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Effects of auriculotherapy on students with Burnout Syndrome in the Physical Therapy program at a Brazilian public university

Abstract

Students with high levels of Burnout Syndrome (BS) had less performance and motivation. Thus, we aimed to evaluate the effects of auriculotherapy on students with BS in the Physical Therapy program at a Brazilian public university. It's a quasi-experimental, longitudinal, prospective, and quantitative study. Eighty academics were accompanied for 8 weeks with a weekly auriculotherapy application. The Copenhagen Burnout Inventory-Student (CBI-S) and the International Physical Activity Questionnaire– short version (IPAQ) were applied before the first, after the fourth, and eighth sessions. For statistical analysis, comparisons were made between CBI-S domains and to correlate the CBI-S and IPAQ, using SPSS®, considering $p<0.05$. The personal domain (PD) and the study domain (SD) had a higher rate of exhaustion pre-intervention. The PD reached 76.25% of the sample, while the SD 84.9%. In the second evaluation, there was a reduction in PD ($p=0.001$), decreasing to 61.09%. In the third, PD and SD decreased compared to the first evaluation. The PD decreased to 56.94% ($p=0.0001$), while the SD to 65.27% ($p=0.008$). Levels of physical activity also decreased, in a smaller proportion, suggesting that auriculotherapy has provided a stress reduction. Auriculotherapy proved to be effective in improving BS, especially in PD and SD.

Keywords: auriculotherapy, occupational burnout, physical therapy modalities, complementary therapies

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Introduction

The Burnout Syndrome (BS) was initially described by the psychoanalyst Herbert J. Freudenberger, whose objective is to indicate the main symptoms and causes of a problem that involves professional Burnout.[1] The author describe BS as a process of progressive loss of responsibility and disinterest in the individual's life or as a reaction to chronic emotional tension from dealing excessively with people.[2] Therefore, BS has been

Characterized as a negative affective state constituted by emotional exhaustion, cognitive

Fatigue, and physical exhaustion, with chronic psychosocial stress as the main cause.[3] The way BS manifests itself changes from one person to another and affects more people who deal with the public daily. Fatigue, exhaustion, insomnia, and frequent headaches are characteristic of physical symptoms in this syndrome. BehavioralBehavioural symptoms involve stress, anxiety, and frustration. Usually, after the first year in a new workspace, the problems and novelties of this new phase begin to negatively influence the individual's quality of life.[1–4] Thus, BS started to be studied in other professional classes, such as university students. Students' Burnout is still not universally accepted in the framework of Burnout, which is an occupational work-related stress syndrome, although several authors already consider it.

The fact that academic life is a stage preceding work, aroused interest in knowing whether the stress and anxiety, typical of this stage, could trigger BS. So, the concept of BS in academics is also characterized by three dimensions: emotional exhaustion, the demands of the study; disbelief, in which the student develops a negative self-analysis about study, distancing himself from it; and professional inefficiency, in which the student considers himself incapable of carrying out his activities.[5–7] Students with high levels of BS have low academic motivation and a lower level of performance during undergraduate training, which can directly affect their professional life.[8] Since stress and anxiety are important symptoms in patients with the syndrome, integrative forms of therapeutic approach as well as the practice of physical activity, are shown to be effective in the treatment of these symptoms and can contribute positively to these condition, so, the levels of physical activity are important to be measured due to their correlation with stress and anxiety levels.[9,10]

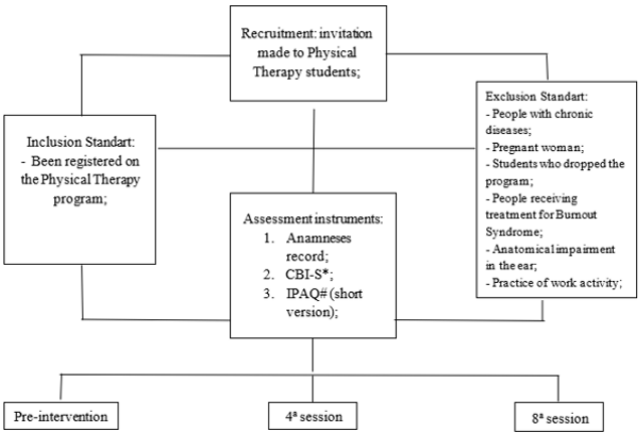
In this context, Acupuncture is characterized by being part of the foundations of Traditional Chinese Medicine (TCM). TCM is an integrated medical system that originated thousands of years ago in China, which symbolically portrays the laws of nature and values harmony between the parts aiming at balance and integrity. It includes the Yin-Yang theory, which understands that opposites complement each other.

