

Immediate effect of quick massage on muscle tension and pressure pain threshold

Efeito imediato da quick massage sobre a tensão muscular e o limiar de tolerância de dor à pressão

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ABSTRACT

BACKGROUND AND OBJECTIVES: Massage is described as an effective complementary therapy for relieving muscle tension and pain. The aim of this study was to verify the benefits of quick massage on muscle tension and pressure pain tolerance threshold (PPT).

METHODS: A randomized clinical study in which 40 professors participated and were randomly divided into control (CG) and experimental (EG) groups. They were assessed for the level of muscle tension in the shoulder and neck regions using the visual analogue scale (VAS). PPT was assessed through algometry at the upper trapezius and sternocleidomastoid muscles and at the following anatomical areas: base of the occipital, scapular spine, thoracic (T6-T7) and lumbar (L4-L5) regions. The EG received a single session of quick massage for 20 minutes on the shoulders, neck and spine.

RESULTS: Regarding pain, a significant difference was observed only at the base of the occipital, the EG presented greater tolerance to pressure pain both before and after the intervention when compared to the CG. Regarding muscle tension, after the intervention, there was a reduction in the perception in the EG compared to the CG group.

CONCLUSION: Quick massage was efficient to decrease the perception of muscle tension assessed by VAS, however, PPT did not increase after the intervention.

Keywords: Massage, Muscle tonus, Pain, Pain threshold.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A massagem é descrita como terapia complementar efetiva no alívio de dor e tensão muscular. O objetivo deste estudo foi verificar os benefícios da *Quick Massage* sobre a tensão muscular e o limiar de tolerância de dor à pressão (LTDP).

MÉTODOS: Estudo clínico randomizado que incluiu 40 docentes divididos aleatoriamente em grupo controle (GC) e grupo experimental (GE). Eles foram avaliados quanto ao nível de tensão muscular na região dos ombros e pescoço por meio da escala analógica visual (EAV). O LTDP foi avaliado por algometria sobre os músculos trapézio superior e esternocleidomastóideo e nos seguintes pontos anatômicos: base do occipital, espinha da escápula, região torácica (T6-T7) e região lombar (L4-L5). O GE recebeu uma única sessão de *Quick Massage* por 20 minutos na região dos ombros, pescoço e coluna vertebral.

RESULTADOS: Em relação à dor, somente na base do occipital foi verificada diferença significativa, o GE apresentou maior tolerância de dor à pressão tanto antes quanto após a intervenção em relação ao GC. Em relação à tensão muscular, após a intervenção, houve redução da percepção no GE em relação ao grupo GC.

CONCLUSÃO: A *Quick Massage* foi eficiente para diminuir a percepção da tensão muscular, contudo, o limiar de tolerância de dor à pressão não aumentou após a intervenção.

Descritores: Dor, Limiar da dor, Massagem, Tônus muscular.

INTRODUCTION

Among the intervention options for the relief of pain resulting from musculoskeletal tension and pain, massage is considered a technique able to promote muscle relaxation and increase nutrition and tissue oxygenation by increasing blood and lymphatic circulation, providing emotional and physical benefits¹⁻⁴.

Among the massage modalities, quick massage is a relaxing technique that integrates classical massage techniques with oriental modalities, such as shiatsu and acupressure, lasting between 10 and 30 minutes⁵.

The use of quick massage proved to be beneficial for office workers after eight sessions twice a week when compared to the CG⁶. Another study⁷ corroborated these findings after analyzing the effects of quick massage in musicians for the same time and quantity of applications.

Another research⁸ has shown that quick massage performed in office workers increases pressure pain tolerance threshold (PPT), as well as the range of motion of the cervical spine. Another stu-

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dy⁹ demonstrated that massage was more effective in increasing pain threshold when compared to relaxing music sessions or to the control intervention.

The results of studies⁶⁻⁹ were obtained using massage during treatment programs with an average of eight massage sessions, but no references were found on the immediate effect after a single session, especially in pain of musculoskeletal origin¹⁰.

Massage is an effective complementary therapy for stress relief, and since university professors are frequently submitted to stressful conditions that can cause muscle tension or physical pain.

This study's objective was to verify the acute effect of quick massage on muscle tension and PPT in this group of professionals.

