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A pilot study of the effects of suboccipital fascial release on cortisol levels in workers in the clothing industry – randomized clinical trial

Bruna Luísa Silva, PT[1]
Lara Alves de Oliveira, PE[1]
Camila Medeiros Costa, BS[1]
Cristiano Queiroz Guimarães, PT, MsD[2,3]
Leonardo Sette Vieira, PT[3]
Andrei Pereira Pernambuco, PT, PhD[1,4]

Introduction: *Repetitive and time sensitive demands of clothing workers has been associated with higher salivary cortisol levels that may reflect the stress experienced by the worker.*

Objective: *This trial evaluates if suboccipital fascial release (SFR) is associated with reduced salivary cortisol levels.*

Methods: *Randomized controlled trial with 40 workers, divided into: untreated group (UG, n = 15) and treated group (TG, n = 25). Both were removed from the*

Introduction : *Les exigences aiguës imposées aux travailleurs de l'industrie du vêtement ont été associées à de fortes concentrations de cortisol salivaire pouvant traduire le stress vécu par ces travailleurs.*

Objectif : *Cet essai vise à savoir si le relâchement des fascias des muscles sous-occipitaux est associé à une réduction des concentrations de cortisol salivaire.*

Méthodologie : *Essai comparatif avec répartition aléatoire mené auprès de 40 travailleurs répartis en deux groupes: groupe non traité (GNT, n = 15) et groupe traité (GT, n = 25). Les sujets des deux groupes ont été retirés de leur milieu de travail. La technique ci-haut mentionnée a été utilisée sur les sujets du GT alors*

[1] Centro Universitário de Formiga – UNIFOR-MG, Formiga, Minas Gerais, Brazil.
[2] Faculdade Ciências Médicas de Minas Gerais – CMMG, Belo Horizonte, Minas Gerais, Brazil.
[3] Academia Brasileira de Fáscias (ABFascias), Belo Horizonte, Minas Gerais, Brazil.
[4] Universidade de Itaúna – UIT, Itaúna, Minas Gerais, Brazil.

Corresponding author: Bruna Luísa Silva, Av. do Contorno, 1638; 37280-000 Candeias – MG.
Tel: +55 35 999185656.
E-mail: brunaluisilva@hotmail.com

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Potential conflicts of interest: We declare that the authors CQG and LSV have a school that specializes in the study of fascia and that the results of this study may be of economic interest to them. We emphasize, however, that the authors mentioned only had access to the results at the end of the manuscript writing phase and that no data was altered or manipulated in order to satisfy any interest.

work environment. The TG received the above technique and the UG remained lying at rest, both for five minutes. Salivary cortisol levels were measured by a commercial enzyme-linked immunosorbent assay (ELISA) kit. Statistical analysis of data distribution, intragroup and intergroups, were performed with α adjusted to 0.05.

Results: *Pre / post intragroup analyses showed significant differences in cortisol levels in both groups, as well as intergroup analyses with lower values in favor of TG (p = 0.014).*

Conclusion: *The reduction in salivary cortisol levels in TG suggests that SFR may be more effective than rest in reducing stress. Future studies with increased experimental rigor are necessary to confirm this conclusion.*

Clinical trial registration number: REBEC – RBR – 56yk9m.

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KEY WORDS: autonomic nervous system, cortisol, massage, musculoskeletal manipulations, occupational stress

que les sujets du GNT sont restés au repos: pour les deux groupes, l'intervention a duré cinq minutes. Les concentrations de cortisol salivaire ont été mesurées à l'aide d'une trousse pour dosage d'immunoabsorption par enzyme liée (ELISA) offerte dans le commerce. L'analyse statistique de la distribution des données intra-groupes et inter-groupes a été effectuée avec α ajusté à 0.05.

Résultats : *L'analyse des données prétraitement et post-traitement à l'intérieur des groupes a révélé des différences appréciables de concentration de cortisol dans les deux groupes, les analyses entre les groupes montrant des concentrations plus faibles dans le GT (p = 0.014).*

Conclusion : *La réduction des concentrations de cortisol salivaire dans le GT semble indiquer que le relâchement des fascias de muscles sous-occipitaux peut être plus efficace que le repos pour réduire le stress. Il faut mener d'autres études expérimentales plus rigoureuses pour confirmer cette conclusion.*

Numéro d'enregistrement de l'essai clinique : REBEC – RBR – 56yk9m.

