



# FIGURE-OF-EIGHT BANDAGING TECHNIQUE EFFECTS ON GAIT AND BALANCE OF NEUROLOGICAL PATIENTS: SISTEMATIC REVIEW

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## ABSTRACT

**Introduction:** patients with common neurological diseases among others, there is no balance and gait, the reason that leads to functional decline and quality of life. **Objective:** To review the effects of bandaging in any treatment of gait and balance of individuals affected by neurological diseases. **Methods:** A study was carried out in the databases SCHOLAR GOOGLE, EBSCO, LILACS, SCIELO, PUBMED and MEDLINE, using the following descriptors: Gait; Orthotic devices; Postural Balance and Neuromuscular Diseases. As researches were conducted between July and December 2016, having as criteria: studies with adult neurological patients, which are the effects of bandaging in our nodes of gait, balances and functionality of the population. The studies were initially screened by title and abstract. In all the studies that fit the selection criteria were retrieved for reading in the integration, evaluation of the methodological quality and extraction of the data of interest for the review. **Results:** As database queries resulted in the identification and selection of four studies. Three of them were developed with volunteers patients affected by stroke. Both studies had the effect of the acute bandaging in eight. However, as analyzed variables ranged between static and dynamic equilibrium, gait and functionality. Only three references obtained significant results. The main results indicate the improvement of walking speed, the activation of the anterior tibial muscle, functional mobility and the balance of the evaluated population. **Conclusion:** The results of this review show that the figure-of-eight bandaging technique promotes significant improvement in clinical gait variables, static and dynamic balance.

**Keywords:** Gait; Orthotic Devices; Postural Balance; Figure-of-Eight Bandaging Technique; Physical and Rehabilitation Medicine.

## INTRODUCTION

Human gait is an essential functional activity for performing daily activities, locomotion and maintenance of health. Patients with neurological sequelae have limited function due to changes in muscle strength, spasticity, sensory functions, motor and postural balance<sup>(1,2)</sup>. Together, these changes also create asymmetries and instability to perform movements with the trunk and appendicular skeleton<sup>(1,3)</sup>. Moreover, increase energy expenditure and decrease the functionality of the individual during daily demands<sup>(1,2,4-6)</sup>.

Although it is described that the gait dysfunction in neurological patients may vary according to the pathology and the lesion area, the difficulty in performing dorsiflexion is frequent in this population. In hemiparetic patients, this limitation is characterized by the equinovarus foot and inadequate muscular activation, leading to a compromise in support of the calcaneus in the initial support. This causes side support plant to increase and reduction in the boost phase,

which leads to an abnormal pattern in the balance phase, characterized by the necessity for excessive hip flexion to keep the foot away from the floor<sup>(1,6,7)</sup>.

The functional limitations developed by patients affected by upper and lower motor neuron injuries, directly interfere in their social and work life, thus reducing their abilities to perform them. Similarly, authors have suggested a negative influence on the quality of life and functional capacity of these individuals. On the other hand, it is plausible to suggest both psychological and emotional impacts, as in regard to motricity<sup>(8-10)</sup>.

Because of its impact, functional recovery of gait, as well as variables related to it allows the functional independence to neurological patients, autonomy and quality of life<sup>(1,5,6,8-11)</sup>. Moreover, it is the objective of physical therapy in most upper and lower motor neuron disorders<sup>(11)</sup>. About 60% to 75% of patients which had neurological impairment do not return

Study developed in the Research Group Health Sciences in Physical Therapy, Salvador University – UNIFACS, Feira de Santana, (BA), Brazil.

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**Financial Support:** none.

**Submission date 10 January 2017; Acceptance 20 August 2017; Publication 19 September 2017**





to their activities in a functional manner, even those which require assistance in walking after hospitalization<sup>(1,12)</sup>.

For the functional recovery of gait and balance, some instrumental resources have been used, including stabilization of the ankle/foot joint by orthoses. These are used in order to align the joint, the improvement of the movement dynamic, the balance and, therefore, decreased energy expenditure<sup>(1,4,13)</sup>. However, these orthoses are expensive, making them unviable for clinical practice. In this way, it is necessary the identification of treatment alternatives, functionally and economically viable.