METHODS

Prospective, randomized, single-blind, clinical study in which 40 individuals of both sexes participated. The stages of the study were carried out in a room, which remained closed during the research, containing a quick massage chair. The inclusion criteria were age up to 59 years old, individuals of both sexes, having at least 3 years of teaching experience, weekly workload between 20 and 40 hours and capacity to walk independently.

The exclusion criteria were: any contraindication to massage, presence of pain resulting from rheumatic diseases such as osteoarthritis or fibromyalgia, neurological deficits resulting from diseases such as stroke, undergoing orthopedic treatment, presence of recent fractures, use of sedative or muscle relaxing drugs, compression of *cauda equina*, vestibular changes, skin injuries, previous history of trauma in the lower limbs, upper limbs or trunk, and pregnant women.

The participants answered the Fantastic Lifestyle Assessment¹¹ and the Perceived Stress Scale (PSS-10)¹² questionnaires. Discomfort and/or muscle tension in the neck and shoulder regions was evaluated using the visual analog scale (VAS), which is a 10-centimeter straight line drawn on a piece of paper. One end says, "no pain" (point zero) and the other end "maximum pain" (point 10). Each participant was asked to leave a mark on the straight line indicating their level of tension in the mentioned areas¹³.

To evaluate PPT, algometry was employed using the Wagner Force Dial FDK/FDN series algometer (Greenwich CT, USA), a handheld device containing a 1 cm² diameter rubber tip. The individual sat in the quick massage chair with their head resting on the upper body, torso forward, arms aligned to the body, and forearms resting on the thigh. Pressure was bilaterally applied on specific points^{14,15} on the upper trapezius and sternocleidomastoid muscles and on the anatomical points of the occipital base, scapular spine, thoracic region (T6-T7) and lumbar region (L4-L5)¹⁶, at a constant speed of 1 kg/s until a level in which the volunteer reported pain or discomfort. The reading was expressed in kg/cm². During the evaluation, the volunteer was instructed to say "stop" as soon as the pressure sensation went from unpleasant to painful. The test was interrupted as soon as the volunteer indicated the onset of pain and the applied pressure was registered^{17,18}.

After the evaluation of lifestyle and stress, individuals were randomized into experimental group (EG) and control group (CG). The evaluations on tension perception and algometry were made before and after an intervention protocol by a blinded evaluator who did not know to which group the volunteer belonged.

After the first evaluation of tension and pain, the CG individuals remained seated comfortably in the quick massage chair, not receiving massage, for 20 minutes. After this time, the second evaluation was performed. After the first evaluation, the EG individuals received a quick massage session for 20 minutes, and the maneuvers of gliding, kneading, compression, friction, percussion, and vibration were applied bilaterally on the upper trapezius and sternocleidomastoid muscles and on the anatomical points of the occipital base, scapular spine, the thoracic region (T6-T7), and the lumbar region (L4-L5). After the massage was completed, another tension assessment was performed.

Gliding was applied at the beginning and at the end of the massage, in centripetal direction. On the superficial tissues, the movement was continuous, uniform, and delicate. On the deeper tissues, the movement was more vigorous. Next, the kneading maneuver was performed, in which pressure is exerted on the tissues, increasing the lymphatic and blood circulation, making the muscles and fascia more flexible, and warming the soft tissues, contributing to reduce muscle tension. Compression was used to improve circulation, warm the tissues, and reduce muscle tension.

Friction on superficial tissues can dissipate body heat and increase blood circulation, and friction on deep tissues is performed to break fascial adherence and separate muscle fibers. Initial percussion is more stimulating than relaxing, and sustained percussion has an anesthetic effect on nerve endings, promoting pain relief, relaxation, and superficial vasodilation. Rapid rhythmic movements were performed: with the hands clasped, flattened, medial side of the hands open, medial side of the fists relaxed, or with the fingertips. Vibration is a technique with the objective of increasing blood flow, reducing pain and increasing tissue temperature, thus decreasing muscle tension. Vibratory movements were also performed with the hands^{19,20}.

This study was approved by the Research Ethics Committee of the Adventist University Center of São Paulo under opinion number 2.958.907.