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MOTS CLÉS : système nerveux autonome, cortisol, massage, manipulations musculosquelettiques, stress professionnel

Introduction

Workers in the clothing industry are exposed to several stressful factors in their work environment. They face precarious work conditions, which involve infrastructure, hygiene, repetitive movements, and ergonomic risks, among others.[1] All these factors, alone or in combination, are seen as stressing agents and tend to disrupt the body's homeostasis, triggering an organic response called stress response.[2]

Physiologically, the response to stress is important, and it is a fight or flight reaction against the stressor agent. This response should last for seconds, minutes, or a few hours, but, when sustained, a series of physiological dysfunctions may occur from chronic stress.[2] These dysfunctions are related to the prolonged hyperactivation of the Hypothalamic-Pituitary-Adrenal axis (HPA) as well as the Sympathetic Autonomic Nervous System (SANS).[3]

Stress presents itself biologically and physiologically in the human organism.[4] According to Selye, a pioneer in the study of stress, this is an inherent phenomenon on the whole disease, since it produces certain modifications in the structure and chemical composition of the body, that can favor the installation of diseases and dysfunctions. Stress can manifest itself differently, depending on the stage of the general syndrome of adaptation in which the individual presents.[5]

The general adaptation syndrome comprises a set of non-specific responses to a stressor, whether physical or psycho-emotional, and develops in three phases: 1) alarm phase, characterized by acute manifestations; 2) resistance phase, when the acute manifestations disappear and; 3) exhaustion phase, when there is the return of the reactions of the first phase and can be the collapse of the organism. Regardless of the individual's stage of development levels of cortisol, a hormone produced by the cortex of the adrenal glands, is considered the gold standard marker of stress response.[6]

At the onset of stress, in response to hyperactivation of the HPA axis, the adrenal glands increase cortisol production.[7] In a second moment, if the agents that cause the stress response are not eliminated, an adaptation phase of the organic systems begins and the cortisol levels become stable (adrenal desensitization).[7] Finally, failure of the response system occurs and cortisol levels tend to fall, even in the face of more severe stressors (adrenal fatigue).[7]

Changes in cortisol levels related to stress response are associated with several diseases and disorders such as: sleep disorders, depression, anxiety, obesity, fibromyalgia, chronic fatigue, immunosuppression, coronary diseases, cerebral ischemia, thrombosis, among others.[8-11]

A possible way of minimizing stress-related reactions in workers would be to stimulate the performance of the Autonomous Parasympathetic Nervous System (APNS), in order to modulate the performance of the SANS and to minimize the effects resulting from the hyperactivation of the HPA axis.[12] In this sense, the suboccipital fascial release (SFR) could be considered a therapeutic alternative. According to literature, this technique may contribute to the release of endorphins and serotonin, neurotransmitters that have an important action on the psycho-emotional aspect and on well-being.[13]

In SFR, the suboccipital region is gently pressed and massaged. Its effects can be explained by three mechanisms: 1. Due to the anatomical proximity to the jugular foramen, the vagus nerve passageway (the main nerve of the APNS), it is believed that by releasing the tensions in the occipital region, it would also be possible to release the nerve tract, decreasing the pressure in the endoneural compartment and thus improving vagal function; 2. The SFR, when touching the muscular fascia, could be able to stimulate the dura mater by means of myodural bridges (two fascial connections are described: one between the minor posterior rectus fascia and the dura mater; and another between the nuchal ligament and the dura mater, passing between C1 and C2). In the brain, the dura mater remains in the cerebellum tent and the pituitary tent – which surrounds the pituitary, the central component of the HPA axis. In addition, the dura mater at the base of the skull is innervated by the vagus nerve[14-17]; 3. It has been proposed that soft and slow techniques have the potential to stimulate the parasympathetic autonomic nervous system.[18] The soft touch can stimulate free nerve endings present in the fascia, which send information to the left insular cortex, stimulate the left hypothalamus and generate a parasympathetic response.[19]

From the foregoing, a positive SFR response is expected at stress levels and consequently over cortisol levels. However, no clinical studies have investigated this hypothesis. Therefore, the objective of the study was to evaluate if the SFR is capable of reducing salivary cortisol levels in clothing industry workers.