Thus, the figure-of-eight bandaging technique has been described as a low-cost method, accessible, which may provide proprioceptive information and promote biomechanical alignment of the ankle, assisting in gait symmetry of patients with neurological disorders<sup>(14-16)</sup>. Therefore, the objective of this study is to systematically review the literature on the effects of figure-of-eight bandaging technique on functional gait re-education and balance of patients with neurological diseases.

## METHODS

### Research Type

This is a systematic review based on recommendations of the Preferred Reporting Items for Systematic Review and Meta-analyses: The PRISMA statement<sup>(17)</sup>. Thus, we selected original studies which analyzed the acute or chronic effects of figure-of-eight bandaging technique on gait, balance, and functional mobility of neurological patients, aged >18 years, who did not present cognitive alterations, deformities which impeded ankle mobility as well as those which did not have an auxiliary device such as walking stick, crutches, walker or dependence of third parties.

### Search strategy

The search for potential studies was carried out by independent authors, between October and December of 2016, where the electronic databases were consulted: GOOGLE SCHOLAR, EBSCO, LILACS, PUBMED, REDALYC and SCIELO. For the selection of the manuscripts, the following keywords were used as descriptors in health sciences and Medical Subject Headings (MeSH): "Physical Therapy Modalities", "Gait"; "Orthotic Devices"; "Postural Balance" and "Neuromuscular Diseases" and their correspondents in Portuguese.

### Eligibility and Exclusion Criteria

It was adopted as an eligibility criterion, original studies, with an experimental design, which analyzed the acute or chronic effects of figure-of-eight bandaging technique on cadence, step length, gait velocity, electromyographic activity of the dorsiflexor muscles, static, dynamic balance and functionality. For inclusion, the studies should be available in

full, published in Portuguese or English, until December 2016. Adopted as exclusion criteria, articles published in non-indexed journals, studies which have not described the evaluation methodology and treatment of the patients.

### Selection of Studies and Data Extraction

The articles retrieved in the databases was initially sorted by reading the titles and then the duplicated studies were excluded. Subsequently, the titles and abstracts were re-read to verify if they met the eligibility criteria of the present study. Eligible studies were retrieved for reading of the full text, re-evaluation of selection and extraction criteria for data concerning the (a) author and year of publication, (b) study type, (c) participants, (d) evaluation, (e) intervention and (f) outcome Table 1. Finally, the references of the selected studies for this review were analyzed in order to verify the existence of eligible articles which were not identified in the searches of the selected databases.

### Risk assessment of bias

All articles included in this review were independently assessed for their methodological quality. The evaluation protocol was adapted from the tool proposed by Downs & Black<sup>(18)</sup>. For each item of the instrument, there are two options of answer: a) "yes", in case of the study explicitly contemplates the criteria; b) "no", if it does not contemplate. Our final instrument consists of 20 items: 1) Was the study hypothesis/purpose clearly described? 2) Were the study outcomes clearly described in the Introduction or Methods?; 3) Have the characteristics of the patients included in the study been clearly described?; 4) Have the interventions of interest been clearly described? 5) Has the distribution of confounding factors in each group been clearly described?; 6) Have the main findings of the study been clearly described?; 7) Does the study provide estimates of random variability of data for the main outcomes?; 8) Have the characteristics of the lost patients been clearly described?; 9) Were the 95% confidence intervals and/or p values reported for associations with the major outcomes, except when the p value was less than 0.001?; 10) Were the subjects invited to participate in the study representative of the population from which they were recruited?; 11) Was there attempted blinding of the subjects submitted to the intervention?; 12) Were the statistical tests used to assess the significance of associations with the main outcomes adequate? 13) Have the comparison groups been maintained? 14) Have the measures of the main outcomes been accurate (valid and reliable)? 15) Were the groups to be compared obtained from the same population?; 16) Have the study subjects been recruited during the same period?; 17) Were the subjects in the intervention group randomized? 18) Was there adequate adjustment of the confounding factors in the analyzes from which the main findings were taken?; 19) Have the follow-up losses been taken into

**Table 1.** Qualitative Synthesis of studies on the effects of figure-of-eight bandaging technique in neurological patients.

