# 02 - MOBILIZATION OF THE NERVOUS SYSTEM IN ORDER TO IMPROVE THE AMPLITUDE OF MOVIMENTS AND FLEXIBILITY OF THE ASSINTOMATIC INDIVIDUALS

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## INTRODUCTION

The mobilization of the Nervous System is a technique that focuses to recuperate the movement and flexibility of the nervous system, what promotes the return to its regular functions. It has been applied as assessment and treatment method of the most different pathologies that attack the nervous system and the structures innerved by it, as well to optimization of the sportive and geriatric muscular function [12,16].

It refers to a set of techniques that aim to put the neural-axle in tension and lengthen it by suitable mobilizations. These techniques of treatment are improvements of the diagnostic tests in order to verify the presence of Adverse Neural Tension. The treatment consists on the application of oscillatory movements and/or briefly kept to the neural issue. The stresses faced by the Peripheral Nervous System over the movement are transmitted to the Central Nervous System and vice-verse, since there is a continuity between these systems [3,15].

It also can be applied as diagnostic method, making use of provoking applying on the nervous issue and therapeutic method, in order to reduce adverse neural tension then contribute to a better resolution of the symptomatic table or simply on asymptomatic people for efficacy of muscular function. The objective of this technique is to improve the neural-dynamic and reset the axoplasmatic flux, resetting the homeostasis of the nervous issue [3,16].

When a nervous is strengthened, its transversal area is gradually reduced and that deformation interferes into the intra-neural micro-vascular flux getting to an improvement of the neural function and the vertebral canal suffers substantial length changes over the movement [3].

The nervous system adapts itself to the corporal movements by relative movements to the structures that involve it. Since it is a continuous issue, movements on a part can be transmitted to another place by the movements and/or tensions. The nervous system gets itself tension for it owns flexible properties, so it can become shorter or longer in response to movements of the corporal segments [10].

A biomechanical deformation of 8% to 15% of the original size of the nerve is enough to reduce or interrupt the nervous peripheral bloody circulation and feasibly generate temporary pain, disappearing with the reduction of the tension or decompression of the nervous [3,15,16].

In general, at least 50% of peripheral nerve is built of conjunctive issue. The rate is of 21% to 81%, with larger present percentages if the nerve is next to an articulation [3,4,16].

Axonios are too important because besides the function of nervous conduction through the help of Schwann cells and of Ranvier nodule, they allow the extension of nerve through endoneural tubules. “Axonios perform a wavy travel into the endoneural tubules such as fasciculus into epineuro do. The wavy travel that runs through axonios into endoneural tubules allows some extension. The flexible component makes extension possible, which is temporary, with the issue returning to its anterior length after removing stress. That is based on premise of the extension reflex, which involves two muscular receptors: the Golgi tendinous organ and muscular fuso, once these are sensitive to the changes on muscular length [3].

The Nervous System Mobilization has been presented itself efficient in the treatment of patients with neural problems, and despite not acting directly on muscles and fascias, are observed positive replies on muscular function as earning of movement amplitude and flexibility, besides being able to be applied on lesions on athletes [6,9,12,14,16].

The goal of the research was analyze the effects of Neural Mobilization, European technique, as about it refers to the earning of movement amplitude (EMA) and flexibility onto asymptomatic individuals.

## MATERIALS AND METHODS

This research was carried out through studies of references and research of field.

Thirteen male students of age rate 21 took part in the research (standardization deviation 3,4).

A beginning assessment was applied and it contained tension tests proposed by Butler, Dutton and Oliveira Junior & Teixeira [3,5,12] (figure 1), “Slump Test” associated to goniometry of knee extension [3,8,11] (figure 2) and sit-down-and-reach test [7] (figure 3).

Figure 1: Test of Neural tension, respectively: cervical passive flexion, pronaded knee flexion, stretched leg raising (SLR), SLR with dorsiflexion of ankle, SLR with plantiflexion and inversion of ankle, “slum test”, tension of the mediano, ulnar and radial nerve.

Figure 2: Test of Slump associated to goniometry of knee extension.

Figure 3: Test of sit-down-and-reach.

Each session was applied an assessment before the protocol and the same was redone at the end, with the tests of Slump associated to goniometry of extension of knee (figure 2) and the sit-down-and-reach test (figure 3).

For final assessment the scores of the final tests of the last day of application of the protocol were applied.

