, and an improvement in balance was observed through the Frankel exercises, however, there was no improvement in quality of life. This can be explained by the fact that individuals do not accept their disease because they are young in full productive activity.

The evaluation of QoL in patients with Multiple Sclerosis is extremely important, for it encompasses social, physical and mental aspects related to individual's perception of his condition, including the treatment of his disease. Therefore, QoL Measurement Scales have been

considered increasingly important in relation to assessment, disease progression, treatment and management of care provided to MS patients¹⁵.

Studies with Multiple Sclerosis patients have shown that there is a decrease in QoL in all its dimensions. This affirmation corroborates the concept that, in the rehabilitation of these patients is imperative the interaction of a multidisciplinary team that attends to patients in all their demands, going beyond the drug treatment, that is, it is important to elaborate a treatment program that attends the individual in their bodily, cognitive, emotional and social functions¹⁶.

There is a consensus that when physical activity is performed properly, it promotes health and improvement of practitioners' QoL. In addition to improving the psychic side of individuals, it still provides physical conditioning, which is an important factor in the performance of daily activities¹⁷.

The main objective of this study was to analyze the quality of life in patients with multiple sclerosis, before and after physiotherapeutic intervention. The specific objectives were to characterize the epidemiological profile of patients with multiple sclerosis regarding sex, age, ethnicity, housing and socioeconomic status, as well as to verify the interference of physiotherapy in the quality of life of patients with MS.

METHOD

This is a descriptive and quantitative case study, using a sample initially of 10 patients. Among them, 90% female and 10% male, with a mean age of 46.2 years, who underwent physiotherapy once a week for a totaling 12 sessions of 40 minutes each one. This research had its project authorized by the Ethics and Research Committee (CEP) in Human

beings from College of Sciences of the Santa Casa de Misericórdia de Vitória, EMESCAM under the registry CAAE: 47027215.2.0000.5965.

Patients with a diagnosis of MS with less than 65 years of age, of both sexes, attended at the Clinical School of Physiotherapy of EMESCAM, who agreed to do the research by signing the Free and Informed Consent Form (TCLE), were included in the study. Patients with visual and auditory problems, which affect the balance, the wheelchair users, or patients with any problem that could impede the active participation in the research as well as the patients who had missed the physiotherapy sessions more than three times along the study were excluded. The research was carried out in two moments. In the first moment a bibliographical research was carried out, using, as source of data, scientific papers selected in Pubmed, Medline and Scielo Data banks and published in the period 2000-2015, with publications in the English and Portuguese languages.

In the second moment the epidemiological profile of the selected patients was drawn. For that, we used the data collection form prepared by the researchers, from which data such as age, race, sex, housing, date of diagnosis and socioeconomic status were collected. In sequence, the Multiple Sclerosis (DEFU) functional quality of life Rating Scale was applied. After the first evaluation, physiotherapeutic intervention was started at the Clinical School of Physical Therapy at EMESCAM.

Statistical analysis: data collected regarding the patients epidemiological profile were analyzed using descriptive statistics methods. The presentation occurred by means of percentages and the summary of data through statistical measures such as mean, median and standard deviation. The comparison of

Quality of Life before and after physiotherapeutic intervention was descriptively performed, not considering the statistical inference.

The methodology consisted of a quality of life assessment before and after physiotherapeutic intervention with the application of the Functional Determination of Quality of Life Scale in MS (DEFU). This scale was translated and adapted to the Portuguese language in 1996. It presents as base a generic questionnaire developed for cancer patients, with questions about symptoms and problems related to MS. The DEFU consists of 6 sub-items valid for analysis: mobility (7 items), symptoms (7 items), emotional state (7 items), personal satisfaction (7 items), thinking and fatigue (9 items) and social and family situation (7 items). The format of the responses allows scores from 0 to 4 for each item, and the reverse score is considered for the negatively constructed questions. In such manner, the larger scores reflect a better quality of life¹⁸.

PHYSIOTHERAPY INTERVENTION

Some exercises were performed for balance training, proprioception and gain of muscular strength, such as: Alternate positioning of the feet to a specific target, by using markings on the floor; lifting and sitting exercises under a specific count; rotation under a specific count; weight transfer, sideways and forward walking exercises (parallel lines were used to control foot positioning, length of strides and width of steps). Exercises by using Swiss ball, trampoline and imbalance board were also performed to improve Proprioception. For the amplitude of movement gain (WMD), the patients performed stretching exercises. In order to improve muscle strength, Proprioceptive Neuromuscular Facilitation exercises (NPF) were performed, which have the capacity to teach and to perform a

therapeutic program with richer and more elaborate exercises, stimulating not only the muscles but also the body as a whole. For progression of balance and gait, Frenkel coordination and proprioception exercises were performed, besides a series of activities with progressive and rhythmic difficulty, in an effort to improve proprioceptive control and, consequently, functional movement.