REFERENCE	STUDY TYPE	PARTICIPANTS	EVALUATION	INTERVENTION	OUTCOME
Torriani et al., 2007 <sup>(14)</sup>	Case series	9 adult participants, including 6 men with a mean age of 53 years. Presenting independent gait and difficulty performing dorsiflexion.	Gait evaluation by a timer at 10 meters. In comfortable and accelerated situation. Then, the electromyography of tibialis anterior muscle for 1 minute on treadmill.	A single session in figure-of-eight bandaging with rigid bandage.	Significant increase in the speed gait and comfortable. There was no recruitment of the tibialis anterior muscle.
Torriani et al., 2008 <sup>(15)</sup>	Comparative study of before and after.	12 patients, 64% female of average age 49 years and post-stroke average time of 41 months, presenting independent gait.	Dynamic gait index, evaluation with electronic pedometer to measure the number of steps in a journey of 10 meters. It was investigated the cadence, average speed, step length and balance.	A single session in figure-of-eight bandaging with rigid bandage.	Significant increase in cadence, average gait speed and dynamic gait index.
Silva et al., 2014 <sup>(16)</sup>	Analytical Study cross section.	Hemiparesis 22 volunteers, including 11 women and 11 men. With an average age of 59 years who roam without assistance device which do not have cognitive impairment.	Gait speed estimated at 10 meters by the Flansbjerg et al. protocol, TUG, Brazilian version of BERG Balance Scale.	Single session figure-of-eight bandaging on hemiparetic ankle with elastic bandage high compression.	Statistically significant improvement in gait speed, balance and functional mobility.
Costa et al., 2015 <sup>(19)</sup>	Analytical Study cross section.	30 subjects, 27 men and 7 women, mean age 57 years, with independent gait and preserved cognitive.	Force platform TeckScan brand, model MedScan (0.50x0.50).	Three evaluations were made: without the figure-of-eight bandaging, with bandaging and 5 minutes after application of bandaging, during the same session.	There was no improvement in static balance and distribution of plantar pressure.

account? 20) Does the study have sufficient power to detect an important clinical effect in which the probability value for chance difference is less than 5%? The evaluations were carried out by two reviewers independently and the disagreements between them were resolved by consensus.

## RESULTS

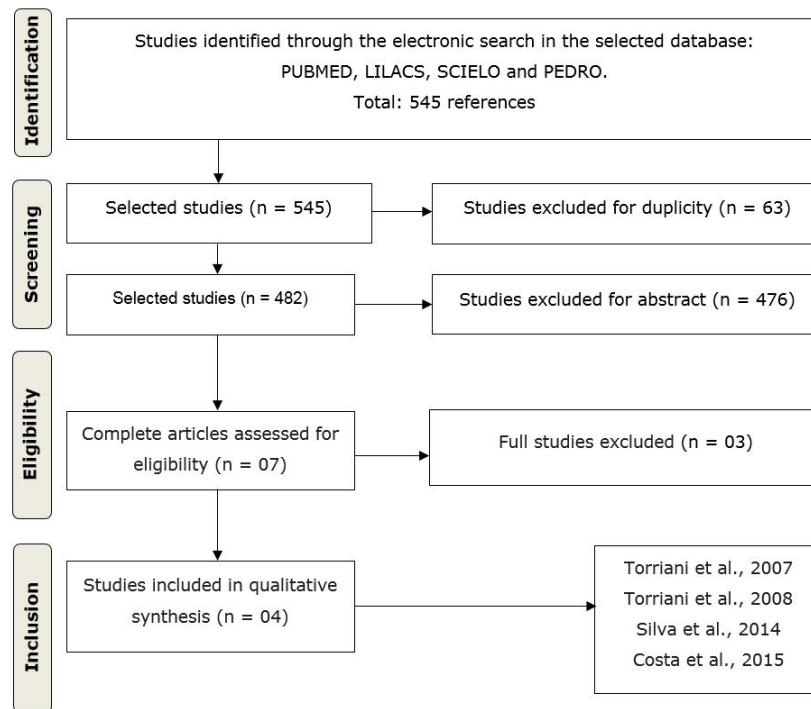
The searches in the databases resulted in the identification of 545 studies, of which 63 were excluded for duplicity, leaving 482 studies remaining. However, after screening by the title and abstract, 475 studies were excluded because they did not meet the previously established eligibility criteria, leaving 7 studies, which they were analyzed in full and reassessed as to eligibility, which resulted in the exclusion of another 3 studies. Finally, 4 articles met the selection criteria and were included in the present study. Figure 1 illustrates the process of screening and selection of the studies included in this review.