The protocol applied was elaborated with Europeans techniques of Neural Mobilization [11].

Neural Mobilization applications were applied onto median, ulna, radial, sciatic and plexus lombossacral, tibia and ramifications and fibular and ramifications nerves (figure 4). One used for each day of application of protocol a series for each nerve bilaterally, that is, 10 repetitions of bombardments and 7 seconds of final maintenance of the technique.

Figure 4: Skillful move of Neural Mobilization for the following nerves, respectively, median, ulna, radial, sciatic and plexus lombossacral, tibia and ramifications and fibular and ramifications.

In total six sessions were applied, divided into three times a week over two weeks.

The locale for applications was the indoor sport-yard of Faculdade Estadual de Educação Física e Fisioterapia de Jacarezinho – FAEFIJA, of the Universidade Estadual do Norte do Paraná-UENP.

The materials used for the effectiveness of the research were chairs made of plastic, tool of Wels by WCS of cardiomed for the sit-down-and-reach test and goniometry by CARCI - Indústria e companhia de Aparelhos Cirúrgicos e Ortopédicos LTDA, São Paulo – Brasil, for the test of goniometry of knee extension associated to the “Slump Test”.

The participants signed a free and conscious agreement term that reported all the excursion of the research. The following criteria for the inclusion were adopted: they could not present any detectable nervous problem through the tests of tension and problems with the research. For exclusion were: missing two or more sessions consecutively and be in any type of physiotherapeutic treatment and/or techniques for flexibility.

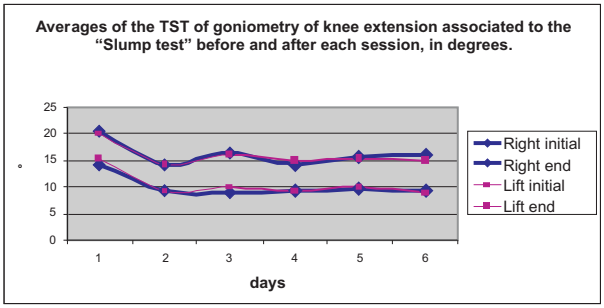
The data were analyzed statistically in tables and graphics of Microsoft Excel 2003, one used the test of Kolmogorov-Smirnov and Shapiro-Wilk for verification of normality of the sample and the tests of Wilcoxon and T Test for variables, once $p \leq 0,05$ determine significance, of the SPSS program for Windows 13.0.

**RESULTS AND DISCUSSION**

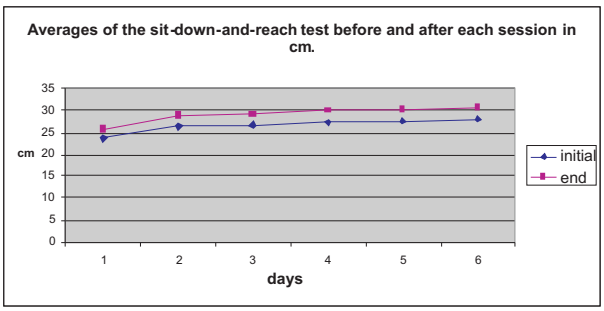
The sample for the present research was compounded of 13 asymptomatic participants that received skillful moves of Neural Mobilization for six sessions.

Graphic 1 shows the averages of the test of goniometry of knee extension associated to the “Slump test” before and after application of each session. One observes the technique presented positive results each session, in decreasing line, scores approximate of degree 0 of knee extension, somewhat considered normal in the literatures (MARQUES, 2005; HOPPENFELD, 1993). Though the movement was limited by the tension of neural-axle through the test of Slump.

Graphic 2 shows the sit-down-and-reach test, in averages, before and after application of each session. One observes the scores went up each session, in an increasing line, considering an increasing in the flexibility (GUEDES E GUEDES, 2006).




Graphic 1: Representation of the averages of the test of goniometry of knee extension associated to the “Slump test” before and after each session.



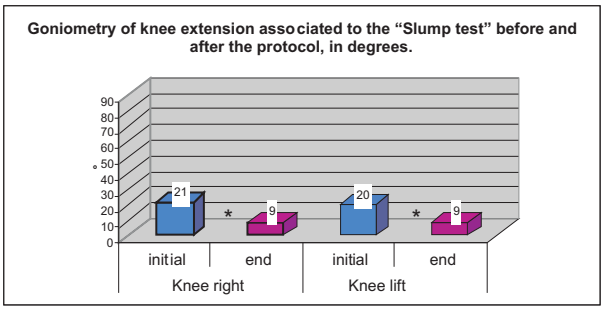

Graphic 2: Representation of the averages of the sit-down-and-reach test before and after each session.

