Flexibility in Physiotherapy Students: Comparison Between two Techniques

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ABSTRACT

Introduction: *flexibility can be the muscular system and its maximum joint capacity to reach, available ranges without pain, to extend without causing stress. The factors that determine flexibility are related to a sedentary lifestyle, prolonged immobility and staying in a certain position that generates muscle shortening. There are several therapeutic techniques that can be used to target and/or increase flexibility, including stretching through neuromuscular facilitation (PNF) and neural mobilization.* ***Objective:*** *to evaluate flexibility in physical therapy course exercises.* ***Methodology:*** *this is a descriptive study, a quasi-experimental composting study by 24 samples, through both sexes of therapy at a higher education institution, an analysis of the use of the SPSS version 25.0 program. The approved one was 6. by the ethics and research committee of SOEBRAS (educational society of Brazil) with opinion 3.600639.* ***Analysis:*** *the gain in flexibility, however, the gain in flexibility between NP as techniques-seven there was no gain in flexibility, but there are no significant differences when techniques were presented as two techniques.* ***Conclusion:*** *it is concluded that the use of flexibility of the hamstrings exists to gain stretching of neural stretching techniques and increase the techniques of significant gain of the techniques used, alterations altered when altered between themselves major or not minor learning, being like two operations without flexibility gain.*

Keywords: *Flexibility. Physiotherapy. Stretching. Hamstring Muscles.*

I. INTRODUCTION

Flexibility is defined as the ability of the joint to reach its maximum amplitude, or the ability to stretch soft tissue structures (muscles, tendons, fascia), available amplitudes without pain, restrictions and without causing stress to the musculotendinous system. This flexibility can still be divided into static, when the joint makes the movement through a passive force, and dynamic, where the amplitude is achieved in an active way depending on the muscular strength and freedom of movement of the limb. Muscle is the biggest contributor to joint range of motion (SILVA et al., 2010).

The factors that lead to a decrease in flexibility are related to a sedentary lifestyle, prolonged immobility (use of plasters and splints, pain, inflammation and joint effusion) and staying in a certain position for a prolonged period of time, where the muscle is placed in the action in which it originated. and insertion approach, leading to an adaptation that generates muscle shortening. The shortening or muscle retraction refers to the slight decrease in the musculotendinous length that results in the partial loss of joint mobility (AQUINO, et al., 2006. SILVA et al., 2010).

There are several therapeutic techniques that we can use that aim to maintain and/or gain flexibility, among them we find stretching through proprioceptive neuromuscular facilitation (PNF) and neural mobilization. PNF is a stretching technique that, through the activation of proprioceptors, seeks to increase range of motion (ROM) and flexibility, combines static stretching, isometric contraction and relaxation followed by static stretching. Considered a technique that gains large arcs of range of motion and flexibility more quickly in individuals with great motor control (CATTTELAN, MOTA, 2002. FELAPPI, LIMA, 2015).

This technique can be divided into three stages, in the first stage there is the mobility of the desired muscle group up to its maximum amplitude activating the muscle spindle, in the second stage the isometric muscle contraction is resisted by the professional for six seconds triggering a process of autogenous inhibition, activating the golgi tendon organs leading to a reduction in muscle tension entering the third stage where we can observe stretching beyond the amplitude found in the first stage (ROSA, et al., 2006. FELAPPI, LIMA, 2015).

Neural mobilization is considered an old technique that only had its development in the last 35 years, being a manual therapy technique that is characterized by the stretching of the nervous tissue, altering the physiology of the neural tissue and consequently of the muscle tissue. It is a technique that aims to restore movement and elasticity of the nervous system by improving the musculoskeletal function innervated by it,

based on the principle of impairment of mechanics and physiology (elastic movement, conduction and axoplasmic flow) of this system, and has been increasingly used as an evaluation and treatment tool for the most diverse pathologies that compromise the nervous system and the structures innervated by it (SANTOS, DOMINGUES, 2008. DAINESES, et al., 2018).

The Technique can still be conceptualized as a set of techniques whose objective is to impose greater tension on the nervous system, performed starting from an amplitude in which the patient does not feel discomfort so that slow and rhythmic movements are then applied directed to the peripheral nerves and the spinal cord providing improvement in nerve impulse conduction (MACHADO, BEGALIN 2010, ARAUJO, et al., 2012).