Regarding the objective, all the studies specifically investigated the effect of the figure-of-eight bandaging

technique on functional parameters of neurological patients<sup>(14-16,19)</sup>. However, not all studies evaluated the same variable. Thus, only 3 studies verified the effects of the technique on gait<sup>(14-16,19)</sup>. In addition to this variable, it was also evaluated the balance, which is static and dynamic<sup>(15-16,19)</sup>. A study analyzed between its variables, the electromyographic activity from tibialis anterior muscle<sup>(14)</sup>. Finally, only one made inferences about functional performance<sup>(16)</sup>.

Regarding the study population, three studies had as sample only patients suffering from stroke<sup>(15-16,19)</sup>. On the other hand, a study evaluated subjects with other pathologies in addition to the stroke, such as myelopathy, multiple sclerosis, inflammatory polyneuropathy, Becker muscular dystrophy and peroneal nerve injury<sup>(14)</sup>. Regarding the sample, all articles were composed of patients of both genders, with an average age of 50 years, which presented weakness or spasticity of the affected side<sup>(14-16,19)</sup>.

For the analysis of gait parameters, balance and functional performance, the authors used several tools. Silva et al.<sup>(16)</sup>



**Figure 1.** Flow chart of screening and selection of studies.

evaluated the rate of natural and maximum gait by validated protocol for Flansbjerg et al.,<sup>(20)</sup> while the functional mobility was measured by the Timed Up and Go and the BERG Balance Scale<sup>(16)</sup>. Torriani et al., used the dynamic gait index<sup>(15)</sup>. Costa et al.<sup>(19)</sup> evaluated static balance and plantar pressure distribution through the force platform. Finally, to assess the recruitment of dorsiflexor, Torriani et al.,<sup>(14)</sup> possessed of surface electromyography.

Regarding the intervention, three studies presented as an intervention the figure-of-eight bandaging technique in hemiparetic ankle, using high compression elastic bandage<sup>(15,16,19)</sup>. Only Torriani et al.<sup>(14)</sup> used a rigid band for the application of its protocol. In all studies, the band was passed around the foot and ankle, causing tension to eversion and dorsiflexion<sup>(14-17)</sup>.

The main outcomes showed significant increase in normal and accelerated gait speed<sup>(14-16)</sup>. It was also identified significant increase in average cadence and the speed gait<sup>(15,16)</sup>. Regarding the balance, studies have documented significant increase in static and dynamic balance<sup>(15,16)</sup>. However, a study failed to observe a significant improvement of balance and distribution of plantar pressure of patients with stroke<sup>(19)</sup>. Another result, it was a significant improvement in functional mobility of this participant<sup>(16)</sup>. All the above information is synthesized and presented in Table 1.

Finally, in the analysis of the methodology of the studies, 100% of the references were identified as cross-sectional, being a series of cases, one comparative study of the before and after

type and two cross-sectional analytical studies<sup>(14-16,19)</sup>. Another important fact is that none of the studies was controlled<sup>(14-16,19)</sup>. However, there was adequate characterization of the sample. Only one study obtained sample sufficiency<sup>(16)</sup>. According to Downs and Black scale, two studies reached 10 points each<sup>(14,15)</sup>, one<sup>(19)</sup> obtained 11 points and the last study reached 12 points<sup>(16)</sup>.

## DISCUSSION

The purpose of this study was to systematically review the literature on the effect of figure-of-eight bandaging technique on the physiotherapeutic treatment of gait and balance of patients with neurological diseases. In this regard, four studies were identified, all of them only reporting the acute effect in volunteers with superior and inferior motor neuron disease<sup>(14-16,19)</sup>. The selected studies, three evaluated and identified significant effects on the gait, balance, and functional mobility<sup>(14-16)</sup>, while only one<sup>(19)</sup> centered on the evaluation of static balance and distribution of plantar pressure found no significant results.