Statistical analysis

The data was analyzed using the statistical package SPSS v.24 for Windows and expressed as means and standard deviations. The normality of the data was tested by the Kolmogorov-Smirnov test. Comparison between demographic variables (age and body mass index) and Lifestyle and Stress scores was done by Student's t-test or Mann-Whitney test, as needed. Comparison of perceived muscle tension and PPT (VAS and algometry) between groups (CG and EG) was done by the 2-way ANOVA. The post-hoc test revealed that for $\alpha=0.05$ and effect size of 0.25, the sample size of 40 subjects resulted in a statistical power ($1-\beta$) of 97%.

RESULTS

The sample consisted of 40 participants divided into EG (n=23) and CG (n=17). The groups were homogeneous regarding age, body mass index (BMI), and perceived stress, however, the EG showed a significantly higher mean Lifestyle score than the CG (Table 1).

Table 1. General sample characteristics

	EG (n=23)	CG (n=17)	p-value
Age (years)	46.22 ± 8.06	41.60 ± 8.80	NS
Gender (F/M)	11/12	7/10	NS
BMI (kg/m ²)	24.79 ± 3.57	26.35 ± 3.83	NS
Lifestyle	79.2 ± 7.8	70.6 ± 16.9	0.04
Stress (PSS-10)	15.4 ± 6.5	15 ± 4.1	NS

Values expressed as mean ± standard deviation.

F = female; M = male; EG = experimental group; CG = control group; BMI = body mass index; NS = non-significant.

The right and left sides of each point assessed by algometry were compared and no statistically significant difference was found between them (p>0.05), both in the EG and in the CG. The average of both sides was taken, and the value was considered in the comparative analyses between the moments before and after intervention in each group.

There were no significant differences between the groups regarding the PPT of the evaluated points (Table 2). It was possible to observe a statistically significant difference only at the base of the occipital, a point where the EG showed higher PPT both before and after the intervention. There was a reduction in the muscle tension perception in the EG after the intervention when compared to the CG (Table 2).

Table 2. Pressure pain tolerance threshold and perceived muscle tension in the groups before and after intervention

		EG (n=23)	CG (n=17)	p-value
Upper trapezius	Before	3.93 ± 1.89	3.40 ± 1.72	NS
	After	3.98 ± 2.02	3.66 ± 2.36	
Scapular spine	Before	5.20 ± 2.48	4.71 ± 2.24	NS
	After	5.51 ± 2.81	5.00 ± 2.60	
Sternocleidomastoid	Before	2.95 ± 3.09	2.70 ± 1.05	NS
	After	1.45 ± 1.61	2.60 ± 1.36	
Thoracic region T6-T7	Before	6.10 ± 2.90	5.83 ± 3.09	NS
	After	6.18 ± 3.38	5.53 ± 2.43	
Lumbar region L4-L5	Before	7.21 ± 3.57	6.30 ± 2.71	NS
	After	7.18 ± 3.85	6.63 ± 2.84	
Base of occipital	Before	3.84 ± 1.73	3.10 ± 1.41	<0.0001*
	After	3.73 ± 1.90	3.40 ± 2.15	
VAS (cm)	Before	3.97 ± 2.55	5.22 ± 4.90	0.002**
	After	1.77 ± 1.95	3.29 ± 2.00	

Values expressed as mean ± standard deviation. Algometry values expressed in kg/cm².

EG = experimental group; CG = control group; NS = non-significant; VAS = visual analog scale; *Significant difference between groups in both moments (higher pain tolerance in the EG); **Significant difference in the EG when comparing the two moments.

DISCUSSION

The results showed that both groups were similar in relation to gender predominance. This is important because it's known that females usually have lower pain thresholds and tolerance²¹. Also, no statistically significant difference was found between the groups in terms of BMI and age of participants.

The analysis of the Fantastic Lifestyle Assessment questionnaire showed that the EG presented a higher score than the CG. Lifestyle can also influence the perception of muscle tension, as well as PPT. Although the groups had significant differences in lifestyle, both were classified in the "very good" category¹¹. The data analysis was performed not considering lifestyle as a possible confounding variable.

Pondering the results obtained by the PSS-10, which evaluated the level of perceived stress, the study verified that there was no difference between groups. A study²² showed that teachers present emotional exhaustion with manifestation of symptoms such as nervousness, stress, mental fatigue, forgetfulness, insomnia, and other symptoms. The sample evaluated by the present study had a regular stress level^{12,23} assessed by the PSS-10 scale, and this may have contributed to the non-significant algometry results after the single session of quick massage.