Several studies have been showing the importance of neural mobilization and PNF stretching procedures for improving flexibility, however, there is a gap in the specialized literature, of its results between these methods, mainly analyzed through angular computerized biophotogrammetry. study was to evaluate the flexibility in academics of the physiotherapy course.

II. METHODOLOGY

The study is characterized by a descriptive, quantitative type, through the accomplishment of a quasi-experimental study, the sample was composed by 24 academics of both sexes of the physiotherapy course of the Faculdades Integradas FUNORTE, in the Amazonas Campus, who attended between the sixth and the tenth period, who presented a decrease in the flexibility of the hamstrings. The sample selection was for convenience, in which they agreed to participate in the research voluntarily, signing the free and informed consent term. The choice of technique was randomly, probabilistically, through a raffle, and 10 students were submitted to the application of the PNF technique and 14 to neural mobilization.

The following instruments were used: Data collection form prepared by the researchers themselves, the international physical activity questionnaire (IPAQ) that assesses the level of physical activity, validated in 2001 (MATSUDO et al., 2001), is self-applicable, corresponding to individual's usual or usual week. The software program for postural assessment (SAPO) was also used, which is a computer program accessed via the internet and is based on digitization through free marking of points, measurement of distances and body angles, allowing the user to define their own protocol scoring points (SOUZA et al., 2011). The research was approved by the ethics and research committee of SOEBRAS (educational society of Brazil) with opinion nº 3,606,639.

Statistical analysis was performed using the Statistical Package for the Social Sciences - 25® software. The significance level established for all analyzes was 5%. Categorical variables were described through their simple and relative frequencies and numerical variables through their means and standard deviation. The normality and homogeneity of data variances were verified using the Shapiro-Wilk and Levene tests, respectively. To evaluate the effect of PNF and neural mobilization techniques on hamstring flexibility, to compare hamstring flexibility between physically active and non-physically active individuals and the difference in flexibility between individuals who perform muscle stretching and those who do not, the Student's t test for independent samples.

III. RESULTS AND DISCUSSION

The total study sample consisted of 24 students, 4.2% of whom were in the sixth period, 12.5% in the seventh period, 37.5% in the eighth period, 16.7% in the ninth period, 29.2% in the tenth period. participants 79.2% were female and 20.8% male aged between 20 and 40 years (25.6 average age) practicing or not physical activity, regarding the IPAC 25.0% were active, 66.7% irregularly active and 8.3% sedentary (table 1).

Tabela 1: Caracterização da amostra (n=24).

	N	%
Sexo		
Feminino	19	79,2
Masculino	5	20,8
Idade	**Média**	**D.P.**
	25,6	5,7
Período		
6º	1	4,2
7º	3	12,5
8º	9	37,5
9º	4	16,7
10º	7	29,2
Praticam atividade física		
Não	16	66,7
Sim	8	33,3
Prática de atividade física (IPAC)		

Ativo	6	25,0
Irregularmente ativos Sedentários	16	66,6
	2	8,3
Tipo de atividade praticada (n=8)		
Musculação Caminhada Ciclismo	5	62,5
Vôlei	1	12,5
	1	12,5
	1	12,5
Diagnóstico de patologia neuro músculo esquelética		
Não Sim	22	91,7
	2	8,3
Realizam alongamento muscular		
Não realizam Realizam	18	75,0
	6	25,0

Fonte: Próprios autores 2019.

Table 2 analyzes the mean, standard deviation of hamstring flexibility, before and after the intervention in the PNF and neural mobilization groups, among the study sample, 8 participants dropped out during the research because they were not available to wait the 30 minutes to performance of the final test being used for this analysis 16 academics, in which a significant gain in flexibility was found for both techniques with p-value of 0.002 for the PNF technique and p-value of 0.005 for neural mobilization (table 2), however when the two techniques were correlated, there was no significant difference between the two in terms of flexibility gain, with a p-value of 0.280 (table 3). Such results agree when compared with Arêas et al., (2017) who found a significant increase immediately after applying the neural mobilization technique.