Methods

Ethical considerations

This study was initiated after approval by the Human Research Ethics Committee under Opinion nº. 2.439.896. For participation, the volunteers signed the Informed Consent Form (ICF). The research protocol was submitted and approved by the Brazilian Registry of Clinical Trials, under the number REBEC – RBR – 56yk9m. All ethical standards were based on the Declaration of Helsinki and Resolution 466/12 of the National Health Council. Finally, for this study, the CONSORT guidelines were followed.

Study design

Two-arm randomized controlled trial.

Participants

The sample was formed in a non-probabilistic way and for convenience no sample size calculation was previously performed. After active recruitment through contacts with clothing industry owners from a city in Minas Gerais, Brazil, 15 participants were selected for the untreated group (UG) and 25 participants for the treated group (TG), totaling 40 individuals.

Inclusion criteria were: being a clothing industry worker in a specific city in the Minas Gerais state; being female; aged between 20 and 50 years; having any educational level; working for eight hours a day; accepting to participate voluntarily in the research; score more than 13 points in the Mini Mental State Examination (MMSE), if illiterate and 18 points if literate.

Exclusion criteria were: employees who were pregnant or breastfeeding, who were using or who used any non-contraceptive drug in the past month, who did not achieve a minimum score in MMSE (13 points if illiterate or 18 points if literate); those with history of autoimmune diseases; those who used steroidal anti-inflammatory drugs or anxiolytics in the last year; those who had deficiencies in the upper and lower limbs (congenital or acquired); workers with a history of migraine or recurrent headache; those with type 1 or 2 diabetes and those with more than one job. Also excluded from the study were those who did not feel well during the technique and those who for whatever reason wished to withdraw from the research, regardless of the phase of the study.

Randomization

The participants recruited for the study were workers from three different factories and were randomly divided into two groups. Randomization was performed by opaque, sealed and numbered envelopes. By means of software, a note was randomly generated with the allocation, which was inserted inside the envelopes. Each participant selected an envelope that contained the type of intervention that would be offered to them. Twenty-five participants composed the TG and 15 participants composed the UG. The allocation concealment was conducted, and the participants were not aware of the type of intervention that would be offered to others.

The imbalance between the number of participants in the groups was generated by the randomization method, since at the beginning of the study the researchers prepared 60 opaque and numbered envelopes, but at the participants' presentation only 40 volunteers were enrolled.

Data collection

All data were collected by an independent evaluator who did not know the objectives of the study and the allocation of the participants. Even before randomization, the ICF was presented and the volunteers' signature was collected. Those who agreed to participate in the survey completed the identification form and the MMSE used for cognitive screening. In order to characterize the sample in the pre-intervention period, two other questionnaires were used: Work Stress Scale (WSS) and World Health Organization Disability Assessment Schedule (WHODAS 2.0).

The Mini Mental State Examination (MMSE) is one of the most widely used and studied tests in the world, which allows the assessment of cognitive function and tracking of dementia. The original instrument consists of two sections that measure cognitive functions. The first section contains items that evaluate orientation, memory and attention, totaling 21 points; the second measures naming ability, obedience to a verbal command, and the free writing of a sentence, in addition to copying a complex drawing (polygons), making up nine more points. The total score is 30 points and the higher the MMSE score, the better the cognitive state of the participant. The following cutoff points are used: 13 points for illiterate people, 18 points for literate people and 26 points for high school students.[20] This questionnaire was used for ethical reasons, in order to determine whether the participant had sufficient cognitive ability to choose to participate in the research.