Massage has been widely studied in several areas and has been applied and recommended also in conditions where musculoskeletal disorders are present. A systematic review⁴, after analyzing two randomized clinical trials, concluded that there is moderate-level evidence that massage can reduce pain when compared to no treatment in individuals with shoulder pain. Studies that evaluated the use of the technique in people with oncologic diseases corroborated these findings of short-term beneficial effects for pain relief, relaxation, and physical discomfort^{24,25}. The present study also observed a reduction in the sensation of muscle tension after a single session of quick massage based on the evaluation performed by the VAS.

Nevertheless, it was not possible to identify significant changes in PPT after the intervention. Study¹⁸ showed that healthy individuals, i.e., without changes in PPT, should be able to bear 4 kg/cm² or more at the points evaluated through algometry. The data from both groups in this study showed that the mean pain tolerance at the trapezius, sternocleidomastoid and occipital base points before and after the intervention remained below 4 kg/cm², which may reflect the presence of musculoskeletal pain and/or tension in the shoulder and neck areas.

Literature shows that massage techniques involve multiple neurophysiological mechanisms responsible for reducing muscle spasms and improving motor control, with these actions being linked to the analgesia effect²⁶. However, in this study, PPT was not modified after the intervention in the group that received a massage session and neither in the CG. These findings are opposed to those presented in studies that show an increase in pain threshold by applying massage for a prolonged period of time^{6,7}. In addition to evidence of increased PPT, another study⁸ also presented increased range of motion in the cervical spine and pain relief with the use of massage in office workers. The result of this study showed that the protocol employed was not able to

promote pain threshold increase, however, it was able to decrease the sensation of muscle tension evaluated by the VAS in the professors who received the intervention.

The present study presents some limitations related to the sample size and the non-quantification of the work hours per day. Application of the protocol in individuals with reported back pain or with lower PPT would perhaps yield more consistent benefit after a single massage session. Thus, future studies should take these factors into consideration in a larger sample in order to contribute to the investigation of this widely used technique, but which still lacks further scientific evidence. Furthermore, longer intervention time with a greater number of sessions may provide new data regarding the perception of muscle tension and increased PPT.

CONCLUSION

Quick massage was effective in decreasing perception of tension, however it did not produce a significant change in PPT.