These findings may represent benefits to the clinical practice of the physiotherapist. This is because the variables presented above reflect both the autonomy, the health and functional capacity of human beings<sup>(1)</sup>. In addition, the gait in particular, has also been used as a marker of cognitive decline, functional capacity, and decreases the risk of mortality in populations affected by respiratory disorders, neuromusculoskeletal and cardiometabolic<sup>(21)</sup>.



In the context of physical rehabilitation, the gait of patients with neurological diseases is dysfunctional due to several factors. Among them, we mention the spasticity, muscle weakness, limitation of range of motion, in particular ankle dorsiflexion<sup>(1,3)</sup>. In this regard, one of the hypotheses that guides the use of figure-of-eight bandaging technique is the increased activity of the dorsiflexor muscles. However, Torriani et al.<sup>(14)</sup> found no significant increase in electromyographic activity of the anterior tibialis of neurological patients submitted to the technique. On the other hand, due to a tendency to decrease the myoelectric activity of the anterior tibial during the use of rigid orthoses, the figure-of-eight bandaging technique may be a viable therapeutical option, since during its use there is no description of decreased activity of the muscles involved in walking<sup>(14,22)</sup>.

Another significant data is the significant improvement in comfortable and accelerated gait speed after the application of figure-of-eight bandaging technique. One hypothesis that may justify this result is that the figure-of-eight bandaging technique seems to act in repositioning the ankle joint, in addition to increasing the amplitude in dorsiflexion, improving/maintaining the contraction capacity of the dorsiflexor muscles, as well as improving the dynamic balance and consequently the functional mobility of patients<sup>(16)</sup>.

In agreement with the hypothesis mentioned above, two other studies with patients suffering from stroke have also identified a significant improvement during gait after treatment with the figure-of-eight bandaging technique<sup>(15,16)</sup>. According to the authors, this result was represented by the increase of the speed of the gait in normal and accelerated condition<sup>(14-16)</sup>. This result seems to be related to an increase in ankle dorsiflexion during the application of the technique. To Silva et al.,<sup>(16)</sup> the figure-of-eight bandaging technique improves the support of the calcaneus at the time of initial contact, and the variation of the paretic limb in balance phase, and allows the impulse of the member while the gait, enabling a better capacity of the plantar flexion.

However, despite the results presented, it is necessary to point out that the gait evaluation methods differed among the studies. Torriani et al.,<sup>(14)</sup> analyzed the comfortable and accelerated gait at a distance of ten meters, in addition to performing the electromyographic activity of the tibialis anterior while walking on a treadmill. In another study, the same authors used the dynamic gait index, a validated tool for evaluation of patients with stroke<sup>(15)</sup>. In addition, it was investigated the cadence, average velocity step length. Moreover, Silva et al.<sup>(16)</sup> evaluated the gait speed at a distance of ten meters, following the protocol validated by Flansbjer et al.<sup>(18)</sup>. These results demonstrate that there is no standardization among the studies, making it difficult to compare adequately as well as to extrapolate the results found for clinical practice.

Another result presented by the studies was a significant improvement in static and dynamic balance of neurological patients<sup>(15,16)</sup>. It is important to emphasize that the neurological changes in gait are associated with balance and cadence, making it plausible to suggest that in addition to the result related to the gait previously discussed, the technique in question causes functional changes in the balance.

Thus, Torriani et al.<sup>(15)</sup> were the first to suggest changes in the patient balance after stroke with the figure-of-eight bandaging technique. Also in patients with stroke, Smith et al.<sup>(16)</sup> found that the application of this technique caused a significant improvement in dynamic balance. However, in contrast to this result, Costa et al.,<sup>(19)</sup> concluded that a single session of this technique is not able to promote clinical changes in static balance in patient affected from stroke, even being suggested by the authors that the figure-of-eight bandaging technique could reduce the internal torque of the ankle, which would impair the balance of the population evaluated.