The WSS is an instrument used to measure perceived stress in the occupational environment. It can be applied in different work environments and in different occupations. It was initially proposed with 31 items. In 2004, Paschoal and Tamayo created a reduced version of the Work Stress Scale (WSS), which includes 23 items that represent the main organizational stressors and general psychological reactions. The expanded version has a Cronbach's alpha coefficient equivalent to 0.91, while the reduced version is 0.85. Despite the lower Cronbach's alpha coefficient, the 23-item scale was used in this study. Each item is scored from one to five, the maximum possible score is 115 points. The score should be interpreted as: below 46 points (low stress), 47 to 69 points (medium stress) and 70 to 115 points (high stress). In this sense, higher scores represent worse levels of worker stress.[21]

The WHODAS 2.0 is an assessment tool developed by the World Health Organization (WHO) that covers several items of the International Classification of Functioning, Disability and Health (CIF). WHODAS 2.0 provides the level of functionality / disability after analyzing six domains of life: cognition, mobility, self-care, interpersonal relationships, life activity and participation. The questionnaire consists of 36 questions and each one is scored from one (no difficulty) to five (extreme difficulty or is unable to do). The score is calculated by domains, the sum of all

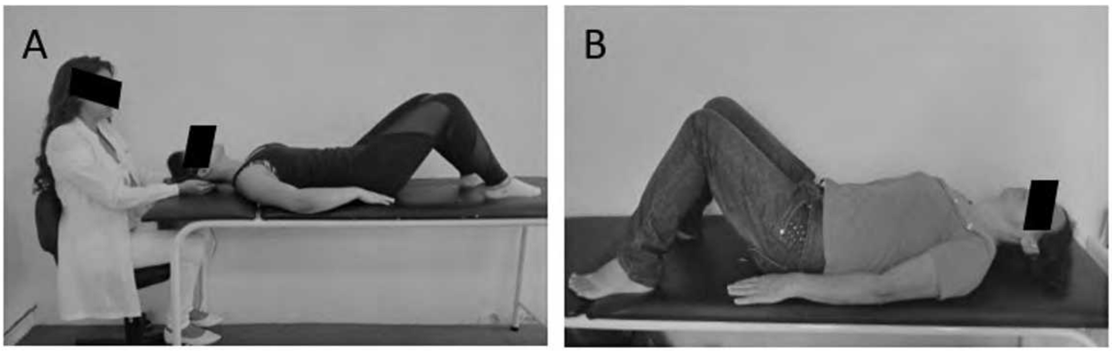

Figure 1.
(A) depicts the positioning of the therapist and a treated group (TG) participant during the suboccipital fascial release technique. (B) represents the positioning of an untreated participant (UG) who remained lying down for five minutes and did not receive the suboccipital fascial release technique.

items that are contained in each domain is converted into a percentage value from 0 to 100. The higher the score, the greater the disability presented by the participant. The questionnaire presents the following percentage cut-off points: 0- 4% (no difficulty) 5-24% (mild difficulty), 25-49% (moderate difficulty), 50-95% (severe difficulty), 96-100% (complete difficulty / does not). The score can be expressed for each domain and total score on the instrument.[22]

For cortisol analysis, saliva samples were collected during the five minutes preceding the intervention and during the first five minutes after the end of the intervention, with the volunteers sitting quietly in a room next to the intervention site. The experiments were performed in the morning. Therefore, a piece of cotton was under the tongue of the volunteers for a period of five minutes before the application of the technique. After this time, the cotton was carefully removed and kneaded by the researcher in order to transfer the cotton saliva into a 1.5 ml Eppendorf® tube. The research volunteers were instructed not to eat, drink, smoke or use oral hygiene products during the time preceding the data collection, thus avoiding contamination of the samples. Then the tubes were centrifuged, the supernatant was aspirated and stored in a freezer at -20ºC until the time of analysis.

Cortisol levels were measured using a commercial ELISA kit with plates previously sensitized with anti-cortisol antibodies according to the manufacturer's recommendations (Salimetrics, State College, Pennsylvania, USA). It should be noted that saliva cortisol analysis is a widely used, easily performed, noninvasive and non-painful technique. It differs from plasma analysis mainly because there is no need for venipuncture, which is a stressor and cause increases in cortisol levels. Salivary analysis is valid and reliable.[11,23,24]

Intervention

SFR was applied only once to each of the TG participants. The intervention lasted five minutes and could supposedly influence certain physiological mechanisms and contribute to neurological or psychophysiological aspects.[25]

In this study the technique was actively performed by one of the researchers, skilled and trained for this. The technique used was adapted from the studies conducted by Figueiredo and Oliveira.[26] In the TG, the volunteer remained lying on a stretcher, supine, with hips and knees bent, feet flat, arms beside the body and eyes closed.