AUTHORS' CONTRIBUTIONS

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REFERENCES

- Gondim SS, Almeida MAPT. Os efeitos da massagem terapêutica manual em pacientes com a síndrome da fibromialgia. *Id on Line Rev Psic*. 2017;11(39):336-54.
- Kurebayashi LF, Turrini RN, Souza TP, Takiguchi RS, Kuba G, Nagumo MT. Massage and Reiki used to reduce stress and anxiety: randomized clinical study. *Rev Lat Am Enfermagem*. 2016;24:e2834.
- Molouki A, Hosseini SM, Rustae M, Tabatabae SM. The immediate effects of manual massage of forearm on power-grip strength and endurance in healthy young men. *J Chiropr Med*. 2016;15(2):112-20.
- Bervoets DC, Luijsterburg PA, Alessie JJ, Buijs MJ, Verhagen AP. Massage therapy has short-term benefits for people with common musculoskeletal disorders compared to no treatment: a systematic review. *J Physiother*. 2015;61(3):106-16.
- Platzer LH, Silveira T, Vilagra J. Os efeitos da quick massage sobre o estresse ocupacional. *Revista Thêma Scientia*. 2013;3(2):130-3.
- Cabak A, Kotynia P, Banasiński M, Obmiński Z, Tomaszewski W. The concept of "Chair Massage" in the workplace as prevention of musculoskeletal overload and pain. *Ortop Traumatol Rehabil*. 2016;18(3):279-88.
- Cygańska A, Truszczyńska-Baszak A, Tomaszewski P. Impact of exercises and chair massage on musculoskeletal pain of young musicians. *Int J Environ Res Public Health*. 2020;17(14):5128.
- Siško PK, Videmšek M, Karpljuk D. The effect of a corporate chair massage program on musculoskeletal discomfort and joint range of motion in office workers. *J Altern Complement Med*. 2011;17(7):617-22.
- Cabak A, Mikicic M, Eyp M, Stanisławska I, Kaczor R, Tomaszewski W. Preventive chair massage with algometry to maintain psychosomatic balance in white-collar workers. *Adv Exp Med Biol*. 2017;1022:77-84.
- Sanchez HM, Gustatti N, Sanchez EGM, Barbosa MA. Incidência de dor musculoesquelética em docentes do ensino superior. *Rev Bras Med Trab*. 2013;11(2):66-75.
- Añez CRR, Reis RS, Petroski EL. Versão brasileira do questionário "Estilo de Vida Fantástico": tradução e validação para adultos jovens. *Arq Bras Cardiol*. 2008;91(2):102-9.
- Reis RS, Hino AA, Añez CR. Perceived stress scale: reliability and validity study in Brazil. *J Health Psychol*. 2010;15(1):107-14.
- Hawker GA, Mian S, Kendzerska T, French M. Measures of adult pain: Visual Analog Scale for Pain (VAS Pain), Numeric Rating Scale for Pain (NRS Pain), McGill Pain Questionnaire (MPQ), Short-Form McGill Pain Questionnaire (SF-MPQ), Chronic Pain Grade Scale (CPGS), Short-Form-36 Bodily Pain Scale (SF-36 BPS), and Measure of Intermittent and Constant Osteoarthritis Pain (ICOAP). *Arthritis Care Res*. 2011;63(Suppl 11):S240-52.
- Grossi DB, Chaves TC, Gonçalves MC, Moreira VC, Canonica AC, Florencio LL, et al. Pressure pain threshold in the craniocervical muscles of women with episodic and chronic migraine: a controlled study. *Arq Neuropsiquiatr*. 2011;69(4):607-12.
- Andrzejewski W, Kassolik K, Brzozowski M, Cymer K. The influence of age and physical activity on the pressure sensitivity of soft tissues of the musculoskeletal system. *J Bodyw Mov Ther*. 2010;14(4):382-90.
- Helfestein JM, Goldenfum MA, Siena CAF. Fibromialgia: aspectos clínicos e ocupacionais. *Rev Assoc Med Bras*. 2012;58(3):358-465.
- Fischer AA. Documentation of myofascial trigger points. *Arch Phys Med Rehabil*. 1988;69(4):286-91.
- Fischer AA. Pressure algometry over normal muscles. Standard values, validity and reproducibility of pressure threshold. *Pain*. 1987;30(1):115-26.
- Oliveira NML, Hueb MFD, de Castro SS. Effect of classic massage in quality of life of university students. *Fisioter Mov*. 2015;28(4):793-802.
- Duran JS, Cerchiarri N, Silva TS. Efeitos da massagem clássica na qualidade de vida em mulheres de 20 a 30 anos com síndrome da tensão pré-menstrual. *Rev Científica do Unisalésiano*. 2016;15:460-72.
- Otto A, Emery K, Côté JN. Sex differences in perceptual responses to experimental pain before and after an experimental fatiguing arm task. *Biol Sex Differ*. 2019;10(1):39.
- Lima MFEM, Lima-Filho DO. Condições de trabalho e saúde do/a professor/a universitário/a. *Ciências & Cognição*. 2009;14(3):62-82.
- Homann D, Stefanelo JMF, Góes SM, Breda CA, Paiva ES, Leite N. Percepção de estresse e sintomas depressivos: funcionalidade e impacto na qualidade de vida em mulheres com fibromialgia. *Rev Bras Reumatol*. 2012;52(3):319-30.
- Alves M, Jardim M, Gomes B, Freitas O. Efeito da massagem terapêutica na saúde mental das pessoas com patologia oncológica. *Rev Port Enferm Saúde Mental*. 2015;(spe2):119-22.
- Ferreira A, Laureti G. Estudo dos efeitos da massoterapia no alívio da dor e na melhoria da qualidade de vida em pacientes oncológicos sob cuidados paliativos. *Rev Dor*. 2007;8(2):983-93.
- Nogueira LAC. Neurofisiologia da Terapia Manual. *Rev Fisiot Bras*. 2008;9(6):414-21.