Acupuncture integrally approaches the health-disease process and comprises a method that stimulates specific anatomical spots, called points.[11] From this, auriculotherapy is a microsystem of acupuncture, and presents the same conception of the human being, based on integrality without barriers between body, mind, and spirit. It is a resource that uses the ear microsystem, and stimulates the points through needles or pressure made by seeds, crystals, or spheres of gold and silver. Several studies demonstrate effectiveness mainly in reducing stress and anxiety, being non-invasive and low cost.[9–12,13] Due to the characteristics of academic life, especially of academics in health programs, the charge for performance, assistance to patients with different health conditions, and insecurity about the professional future can be triggering BS factors in Physical Therapy students. Besides, the detection of BS in this population is for the development of therapeutic strategies to minimize this scenario. Therefore, the

objective of this study was to verify the effects of auriculotherapy on students with BS in the Physical Therapy program at a Brazilian public university.

Methods

This is and a quasi-experimental, longitudinal, prospective, and quantitative study approved by the Research Ethics Committee of the Health Sciences Sector of UFPR (CAAE: 69892017.0.0000.0102) (Appendix 1). Initially, an evaluation form was created by the researchers' team to obtain the main information of the participants, such as age, sex, marital status, physical exercise, a current period in the Physical Therapy program, and if smoking or drinking alcohol (Appendix 2) (Flowchart 1).



Flow chart 1

*Copenhagem Burnout Inventory Students (CBI-S)

Internacional Physical Activity Questionnaire (IPAQ) – (short version)

To evaluate the prevalence of BS, the instrument used in the assessment of BS was the CBI-S - Copenhagen Burnout Inventory – Student, adapted and validated for Portugal and Brazil (Appendix 3).[14] The questionnaire for students (CBI-S) consists of 25 items, divided into the following dimensions: personal Burnout, Burnout related to study, Burnout related to colleagues, and Burnout related to the relationship with teachers. Personal Burnout evaluates the degree of physical, psychological, and exhaustion experienced by the person. The Burnout related to study, analyzes the value of physical and psychological fatigue and exhaustion perceived by the person about their study. Finally, Burnout related to colleagues and teachers evaluates the value of physical and psychological fatigue and exhaustion that is perceived by the person in the relationship with colleagues and teachers.

The response for each item ranges from 1 to 5, representing how often feelings occur, with 1 – 0%, 2 – 25%, 3- 50%, 4- 75%, and 5 – 100%. High levels of Burnout are considered from 50% (score greater than or equal to 3), both on the global scale and in each dimension evaluated.[15] The International Physical Activity Questionnaire (IPAQ) – a short version (Appendix 4) was used to relate stress levels to physical activity. This instrument was validated to Portuguese by Matsudo et al.[16] in 2001 and comprises the dimensions of physical activity at work, as a means of transport, at home (work, family care,housework), for recreation, leisure, sport, exercise, and sitting time. The result is calculated using the information contained in the "PHYSICAL ACTIVITY LEVEL CLASSIFICATION", a specific instrument for this purpose.[17] The questionnaire classification has 5 levels: very active, active, irregularly active "A", irregularly active "B" and inactive (Table IPAQ Suppementary Supplementary file).

An electronic invitation was made to recruit participants for the research. All students enrolled in the Physical Therapy program at a public Brazilian university were invited to the research. The students who were interested in participating and voluntarily agreed to participate and signed the informed consent form were included in a social network group to organize the evaluation and auriculotherapy application.

Excluded from the research were participants with chronic diseases, pregnant women, students who had dropped out of the program, those who were already receiving treatment for BS or its symptoms, anatomical impairment in the ear, and students who worked after school hours. All participants received longitudinal follow-ups. First, the participants submitted an evaluation form (Appendix 2), CBI-S and IPAQ questionnaires – a short version on the day of the first auriculotherapy session. Subsequently, local antisepsis was performed with 70% alcohol and cotton. After being located, the mustard seeds were placed and fixed with hypoallergenic adhesive tape on the points ShenMen, kidney, neurovegetative system and points related to stress: adrenal and anxiety (auricular map: Appendix 5). All points were chosen by their calming properties.[18,19]