In order to test the normality of the samples Kolmogory-Smirnov and Shapiro-Wilk tests were used since the results did not present themselves meaningful to the samples of the sit-down-and-reach test p=0,82 initial and p=0,20 final and to the test of knee goniometry associated to the Slump test, to left knee p=0,10 initial and left knee p=0,39 final. Yet to the same test on right knee p=0,04 initial and right knee p=0,01 final the result was meaninful, presenting normality of these samples.

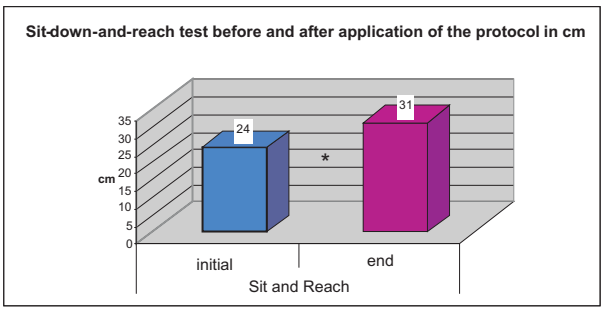
For analyzes of the results of the sample that presented normality the test T was applied, since p=0,00. And for the samples without significance of normality the test of Wilcoxon was applied. The results were p=0,00 for the test sit-down-and-reach and p=0,00 for the test of goniometry associated to the "Slump test" of left knee.

Thinking about the averages of initial and final of protocol for the test of goniometry of knee extension associated to the slump test one observes Graphic 3. There is a reduction of the averages, 12 degrees for right knee and 11 degrees for left knee, approximating itself of 0 degree of extension, positive result. Thinking about the percentages of the averages, there is an improvement of 57% on the test of the right knee and 55% on the test of the left knee.

Graphic 4 shows the averages of the sit-down-and-reach test before and after the protocol. One can see an increase of seven centimeters after application of the protocol, a percentage of 30% of improvement.




Graphic 3: For the variables Test T to right knee and Wilcoxon to left knee were used, once that: * for p≤0,00, ** for p≤ 0,02, *** for p≤0,05 and NM for non-meaningful.




Graphic 4: For the variables the test of Wilcoxon was used, once that: * for p≤0,00, ** for p≤0,02, *** for p≤0,05, NM for non-meaningful.

Through the present research, it found out a meaningful improvement on the extension of the knee associates to the "Slump Test" and of the flexibility through the Mobilization of the Nervous System.

To Schmidt [14] neural mobilization of the median nerve provides relief of the neural tension of the superior member, finding out through his study that this stimulus transmits itself by Peripheral Nervous System and allows a larger mobilization onto flexion of the hip and vertebral column in the population studied.

Jesus [11] states that on the treatment of several patients with history of neural tension, one observed the occurrence of a earning on the movement amplitude (EMA) of flexion of the hip. For confirming the relation between the neural tension and the flexibility, the study carried out consisted of Neural Mobilization of the inferior members in two groups, one with adverse neural tension and the other sound, since 94% of the patients got increase of the EMA, there not being meaningful difference of the increase of the EMA between both two groups.

So as the nervous system, conjunctive issue an element of the muscular issue, with its plastic and flexible properties

represents important focus of restriction of movement amplitude [6].

In his studies, Boeing [2] tried to verify if the technique of neural mobilization would be suitable for treatment of the lumbarciatalgies. One could see that the protocol used was efficient for the reduction of the painful picture. But it did not get meaningful results for the alterations of sensibility and mobility of lumbar column in flexion / extension.

Stelle [17] reports in her studies that according to the acquired knowledge to the neural Mobilization, there is the feasibility of treatment and prevention of the lesions by repeating moves with neural involvement through assessments applying the tests of adverse neural tension followed by the application of the technique.

Neural Mobilization brings endless relations, and they can be applied to the most different opportunities. Bezerra and Nascimento [1] demonstrated that the mobilization of nervous system can be applied as a resource more in the control of arterial hypertension. Zamberlan and Kerppers [18] concluded from their studies that the sequences of movements proposed by neural mobilization can be included in the protocol of rehabilitation of the patient with Encephalic Vascular Accident, together with other techniques, once that these movements allow nervous flexibility and extension be kept helping in the maintenance of muscular extension as well in the amplitude of articular movement and chiefly the properties of suitable stretching of the nervous system, influencing still on the circulation and breathing.