This study was performed in Multiple Sclerosis Extension Project, in the Clinical School of Physiotherapy at College of Sciences of Santa Casa de Misericórdia de Vitória, ES (EMESCAM), between 12/11/2015 and 11/02 / 2016, once a week, totaling 12 sessions of 40 minutes each one. Out of the 10 initial patients, 4 gave up the survey and only 6 were for statistical analysis. At the end of the last session, the patients were reevaluated, applying the DEFU once more.

RESULTS

Applying the DEFU, we noted in this study that 80% of the participants had a rather good quality of life index. Barely 20% presented lower scores, which indicates a poor QoL index. After 12 sessions of physiotherapy, the participants were reassessed and, based on the results of the DEFU, the quality of life did not present any difference, as can be noted in table 1.

Table 1. Comparison of Quality of Life before and after Physical Therapy Intervention.

	Me
DEFU_ before	74.
DEFU_ after	72.

Regarding the characterization of the research sample, the results showed a greater predominance in the female sex,

representing 90%. Concerning ethnicity, it was predominant in the white race representing 50% of the sample, followed by brown race 40% and black 10%. As for marital status, 60% are married, 30% single and 10% widows. In relation to the profession, 50% are retired, 10% are housewives and 40% are professionally active of various technical specialties; 30% of the sample resides in the municipality of Serra, 30% in Vila Velha, 20% come from Cariacica and 20% from the city of Vitória.

DICUSSION

Studies on QoL in patients with MS is an important tool to evaluate the impact of the disease on these patients' daily lives, since the evolution of the MS implies in individual factors and not only in criteria of incapacity and deficiency¹⁹. In addition to the health-related factors, QoL also relates fundamental elements of life and how people react, that is, how people perceive situations that involve friends, family, work and the unforeseen events of daily life¹². In addition to the physical factors, other aspects must be considered during the physiotherapeutic intervention, so that the treatment plan can meet the real needs of these patients¹⁴. Out of the participants in the present study, 80% had higher scores on the functional quality of life scale in MS, which represents a better quality of life, in contrast to studies by Rodrigues et al (2008)²⁰ that observed a negative impact in the QoL of the participants of their research, using the same scale. This fact can be explained by the subjectivity and relativity of QoL, which is defined by the World Health Organization (WHO) as a personal conception of the individual, based on his socio-cultural context, values, dreams, goals, patterns and apprehensions to characterize his position in life^{12, 13}.

Pereira et al.¹⁴ did not observe improvement in QoL after 15 sessions of physiotherapy, which corroborates with

the present study where there was also no statistically significant improvement in QoL after 12 physiotherapy sessions. It was noted in this study that the relationship between balance and quality of life was inversely proportional to individual cases. It was also observed that patients with good balance and outside the risk zone of falls showed the worst quality of life index, whereas patients with worse balance, that is, with 100% risk of falls, were the ones that presented the best quality of life. This fact confirms that the negative impact of MS can be a consequence of several factors, one of which is the disability caused by the disease. The fact that it has a chronic, evolutionary, neurological disease that is unpredictable, gradually incapacitating, and still without cure can have a strong repercussion in patients' lives, even in the early stages²¹.

The participants of our study did not present a bad QoL, when compared with the other studies published on the same subject. However, even that the study had proposed to verify if and how the physiotherapy interferes in the QoL of these individuals, we did not observe a difference before and after the physiotherapeutic intervention, which can be explained by the age factor, since the participants of our study had a mean of 46.2 years. We must take into account that the disease was installed in the middle of the socioeconomic development stage and that, even in the face of the difficulties peculiar to a chronic disease and with no cure, the patients presented an optimistic attitude towards these difficulties.

CONCLUSION

This study could not observe significant changes in quality of life, and this fact can be explained by the multidimensional and subjective concept that encompasses quality of life. It is essential that there be more studies with a longer time of intervention, and with a larger number of

participants, in order to measure the quality of life and the interference of physical therapy in patients with multiple sclerosis; to better assess the impact of MS with the joint use of generic and specific instruments for the more detailed determination of the influence of symptoms; and also for the verification of the interference of drug and non-drug interventions in the QV, perceived by the patients. It was also demonstrated in this study that MS affects mainly female, white and young adults, and that the patients are mostly inactive and retired. Because it is a rare disease, the promotion of multi-centric studies with a greater number of patients can lead to more consistent results.