There were 8 sessions of auriculotherapy, during 8 weeks, with one session by week, with an average duration of 15 minutes. After the 4th and 8th sessions, all participants were reevaluated. The researchers stimulated the points after each application of the seeds, and the participants were instructed to stimulate the points 3 times per day. All researchers who applied auriculotherapy underwent previous training about the location of points and seeds application.[20] As this is a non-probabilistic sample, the sample strength test was performed using the G-Power software, obtaining 77% reliability for a sample of 80 participants. For the statistical analysis, the distribution of the samples was initially evaluated using the Kolmogorov-Smirnov normality test and Levene's homogeneity test, it was observed that this was non-parametric data. Therefore, to compare the pre and post-evaluation, the non-parametric Wilcoxon test was used, considering $p<0.05$ for the correlation of the BS domains (CBI-S) with physical activity (IPAQ), using the Spearman correlation test. This test was done to verify if the levels of physical activity in this study are correlated with the levels of BS. For this, the magnitude scale was used to interpret the correlation coefficients (R), where: < 0.1 = trivial; between 0.1-0.29 = small; 0.30-0.49 = medium; 0.50-0.69 = high; 0.70-0.90 = very high; >0.90 = almost perfect. For this analysis, SPSS® 25 version was used, and the significance level was set at $p<0.05$.[21]

Results

Of the 135 students enrolled in the period from 2014 to 2017, 80 participated in the research, 11 men and 69 women. Of these, 29 (36.25%) were from the first year, 30 (37.5%) from the second year, 18 (22.25%) from the third year, and 3 (3.75%) were deperiodized. The mean age of the participants was 20.21 years ± 2.92 years. Among the total, 2 were married, 2 declared themselves to be smokers, 5 declared themselves to be alcoholics, 1 had another higher education degree, and 1 had a child. During the evaluations, there was a sample loss, in the second evaluation 77 academics participated, and 72 in the third. According to the CBI-S scale, it was observed that in the personal and study domains, academics of all years showed a higher rate of pre-intervention exhaustion compared to colleagues and teachers domains, represented in mean. (Table CBI-S –Supplementary file). Also, it was observed in the evaluation carried out before the beginning of the sessions, n=80 (100%), that 73 (91.2%) had a score ≥3 in at least one of the four domains of the CBI-S. The personal domain (PD) obtained the highest score, with an average score of 3.39

points reaching 61 participants (76.25%) of the sample, followed by the study domain (SD) with a score of 3.29 reaching 68 participants (84.9%), demonstrating that these students experience physical and psychological exhaustion.

In the evaluation after the fourth session of auriculotherapy, which had 77 participants, it was observed that 59 participants (77%) had a score ≥ 3, with the SD having the highest score, with an average of 3.15 points, reflecting physical and psychological fatigue and the exhaustion related to the study. After the eighth session of auriculotherapy, with 72 participants, 47 participants (65.27%) showed exhaustion, and the SD maintained the highest score, with an average of 2.95 points. It was observed that in all evaluations, the domains that characterize the BS werereduced. There was significance in the comparison of the first with the second evaluation of the PD (p=0.001), the first with the third evaluation of the PD (p=0.0001), and the first with the third evaluation of the SD (p=0.008) (Figure 1).

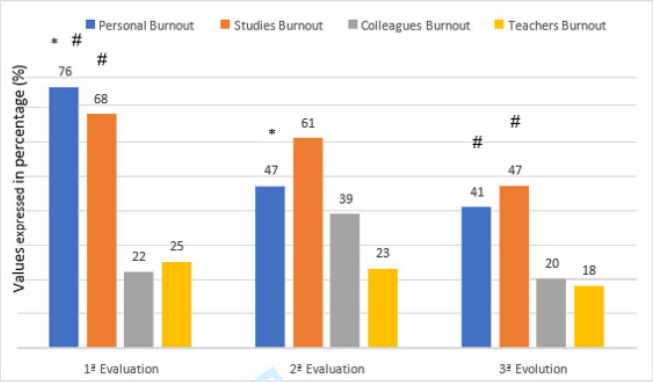


Figure 1 Percentage of participants with an indication of BS (score ≥ 3) in the different domains in the 3

evaluations (before, after the fourth session, and after the eighth session of auriculotherapy).

*Comparison of domains between the first and second evaluation - p<0,05.

#Comparison of domains between the first and third assessment - p<0,05.

Regarding the level of physical activity, it was found that most students were classified as active in all evaluations. There was no significant change between the evaluations (Figure 2).