The researcher remained seated close to the patient's cephalic region, with her hands positioned in the patient's suboccipital region, between the occiput and the C1 vertebra (Figure 1A). The maneuvers used by the researcher included counterclockwise circular sliding and very slow shear techniques, with both hands in prayer position, with the palm up, relaxed and with the volunteer's head resting on the palms of the researcher.

This maneuver is indicated to induce relaxation, as it helps to improve blood and lymphatic flow by reaching both deep and superficial tissues.[27] These movements are capable of generating a pressure that is transmitted to the underlying tissues by means of biotensegrity, a mechanism capable of harmonically and dynamically transmitting force.[28] Soft pressure, using the last four digits of each hand, is a technique used to increase local circulation, stimulate nerve endings, release fascia and suboccipital tissues, and tone soft tissue regions.[29]

UG participants were also absent from their jobs during the day and remained lying down for the same time period and in the same position as the TG participants. However, the SFR technique was not applied to the UG participants (Figure 1B). Participants in this group provided saliva samples before and after the five-minute rest period, respecting the same collection protocol used for the TG.

Regardless of the number of participants completing the study, intention-to-treat analysis would be used, and all participants would be evaluated within the original allocation group.

Statistical analysis

Shapiro-Wilk test was used to verify data distribution. For data with normal distribution, intergroup comparisons were performed using the independent T-test and descriptive statistics were expressed as mean, standard deviation and 95% confidence interval (95% CI). For data with non-normal distribution, the comparative test was the Mann-Whitney test, and the descriptive statistics was expressed as median and interquartile range (P25% – P75%). Intragroup analyses were performed using the Wilcoxon test. All analyses were performed using GraphPad Prism v.6.0 software with significance level of all tests adjusted to $\alpha = 0.05$ ($p \leq 0.05$).

Results

Forty women participated in the study, divided into two groups. The UG consisted of 15 participants, aged 36.5 ± 10.5 years, time in the company of 44.7 ± 43.4 months. The TG consisted of 25 women, age 33.1 ± 9.8 years, time in the company 22 ± 38.1 months. The scores obtained by both groups in the MMSE, WSS and WHODAS 2.0 (domains and total score) are shown in table 1. Clinically no disparities were observed between the groups at baseline, however the working time in the company was longer among the UG participants (Table 1).

The results regarding the analyses within the groups over the study period are summarized in Table 2. In both groups there were significant differences in cortisol levels when comparing the data obtained in the pre and post intervention phase.

The results for the analyses between the two study groups are summarized in Table 3. They demonstrate that prior to intervention in the TG there were no significant differences between the cortisol levels of UG and TG participants. The post-intervention analyses in the TG pointed to a significant difference in the levels of this marker (p = 0.014) with significantly lower salivary cortisol levels in the participants exposed to the intervention.

Table 1.
*Characterization of study participants at baseline (n = 40). Untreated Group (UG), Treated Group (TG), Work Stress Scale (WSS), World Health Organization Disability Assessment Schedule (WHODAS 2.0). Data are expressed as mean ± standard deviation and 95% confidence interval (95% CI). The analysis was performed using the independent T test. * p ≤ 0.05.*