Still, in relation to the balance, it should be emphasized that the patients were evaluated by different tools, which limits the comparison of the results. In the study by Torriani et al.<sup>(15)</sup> this variable was evaluated by dynamic gait index, designed to measure the balance during walking on a flat surface, changes in gait speed, gait with horizontal rotation of the head, gait with vertical head movements, gait and rotation, go over an obstacle, walk around obstacles, and climb and descend steps. In the study by Silva et al.<sup>(16)</sup>, the BERG scale was used, instrument which measures the performance of the individual during functional tasks, such as the reach and transfers, and the scale assesses the balance based on 14 daily common items. And the most recent study used the force platform in which the oscillations of power points related to the speed and the anteroposterior and mediolateral displacement are analyzed in order to evaluate the balance through the center of pressure<sup>(19)</sup>.

Functional rehabilitation strategies gait and balance are strongly recommended by the guidelines for physical rehabilitation of neurological patients<sup>(3,4)</sup>. This occur because a large portion of these patients are expected to recover or walk with quality and functional independence. According to some authors, the functional rehabilitation of balance and gait culminates in better performance and functional mobility, since, when subjected to figure-of-eight bandaging, there is a significant improvement in the dorsiflexion movement and consequently the gait quality at comfortable speed, being the most selected by these patients. Another point that suggests improved performance and functional mobility is increased static and dynamic balance, and reduce the risk of falling to around 6% to 8%<sup>(14-16)</sup>.

Finally, the technique discussed here may represent an interesting therapeutic option for the treatment of variables related to gait, balance and, consequently, the functional mobility of neurological patients. On the other hand, some



points still need to be better discussed. Firstly, all the studies analyzed only the acute effect of the technique, remaining, therefore, doubts about its chronic effects. The second point relates to the methodological study design, which does not allow to establish a relationship of cause and effect properly<sup>(14-16,19)</sup>. In addition, only one study presented a sample adequacy calculation. Regarding the assessment by Downs and Black scale, most studies<sup>(14,15,19)</sup> reached only 50% of the maximum score, which suggests methodological limitations and risk of bias. Third, it is noteworthy that although studies dealing with neurological patients, one evaluated participants with multiple nervous system pathologies<sup>(14)</sup>. The limitations presented here make it difficult to establish the effects of the treatment with figure-of-eight bandaging. Finally, there is still a necessity to standardize both the form of treatment and the evaluation. Together these data suggest the necessity for new studies with adequate experimental design to approach intervention in physiotherapy.

## CONCLUSION

The results of this review show that the figure-of-eight bandaging technique promotes significant improvement in clinical gait variables, static and dynamic balance. Consequently, these results represent gains related to the mobility and functional performance of neurological patients.

## AUTHOR CONTRIBUTIONS

Conception and design: Santos ACN and Mota RS; Data collection: Santos ACN, Almeida LPS, Barbosa JES, Oliveira MP and Cerqueira LSS; Analysis and data interpretation and writing of the manuscript: Santos ACN, Almeida LPS, Barbosa JES, Oliveira MP and Cerqueira LSS; Critical review of the manuscript regarding the important intellectual content: Santos ACN, Mota RS, Almeida LPS and Barbosa JES.

## CONFLICT OF INTEREST

None.