According to Câmara et. al (2016) found an increase in the flexibility of the hamstrings, obtaining an average gain of 22.5º. The gain in flexibility after performing neural mobilization is associated with gain in movement and flexibility of the nervous system promoting the restoration of normal functions (Santana et al., 2013). When comparing the gain of flexibility of the hamstrings with the use of the PNF technique in the study by Santos et al., (2018), it showed a significant increase in the flexibility of the hamstring muscles in the pre-intervention and post-intervention with p-value 0.001 .

Tabela 2: Média, desvio padrão e p-valor da flexibilidade dos isquiotibiais, antes e apósa intervenção nos grupos FNP e mobilização neural.

Grupos	**Antes**	**Após**	**p-valor**
FNP (n=8)	60,6 ±3,9	68,5 ± 4,9	0,002
Mobilização neural (n=8)	56,3 ±9,8	67,9 ± 12,6	0,005

Fonte: Próprios autores, 2019.

Tabela 3: Média, desvio padrão e p-valor das diferenças após intervenção da flexibilidade de isquiotibiais nos grupos FNP e mobilização neural.

	Grupos		
Medida	**FNP (n=8)**	**Mobilização neural (n=8)**	**p-valor**
Antes	60,6 ± 3,9	56,3 ± 9,8	
Após	68,5 ± 4,9	67,9 ± 12,6	0,280
Diferença	7,9 ± 4,5	11,6 ± 8,3	

Fonte: Próprios autores, 2019.

When analyzing the mean, standard deviation of hamstring flexibility, before and 30 minutes after the intervention in the PNF and neural mobilization groups, there was a reduction in the gain in hamstring flexibility (tables 4 and 5).

Tabela 4: Média, desvio padrão e p-valor da flexibilidade dos isquiotibiais, antes e 30 minutos após a intervenção nos grupos "FNP" e "mobilização neural".

Grupos	**Antes**	**Após 30 min**	**p-valor**
FNP (n=8)	60,6 ±3,9	66,1 ± 4,3	0,007
Mobilização neural (n=8)	56,3 ±9,8	62,0 ± 10,7	0,018

Fonte: Próprios autores, 2019.

Tabela 5: Média, desvio padrão e p-valor das diferenças 30 minutos após intervenção da flexibilidade de isquiotibiais nos grupos "FNP" e "mobilização neural".

	Grupos		
Medida	**FNP (n=8)**	**Mobilização neural (n=8)**	**p-valor**
Antes	60,6 ± 3,9	56,3 ± 9,8	
Após 30 min	66,1 ± 4,3	62,0 ± 10,7	0,918
Diferença	5,5 ± 4,2	5,7 ± 5,3	

Fonte: Próprios autores, 2019.

Tabela 6: Média, desvio padrão e p-valor da flexibilidade de isquiotibiais de indivíduos que praticam atividade física, não praticam atividade física, realizam alongamento muscular e não realizam alongamento muscular (n=24).

	Média (D.P)	**p-valor**
Praticam atividade física		
Sim	64,5 ± 5,1	0,018
Não	57,0 ± 7,4	
Realizam alongamento muscular		
Sim	63,3 ± 4,6	0,154
Não	58,2 ± 8,0	

Fonte: Próprios autores, 2019.

The analysis of the mean, standard deviation and p-value of hamstring flexibility in individuals who practice physical activity, do not practice physical activity, and individuals who perform muscle stretching and do not perform muscle stretching. The findings of this study did not show a significant difference in the flexibility of practitioners and non-practitioners of physical activity, with a p-value of 0.018 (table 5), showing that hamstring flexibility was similar in both participants.

In the study by Corbetta et al., (2008) showed a small difference in flexibility in sedentary and physically active individuals, practitioners or not of stretching, however a small flexibility was observed in individuals practicing physical activity. In this study, it can be observed that there is a reduction in flexibility in academics who do not practice physical activity, and, according to the study by Cardoso et al., (2015) showed that this reduction can be explained by the little use of the joint, and, shortening already present will result in progressive shortening. The authors also add that there was a significant gain in flexibility when submitted to PNF stretching before the practice of physical activity.

CONCLUSÃO

Conclui-se que as duas técnicas investigadas, tanto o alongamento FNP, quanto a mobilização neural aumentam a flexibilidade dos musculos isquitibiais, porém quanto comparadas entre si, não foi encontrado diferença significativa entre elas. Faz-se necessário, novas pesquisas com amostras mais robustas para melhorar a confiabilidade dos resultados obtidos e confirmar tais tendências.

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