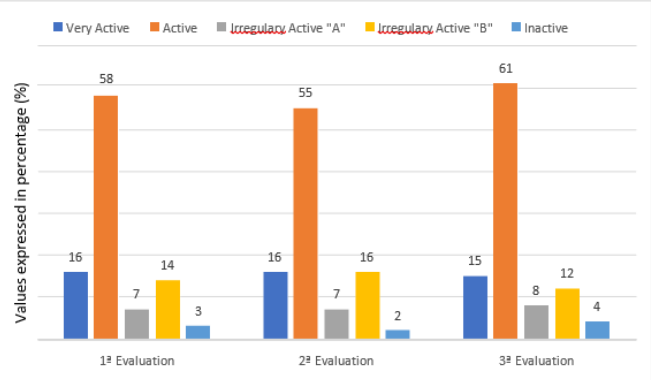


Figure 2 Classification of students' physical activity level (before, after 4 sessions, and after 8 sessions of auriculotherapy).

The test of the correlation between CBI-S and the IPAC showed in the second evaluation a weak positive correlation (p<0.05) for personal (r=0.24;p=0.03) and study (r=0.23;p=0.04) domains, and a strong correlation for the teachers' domains (r=0.91;p=0.01) (Tables 1–3).

Table CBI-S – Supplementary file: SB score by CBI-S. Scale 1-5: the higher the score, the greater the rate of exhaustion in each dimension. Levels greater than 3 indicate the presence of BS (*).[15]

Discussion

The present study showed the high prevalence of the indication of BS in the Physical Therapy program at a Brazilian public university, 91.2% of the participants had a score greater or equal to 3 in at least one of the four domains of the CBI-S, which is the marker indicative of BS.[15] The most affected domains were personal and study, reaching 76% and 68% of the sample, respectively. A study[22] with 30 students from a Physical Therapy program at another Brazilian public university, used the Lipp Stress Symptoms Inventory for Adults (ISSL) to identify Physical Therapy students with symptoms of stress. In this study, psychological stress reached 66.7% of the sample, 26.7% physical stress, and 6.6% both, which indicated that both, personal life and study routine, can cause physical and emotional exhaustion in academics. In the second evaluation, after 4 sessions, it was possible to observe the positive effects of auriculotherapy with a 29% reduction in the PD, which was statistically significant, 7% in the SD, and 2% in the teachers domain (TD). There was a 17% increase in the colleague's domain (CD), probably because the Physical Therapy program requires a lot of group work, which can cause physical and psychological fatigue and emotional exhaustion due to interpersonal relationships with colleagues. Group work can be a factor in the development of emotional exhaustion or academic stress because conflicts of opinion can be generated regarding the content of the work and the tasks division.

It is common in this type of work that a person ends up being in charge of a greater part of what will be accomplished, however, when this becomes repetitive or even abusive by the other colleagues, the student can develop or progress the stress or emotional exhaustion to levels that pose a health risk. Another study[23] evaluated the BS in nursing professionals and found that conflicts between the team are factors that can aggravate the professional situation. The same can be related to the work or group consultations carried out by academics, since conflicts are recurrent and, in some situations, unavoidable. Also, in the second evaluation, the presence of a positive correlation was seen between 3 domains of the CBI-S (personal, studies, and teachers) and the IPAQ.

The importance of this evaluation is due to the fact of physical activity had a relation with stress levels. So, if the levels of exercise practice had a significant change, we could suggest that change changes in stress levels were due to this factor. However, from the general classification of physical activity observed in IPAC evaluation, the levels had a minimal reduction statistically that was not significant. Besides, BS levels decreased considerably, highlighting the positive effect caused by treatment with auriculotherapy.[9,10] After auriculotherapy protocol application, the prevalence of BS reduced to 62.5%, and the personal and study domains had a reduction of 35% and 21%, respectively, statistically significant, when compared to the first evaluation. A similar study22 used a protocol of 7 sessions of auriculotherapy and observed that after treatment, 80% of this group no longer had any symptoms of stress, while only 13.3% maintained psychological stress and 6.7% physical stress. In the same way, another study[24] also realized 8 sessions of auriculotherapy in Physical Therapy students and obtained stress reduction in 50% of the sample. With the end of the semester approaching, there is an accumulation of tests and final work to be delivered for the disciplines.