**CONCLUSION**

Findings of the research point out that Mobilization of Nervous System brought meaningful improvement to the earning of movement amplitude of knee extension and flexibility in asymptomatic individuals. Exposing that more being used as assessment and treatment of patients with neural problems, can be applied to people with no neural problem, improving the muscular performance.

One suggests that works are carried out for new scientific results about this study, with increase of the sample.

**Key words:** Mobilization of the Nervous System, Movement Amplitude, Flexibility.

**REFERENCES**

1. BEZERRA, A.F.; NASCIMENTO, T.Á.C. **O efeito da mobilização do sistema nervoso na pressão arterial de indivíduos idosos.** out/dez, 2007. Disponível em: <http://search.bvsalud.org/regional/resources/lil-481030>. Acessado em: 12/09/08.

2. BOEING, M. **Análise da eficácia de técnicas de mobilização neural para pacientes com lombociatalgia.** Monografia - Curso de Fisioterapia, Universidade Estadual do Oeste do Paraná. Cascavel. 2004.

3. BUTLER, D.S. **Mobilização do sistema nervoso.** Barueri-SP: Manole, 2003.

4. DORETO, D. **Fisiopatologia Clínica do Sistema Nervoso:** fundamentos da semiologia. 2. ed. São Paulo: Atheneu, 2005.

5. DUTTON, M. **Fisioterapia ortopédica:** exame avaliação e intervenção. Porto Alegre: Artmed, 2006.

6. FONTEQUE, M.A.; PETRY, C.O.; SALGADO, A.S.I. **Estudo da eficácia da mobilização do sistema nervoso e do alongamento passivo para ganho de amplitude de movimento de flexão de quadril**. IX Encontro Latino Americano de Iniciação Científica e V Encontro Latino Americano de Pós-Graduação – Universidade do Vale do Paraíba. Disponível em: http://www.inicepg.univap.br/UNIC_2005/epg/EPG4/EPG4-16%20ok.pdf. Acessado em: 12/09/08.

7. GUEDES, D.P.; GUEDES, J.E.R.P. **Manual prático para avaliação em educação física.** Barueri-SP: Manole, 2006.

8. HOPPENFELD, S. **Propedêutica ortopédica**: coluna e extremidades. São Paulo: Atheneu, 1993.

9. JESUS, C.S. A mobilização do sistema nervoso e seus efeitos no alongamento da musculatura isquio-tibial. **Revista Terapia Manual.** Londrina-PR. v.2, n.4, p.162-165. abr./jun, 2004.

10. MARINZECK, S. **Mobilização neural** - aspectos gerais. Disponível em: <www.terapiamanual.com.br>. Acessado em: 25/02/08.

11. MARQUES, A.P. **Manual de goniometria**. 2. ed. Barueri-SP: Manole, 2003.

12. OLIVEIRA JUNIOR, H.F.; TEIXEIRA, A.H. Mobilização do sistema nervoso: avaliação e tratamento. **Fisioterapia em Movimento**. Curitiba. v.20, n.3, p.41-53. jul/set, 2007.

13. ROMERO, A. **Mobilização neural.** Congresso Sulbrasileiro de Fisioterapia Trauáto-Ortopédica e 7ª Jornada de Fisioterapia Ortopédica e Taumaológica. Curitiba, 2007.

14. SCHMIDT, R.F. **A mobilização neural dos membros superiores e a sua influência na flexibilidade Global.** 2006. Disponível em: <http://www.listadasaude.com.br/index.php?acao=artigos&codigo=000117>. Acessado em: 15/09/08.

15. SHACKLOCK, M. O. **Clinical application of neurodynamics.** Moving in on pain, Butterworth-Heinemann, Sydney. p. 123-131, 1995.

16. SMANIOTTO, I.C.G.; FONTEQUE, M.A. A influência da mobilização do sistema nervoso na amplitude de movimento da flexão do quadril. **Revista Terapia Manual.** Londrina-PR. v.2, n.4, p.154-157. abr/jun, 2004.

17. STELLE, H.M. **Técnica de mobilização neural na prevenção e tratamento de lesões por esforços repetitivos nos esportes**. Disponível em: <www.terapiamanual.com.br>. Acessado em: 25/02/08.