Parameters	**UG (n=15)**	**TG (n=25)**	**p-value**
Age	36.53 ± 10.52 (30.71 to 42.36)	33.16 ± 9.87 (29.08 to 37.24)	0.31
Time in the company (months)	44.73 ± 43.36 (20.72 to 68.75)	22.00 ± 38.16 (6.24 to 37.75)	0.02*
MMSE	26.20 ± 2.65 (24.73 to 27.67)	25.44 ± 2.80 (24.28 to 26.60)	0.33
WSS	63.47 ± 9.05 (58.45 to 68.48)	57.24 ± 18.70 (49.52 to 64.96)	0.23
WHODAS 2.0			
Cognition	19.44 ± 13.05 (12.22 to 26.67)	27.66 ± 15.40 (21.31 to 34.02)	0.09
Mobility	6.61 ± 10.33 (0.88 to 12.33)	12.40 ± 14.37 (6.46 to 18.33)	0.10
Self-care	5.58 ± 16.80 (-3.72 to 14.89)	2.25 ± 5.67 (-0.09 to 4.59)	0.76
Interpersonal relationships	10.33 ± 9.72 (4.94 to 15.72)	12.60 ± 12.43 (7.47 to 17.73)	0.77
Activity	18.75 ± 22.35 (6.37 to 31.13)	21.63 ± 13.74 (15.96 to 27.31)	0.20
Participation	20.85 ± 14.96 (12.56 to 29.13)	23.00 ± 19.35 (15.02 to 30.99)	0.97
Total	13.32 ± 10.63 (7.44 to 19.21)	16.59 ± 8.91 (12.91 to 20.27)	0.17

Table 2.
*Intragroup Comparison of Cortisol Levels in UG (n = 15) and TG (n = 25). Untreated Group (UG), Treated Group (TG). Data are expressed as median and interquartile range (P25% – P75%). Intragroup analysis was performed using the Wilcoxon test. * p ≤ 0.05.*

	UG (n = 15)			TG (n = 25)		
Parameter	**Before**	**After**	**p-value**	**Before**	**After**	**p-value**
Salivary Cortisol	1.40 (1.20 to 1.76)	0.61 (0.54 to 0.65)	0.0001*	1.34 (1.11 to 1.71)	0.49 (0.42 to 0.59)	0.0001*

Table 3.
*Intergroup comparison of cortisol levels before and after light release intervention. Untreated Group (UG), Treated Group (TG). Data are expressed as median and interquartile range (P25% – P75%). Intergroup comparison was performed using the Mann-Whitney test. * p ≤ 0.05.*

	Pre-intervention			Post-intervention		
Parameter	**UG**	**TG**	**p-value**	**UG**	**TG**	**p-value**
Salivary cortisol (pg/ml)	1.40 (1.20 to 1.76)	1.34 (1.11 to 1.71)	0.448	0.61 (0.54 to 0.65)	0.49 (0.42 to 0.59)	0.014*

Discussion

The study results suggest that SFR may contribute to the treatment of stress experienced by clothing industry workers, since significant differences were observed in the analyzed outcome in favor of the TG when compared to the UG.

This is an unprecedented study, developed with workers in the clothing industry, especially due to the history of this sector, which, since the 19th century to the present day, employs a large number of women in unfavorable environmental conditions.[30] Unexperienced workers were not included in the study; after all, a new work experience could, by itself, act as a stressor, capable of generating the HPA axis and SANS hyperactivation.[31,32]

At the beginning of the study, the working time of participants in both groups was different. UG participants had nearly twice as many years of work as TG participants. This fact could interfere with the participants' cortisol levels and generate bias in the study, since the work environment can be seen as a stress-generating agent[1] and, by staying in contact with such agent for a longer time, cortisol levels could be higher. However, pre-intervention WSS score and salivary cortisol analysis showed no significant difference between the two groups. The questionnaire scores and similar salivary levels of cortisol ensure that the stress levels were similar at baseline.

Another hypothesis that should be considered is that the group exposed to the work environment for a longer period could be in the adaptation or exhaustion phase of the stress response[7] and, consequently, would have lower cortisol levels. This hypothesis was also discarded by checking similar levels of cortisol and WSS score in both groups at baseline. Thus, working time in the company, although different between groups, did not cause changes in participants' salivary cortisol levels. It is important to mention that the functional levels (WHODAS 2.0), as well as the cognitive levels (MMSE) were also similar in both groups at baseline.

Salivary cortisol levels were selected as a stress marker, mainly because they are measurable and objective data, independent of the participant's perception or opinion.[33] Most studies investigating interventions to minimize the effects of stress use questionnaires or interviews[34] and, therefore, are subjective and more prone to failure.

Cortisol measurement could be performed in several body solutions, such as blood, urine, saliva, among others. The choice for saliva occurred because it is a noninvasive collection method and the fact that venipuncture may result in acute cortisol release due to stress caused by vein puncture.[35] In addition, salivary cortisol levels are highly correlated with plasma levels of this hormone[35], making it a more methodologically and biologically viable alternative.