REFERENCES

1. Flores FM, Sousa LS, Menezes KM, Copetti F, Trevisan CM. Quality of life in multiple sclerosis patients participating in therapeutic horseback riding. *ConSc Saúde* [online]. 2014[acesso em 15 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 Méd Port* [online]. 2009 [acesso em 15 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* [online]. 2015[acesso em 21 maio 2016];11: 525-534. Disponível em: <http://www.ncbi.nlm.nih.gov>.
- 4 Grzesiuk K. Clinical and epidemiologic characteristics of 20 patients with multiple sclerosis in Cuiabá Mato Grosso, Brazil. *Arq Neuro-Psiquiatr* 2006;64:635-638.

5 Browne P, Chandraratna D, Angood C, Tremlett H, Baker C, Taylor BV et al. Atlas of Multiple Sclerosis 2013: A growing global problem with widespread inequity. *Neurology*. 2014 Sep 9;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*. [online]. 2013[acesso em 14 abril 2016]; Sep26;13(1):128. Disponível em: <http://www.bmcneuro.biomedcentral.com>

7 Zeqiraj K, Kruja J, Kabashi S, Muçaj S. Epidemiological Characteristics and Functional Disability of Multiple Sclerosis Patients in Kosovo. *Medic Archives* 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* [online]. 2014 [acesso em 12 jun 2016];72(12):960-965. Disponível em: <http://www.scielo.br/scielo doi.org>.

9 O'Sullivan SB. Esclerose Múltipla. In: O'Sullivan SB. *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* [online]. 2010[acesso em 17 maio 2016]. Disponível em: <http://www.nee.ueg.br>.

11 The World Health Organization Quality Of Life Assessment (WHOQOL): position paper from the World Health Organization. *Soc Sci Med* 1995;41:1403-1409.

12 Theunissen NC, Vogels TG, Koopman HM, Verrips GH, Zwinderman KA,

Verloove-Vanhorick SP et al. The proxy problem: child report versus parent report in health-related quality of life research. *Quality of Life Research*. 1998 Jul 1;7(5):387-397.

13 Quintanilha RS, Lima LR. Avaliação da qualidade de vida em portadores de Esclerose Múltipla. *Rev Enf UFPE* 2010;4(1):153-161.

14 Pereira EF, Teixeira CA, Santos A. Qualidade de vida: abordagens, conceitos e avaliação. *Rev bras Educ Fís Esporte* 2012;26(2):241-50.

15 Baumstarck K, Boyer L, Boucekine M, Michel P, Pelletier J, Auquier P. Measuring the quality of life in patients with multiple sclerosis in clinical practice: a necessary challenge. *Multiple sclerosis international*. [online]. Feb 28;2013. 2013(1):1-8. [acesso em 16 abril 2016]; Disponível em: <http://dx.doi.org/10.1155/2013/524894>.

16 Almeida SRM, Bersuaski K, Cacho EWA, Oberg TD. Eficiência do treino de equilíbrio na Esclerose Múltipla. *Fisioter mov*. 2007;20(2):41-48.

17 Oliveira NG, Bofi TC, Barbatto LM, Cesinando de Carvalho A. "Analysis of a physiotherapy program in a group of patients with multiple sclerosis." *MTP & Rehab Journ*, 2014;12(1):831-845.

18 Mendes MF, Balsimelli S, Stangehaus G, Tilbery CP. Validação de escala de determinação funcional da qualidade de vida na esclerose múltipla para a língua portuguesa. *Arq Neuropsiquiatr* 2004;62(1):108-113.

19 Pedro L, Ribeiro JLP. Implicações da situação profissional na qualidade de vida em indivíduos com esclerose múltipla. In: *Simpósio nacional de investigação em psicologia*, 7. 2010. Anais... Braga:

Universidade do Minho; 2010. p.1286-1294.

20 Rodrigues IF, Nielsen 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.

21 Janssens AC, Van Doorn PA, De Boer JB, Kalkers NF, van der Meché FG, Passchier J et al. Anxiety and depression influence the relation between disability status and quality of life in multiple sclerosis. *Mult Scler* 2003;9:397-403.