## REFERENCES

- Ottoboni C, Fontes SV, Fukujima. Estudo comparativo entre a marcha normal e a de pacientes hemiparéticos por acidente vascular encefálico: aspectos biomecânicos. *Rev. Neurociências*. 2002;10(1):10-16.
- Leite NN, Borba ADO, Silva MJ da, Nascimento N da S, Silva NA da, Conceição ECG da. Uso da bola terapêutica no equilíbrio estático e dinâmico de pacientes com hemiparesia. *Fisioter Mov*. 2009 ;22(1):121-131.
- Diretrizes de atenção à reabilitação da pessoa com acidente vascular cerebral / Ministério da Saúde, Secretaria de Atenção à Saúde, Departamento de Ações Programáticas Estratégicas. – Brasília: Ministério da Saúde, 2013.
- Terranova TT, Albieri FO, Almeida MD, Ayres DVM, Cruz SF, Milazzotto MV, et al.. Acidente vascular cerebral crônico: reabilitação. *Acta Fisiatr*. 2012;19(2):50-9.
- Corrêa FI, Soares F, Andrade DV, Gondo RMG, Peres JÁ, Fernandes AO et al. Atividade muscular durante a marcha após acidente vascular encefálico. *Arq Neuropsiquiatr* 2005;63(3-B):847-851.
- Dettmann MA, Linder MT, Sepic SB. Relationships among walking performance, postural stability, and functional assessments of the hemiplegic patient. *Am J Phys Med*. 1987;66(2):77-90.
- Milot M, MSc; Nadeau S; Gravel D; Requião LF. Bilateral level of effort of the plantar flexors, hip flexors, and extensors during gait in hemiparetic and healthy individuals. . *Stroke*. 2006;37:2070-2075.
- Cesário CMM, Penasso P, Oliveira APR. Impacto da disfunção motora na qualidade de vida em pacientes com Acidente Vascular Encefálico. *REVISTA NEUROCIÊNCIAS* 2006;14(1):6-9.
- Antunes JE, Justo FHO, Justo FO, Ramos GC, Prudente COM. Influência do controle postural e equilíbrio em pacientes com sequela de AVC. *Rev Fisioter S Fun*. Fortaleza, 2016; 5(1): 30-41.
- Scalzo PL, Souza ES, Moreira AGO, Vieira DAF. Qualidade de vida em pacientes com Acidente Vascular Cerebral: clínica de fisioterapia Puc Minas Betim. *Rev Neurocienc* 2010;18(2):139-144.
- Silva LLM, Moura CEM, Godoy JRP. A marcha no paciente hemiparético. *Univ. Ci. Saúde*. 2005;3(2):261-273.
- Polese JC, Tonial A, Jung FK, Mazuco R, Oliveira SG, Schuster RC. Avaliação da funcionalidade de indivíduos acometidos por Acidente Vascular Encefálico. *Rev Neurocienc* 2008;16(3):175-178.
- Simons CD, van Asseldonk EH, van der Kooij H, Geurts AC, Buurke JH. Ankle-foot orthoses in stroke: Effects on functional balance, weight-bearing asymmetry and the contribution of each lower limb to balance control. *Clin Biomech*. 2009;24(9):769-75.
- Torriani C, Queiroz SS, Cyrillo FN, Roxo R, Zacani R, Marcarí R. Enfaixamento em 8 como recurso fisioterapêutico para o recrutamento muscular dos dorsiflexores durante a marcha. *Fisioter Moviment*. 2007;20(4):31-41.
- Torriani C, Mota EPO, Lima RZ, Rosatti L, Umestsu P, Pries RM et al. Efeitos do enfaixamento em oito no equilíbrio e nos parâmetros da marcha de pacientes hemiparéticos. *Rev Neurocienc* 2008;16(2):107-112.
- Silva MS, Corrêa JCF, Salvador RMM, Martinez TS, Corrêa FI. Enfaixamento em oito como recurso fisioterapêutico para reabilitação do desempenho funcional após acidente vascular encefálico. *Fisioter Pesq*. 2014;21(1):4-9.
- Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA Statement. *Ann Intern Med*. 2009;151(4):264-9.
- S.H. Downs, N. Black The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions *J Epidemiol Community Health*. 1998;52 (6): 377-84.
- Costa GC, Corrêa JCF, Silva SM, Corrêa FI. Efeito do enfaixamento em oito no equilíbrio estático e distribuição de pressão plantar após acidente vascular encefálico. *Fisioter Pesq*. 2015;22(4):398-403.
- Flanbsjer U, Holmback A, Downham D, Patten C, Lexell J. Reliability of gait performance tests in men and women with hemiparesis after stroke. *J Rehabil Med*. 2005;37(2):75-82.
- Segev-Jacobovski O, Herman T, Yogev-Seligmann G, Mirelman A, Giladi N, Hausdorff JM. The interplay between gait, falls and cognition: can cognitive therapy reduce fall risk? *Expert Rev Neurother*. 2011;11(7):1057-75.
- Simons CD, van Asseldonk EH, van der Kooij H, Geurts AC, Buurke JH. Ankle-foot orthoses in stroke: Effects on functional balance, weight-bearing asymmetry and the contribution of each lower limb to balance control. *Clin Biomech*. 2009;24:769-75.