In this study, gentle touch was used instead of deep touch, this option was due to the fact that, possibly, the intensity of touch can activate different receptors and neurophysiological pathways and, consequently, result in different organic effects.[14,18,19,36] Previous studies demonstrate that the deep and strong touch is captured by tactile receptors and proprioceptive receptors, such as: Meissner's corpuscles, mechanically sensitive tactile receptors, Ruffini's corpuscles and Pacini's corpuscles, among others. The stimulus captured by these receptors is projected into the medulla by neurons type I and II (highly myelinated) and from there the stimulus ascends to the somatosensory cortex.[18] The gentle touch, on the other hand, is mainly captured by free nerve endings, the stimulus captured is carried to the medulla by neurons type III and IV (slightly myelinated or demyelinated) and from there they ascend to the insular cortex where it stimulates parasympathetic activity.[18,19] Unlike deep touch, which follows a tactile pathway, gentle touch follows an interoceptive pathway.[14,18,36,37] In this study, no group was treated with deep touch, so it is not possible to say whether the observed effects could be different from the ones presented here. It is also important to mention that it is not possible to determine whether light touch activated other types of receptors in the conjunctive tissue or others neurophysiological pathways.

Intragroup analysis showed a significant reduction in cortisol levels in both groups, when comparing the pre and post-intervention situation. These data indicate that the environment and the work routine act as an activating and/or perpetuating mechanism of the stress response; after all, the withdrawal of the worker from his/her activities, even for a short period of time, reduced circulating cortisol levels. In this assumption, it is also important to emphasize the importance of pauses, recreational activities or therapeutic programs implemented by some companies with the objective of improving the health and quality of life of their employees.[38]

Such actions can, at least in theory, minimize the effects of stress and reduce the organic effects associated with increased cortisol, such as reduced muscle mass, weight gain, water retention, bone demineralization and altered immunological activity, among others.[38] In this study, such questions were not addressed.

It is also important to mention that the within group differences, although clinically important, may not be related exclusively to the intervention offered, since in this type of experiment it is practically impossible to control some confounding factors, such as: the placebo effect, Hawthorne effect, return to average, natural history of the disease, spontaneous improvement, among others.[39] However, it should be noted that the outcome used was an objective biomarker, and the variances of this variable are not dependent on the participant's opinion or perception of the intervention used. In addition, a non-active control group (UG) was used which allowed fairer interpretations of the results.

Data between the groups from the post-intervention period showed that the TG ended the study period with significantly lower salivary cortisol levels than the UG. However, the mechanisms involved in reducing cortisol levels in individuals undergoing SFR are not yet understood. It is possible that the neuroendocrine system is related to such changes.[12,14-16] The decline in cortisol levels observed in this investigation cannot necessarily be attributed to the fascial release technique used, as it could equally be due to the act of touching. In this sense the inclusion of an appropriate sham intervention would have been informative.

No other studies were found that aimed to minimize the stress experienced by workers, through fascial release techniques. This fact prevents the comparison of the results of the present study with other findings, especially if we consider the objective marker of stress as a variable, such as cortisol levels.

The main limitations of the study were: the small sample size that can cause type II errors and the absence of a follow-up period, which could contribute to the understanding of long-term responses. Another important flaw of the study is that, although there was an untreated group, there was no group that received a sham treatment. This fact prevents us from claiming that the effects observed in TG were truly provided by the method used. In this sense, there is no way to say whether the technique used would be superior to any other type of manual stimulus in the occipital region. The limitations mentioned, as well as other issues not addressed here should be addressed in future studies, such as the organic reactions presented by individuals exposed to suboccipital fascial release and the duration of these reactions.

Conclusion

The reduction in salivary cortisol levels in TG suggests that SFR is more effective than rest in reducing stress experienced by clothing industry workers. However, the unprecedented nature of this study makes the comparison of the results with the literature difficult. Studies with greater methodological power, designed to include a sham intervention group, and extended follow-up periods should be conducted to clarify issues not addressed here.

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