18. ZAMBERLAN, A.L.; KERPPERS, I.I. Mobilização neural como um recurso fisioterapêutico na reabilitação de pacientes com acidente vascular encefálico - Revisão. Salus. Guarapuava-PR. p.185-191. jul./dez. 2007.

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**MOBILIZATION OF THE NERVOUS SYSTEM IN ORDER TO IMPROVE THE AMPLITUDE OF MOVIMENTS AND FLEXIBILITY OF THE ASSINTOMATIC INDIVIDUALS**

**ABSTRACT**

Mobilization of the Nervous System is a technique that focuses to restore the movement and the flexibility of the nervous system, promoting return to the normal functions, also observing positive replies in the muscular function, besides being able to be used for prevention of lesions in athletes. The objective of research was to analyze the effects of Neural Mobilization, as an European technique, on what concerns to the earning of movement amplitude (EMA) and flexibility on asymptomatic individuals. The sample was made of 13 male participants, with the age about 21 years (standardization deviation 3,4). They went

through initial assessments and in each session. The protocol was determined using a bilateral series for nerves: median, ulna, radial, sciatic and plexus lumbar-sacral, tibia and fibular and its ramifications, in 10 bombardments with final maintenance of 7 seconds. Six sessions were carried out. The participants signed a free and conscious agreement term. The criteria for inclusion were: they could not present any detectable nervous problem through the tests of tension. For exclusion were: missing two or more sessions consecutively and be in any type of physiotherapeutic treatment and/or techniques for flexibility. The data were analyzed statistically through graphics by Microsoft Excel 2003, and tests of normality, Kolmogorov-Smirnov and Shapiro-Wilk, and, for the variables, Wilcoxon and T Test, since $p \leq 0,05$ determine significance, of the SPSS program for Windows 13.0. The results gotten were meaningful p=0,00 for earning of EMA of knee extension associated to the “Slump Test” and p=0,00 for flexibility. One concluded that Neural Mobilization has brought meaningful improvements onto muscular performance of asymptomatic individuals.

**KEY WORDS:** Mobilization of Nervous System, Movement Amplitude, Flexibility.

**MOBILISATION DY SYSTEME NERVEUX POUR PLAGE DE GAIN DE MOUVEMENT (ROM) ET DE LA FLEXIBILITE CHEZ LES INDIVIDUS SAINS.**

**RÉSUMÉ**

La mobilisation dy système nerveux (neurones) est une technique qui vise à rétablir la circulation et l'élasticité du système nerveux, de promouvoir le retour à des fonctions normales, en notant aussi des réponses positives de la fonction musculaire et peut également être utilisé pour la prévention des blessures chez les athlètes. La recherche visait à analyser les effets de la mobilisation de neurones, technique européen, à l'égard de la plage de gain de mouvement (ROM) et de la flexibilité chez les individus sains. L'échantillon se composait de 13 participants, âge moyen 21 ans (SD 3.4) étaient des hommes. Passe par des étapes et chaque session. Le protocole a été créé en utilisant une série bilatérale des nerfs médian, cubital, radial, le plexus lombo-sacrée et sciatique, du tibia et du péroné et ses succursales, 10 de pompage de 7 secondes avec un entretien final. Ont été effectuées 6 séances. Les participants ont signé un formulaire de consentement. Les critères d'inclusion étaient: présenter aucune déficience du système nerveux détectable par des tests de tension. D'exclusion ont raté deux ou plusieurs séances consécutives et / ou faire un certain type de thérapie physique et / ou des techniques de souplesse. Les données ont été analysées statistiquement par des graphiques de Microsoft Excel 2003, et tests de normalité de Kolmogorov-Smirnov et de Shapiro-Wilk, et pour les variables, et Wilcoxon test T, où $p \leq 0,05$ signification déterminée, SPSS pour Windows 13.0. Les résultats ont été significative p = 0,00 pour l'extension du genou ROM gain associé avec le "Essai d'affaissement" et p = 0,00 pour la flexibilité. Il a été conclu que la mobilisation de neurones a entraîné une amélioration significative de la performance musculaire chez des individus sains.

**MOTS-CLÉS:** le système nerveux, l'amplitude articulaire, la flexibilité.

**MOVILIZACIÓN DEL SISTEMA NERVIOSO PARA MEJORAR LA AMPLITUD DE MOVIMIENTO Y FLEXIBILIDAD DE INDIVIDUOS ASINTOMÁTICOS**

**RESUMEN**

La movilización del sistema nervioso (neural) es una técnica que tiene por objeto restaurar el movimiento y la elasticidad del sistema nervioso, promoviendo el retorno a las funciones normales, observando también respuestas positivas en la función muscular, además de poder ser utilizada para la prevención de lesiones en los atletas. El objetivo de la pesquisa fue analizar los efectos de la Movilización Neural, técnica europea, en lo que se refiere al logro de amplitud de movimiento (ADM) y la flexibilidad en los individuos asintomáticos. La muestra constó de 13 participantes, de edad media de 21 (desvío estándar 3,4) varones. Pasaron por evaluaciones iniciales a cada sesión. El protocolo fue creado utilizándose una serie bilateralmente para los nervios: mediano, ulnar, radial, ciático y plexo lombosacral, tibial y fibular y sus ramificaciones, en 10 bombeos con manutención final de 7 segundos. Se realizaron 6 sesiones. Los participantes firmaron un formulario de consentimiento libre y esclarecido. Los criterios para la inclusión fueron: no presentaren ningún comprometimiento nervioso detectable a través de los testes de tensión. Para la exclusión fueron: faltar dos o más sesiones consecutivas y / o hacer algún tipo de terapia física y / o técnicas de flexibilidad. Los datos fueron analizados estadísticamente a través de gráficos del programa Microsoft Excel 2003, y los testes de normalidad,Kolmogorov-Smirnov y Shapiro-Wilk, y para las variables, Wilcoxon y Test T, donde $p \leq 0,05$ determina importancia, del programa SPSS para Windows 13.0. Los resultados obtenidos fueron significativos p = 0,00 para el logro de ADM de extensión de la rodilla asociado a la "caída de prueba" y p = 0,00 para la flexibilidad. Se concluyó que la Movilización Neural trajo una mejora significativa en el rendimiento muscular de individuos asintomáticos.

**PALABRAS CLAVE:** Movilización del sistema nervioso, amplitud de movimiento, flexibilidad.

**MOBILIZAÇÃO DO SISTEMA NERVOSO PARA MELHORA DA AMPLITUDE DE MOVIMENTO E FLEXIBILIDADE DE INDIVÍDUOS ASSINTOMÁTICOS**

**RESUMO**

A Mobilização do Sistema Nervoso é uma técnica que visa restaurar o movimento e a elasticidade do sistema nervoso, promovendo retorno às funções normais, observando também respostas positivas na função muscular, além de poder ser usada para prevenção de lesões em atletas. O objetivo da pesquisa foi analisar os efeitos da Mobilização Neural, técnica européia, no que se refere ao ganho de amplitude de movimento (ADM) e flexibilidade em indivíduos assintomáticos. A amostra foi composta de 13 participantes, com idade média de 21 anos (desvio padrão 3,4) do sexo masculino. Passaram por avaliações iniciais e a cada sessão. O protocolo foi criado utilizando-se uma série bilateralmente para os nervos: mediano, ulnar, radial, ciático e plexo lombossacral, tibial e fibular e suas ramificações, em 10 bombeamentos com manutenção final de 7 segundos. Foram realizadas 6 sessões. Os participantes assinaram um termo de consentimento livre e esclarecido. Os critérios para inclusão foram: não apresentarem nenhum comprometimento nervoso detectável através dos testes de tensão. Para a exclusão foram: faltar duas ou mais sessões consecutivas e/ou estar realizando algum tipo de tratamento fisioterapêutico e/ou técnicas para flexibilidade. Os dados foram analisados estatisticamente através de gráficos do programa Microsoft Excel 2003, e testes de normalidade, Kolmogorov-Smirnov e Shapiro-Wilk, e, para as variáveis, Wilcoxon e Test T, onde $p \leq 0,05$ determina significância, do programa SPSS for Windows 13.0. Os resultados obtidos foram significativos p=0,00 para ganho de ADM de extensão de joelho associado ao “Slump Test” e p=0,00 para flexibilidade. Concluiu-se que a Mobilização Neural trouxe melhora significativa no desempenho muscular de indivíduos assintomáticos.

**PALAVRAS-CHAVE:** Mobilização do Sistema Nervoso, Amplitude de Movimento, Flexibilidade.

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