Table 1 CBI-S/IPAQ correlation values

Domains	IRAQ 1ª evaluation		IPAQ 2ª evaluation		IRAQ 3ª evaluation	
Personal Burnout 1ª evaluation	p=0.07	r=0,505	13=0,11	1=0,342	p=0,15	1=0,201
Personal Burnout 2ª evaluation	p=0,197	1=0,151	13=0,03*	r=0,249	p=0.087	r=0,203
Studies Burnout 2ª evaluation	p=0.547	r=0,07	p=0.04'	r=0,231	p=0,061	1=-0,220
Teachers Burnout 2' evaluation	p=0,212	r=0,146	p=0.01*	r=0,915	p=0,328	!=-0,117
Personal Burnout 3ª evaluation	p=0,320	r=0,120	p=0,02	1=0,272	p=0,075	r=0 211
Studies Burnout 3ª evaluation	p=0.590	r=0,065	p=0,05	r=0,227	p=0,053	1=0,229

Table 2 IPAQ Suppementary file IPAQ classification at different levels

	The intensity of physical activity	Frequency	Duration
Very Active	1 –Vigorous	1 – 5 x p/ week	1 – 30 minutes p/ day.
	2 –Vigorous + Moderate	2- 3 x p/ week + 5x p/week.	2 – 20 minutes p/ day + 30 minutes p/day.
Active	1 –Vigorous	1 – 3x p/ week	1 – 20 minutes
	2 – Moderate	2 – 5x p/ week	2 – 30 minutes
Irregular active "A"	Walking + Vigorous + Moderate	Not applicable	150 minutes p/ week
Irregular active "B"	Walking + Vigorous + Moderate	Not applicable	>10 e <150 minutes p/ week
Inactive	Not applicable	Not applicable	< 10 minutes.

Table 3 CBI-S – Supplementary file

Dimensions	Score 1° year (n=29)	Score 2° year (n=30)	Score 3° year (n=18)	Score Deperiodized (n=3)
Personal Burnout	3,26*	3,38*	3,10*	3,83*
Studies Burnout	3,11*	3,32*	3	3,66*
Colleagues Burnout	2,23	2,71	2,19	3,05*
Teachers Burnout	2,08	2,72	2,14	3,21*

As a result, many academics could stop performing leisure activities, such as physical activity, due to the requirement of the University. It was also observed in the third IPAC evaluation, that there was a small reduction, despite not being statistically significant, in the level of physical activity. As we know, physical activity is important to combat stress, one of the symptoms that precede BS, greater exercise intensity shows better results in stress. Thus, even with the slight reduction in the levels of physical activity in the sample, it was found that there was an improvement, mainly in fatigue and psychological exhaustion observed in the personal and study domains in the final evaluation. From this, the importance of auriculotherapy is again highlighted during this period, which had a reduction in the levels of BS in academics from this research.[9,10] Since the first evaluation, the academics showed a low level of BS about the professors, who did not present major changes during the research.

According to this, a study interviewed 29 Psychology and Economics students from the Federal University of Santa Maria – RS and observed that the stress related to teachers is directly linked to their commitment to academics. So, the conflictual relationships between academics and teachers and poor academic performance can generate an increase of stress in the relationship between both, contributing to a possible increase in Burnout levels. However, the professors from the program of this research are extremely dedicated and are always available to help academics, so few reasons can cause emotional or physical stress related to them. Many studies have shown high levels of Burnout in academics and teachers. Interventions to prevent Burnout in this population can improve the relationship between both. Although the literature still does not demonstrate robust evidence in the prevention of Burnout, interventions involving behavioral and cognitive skills have begun to show results.

These may involve meditation, physical activity, self-care practices, leisure, hobbies, improved communication between colleagues and teachers, and alternative therapies such as acupuncture and auriculotherapy, making important interventions for BS treatment and possible prevention.[25–27] Therefore, auriculotherapy showed a greater effect in the personal and study domains, the PD decreased to 35% and the SD to 21%. The selected auricular points aimed to reduce the participants' stress and anxiety, which are major factors to generate physical and psychological exhaustion in both domains. The colleague's colleagues and teachers domains also brought positive results, although less expressive. In this way, a conducted clinical trial with nursing professionals found that after the 8th session of auriculotherapy with seeds, there was a significant reduction in the participants' stress levels.[20] In the literature, we can explain these results through some main action mechanisms. The first is about the action due to the activation of meridians, and regulation of organ function, from Acupuncture present in Traditional Chinese Medicine. A second route would be through the hypersensitive reflex neuronal pathways that connect the stimulated region in the ear to the corresponding somatotopic region in the brain, making the auricular pavilion a microsystem.

Another pathway can be explained through a neurophysiological mechanism.[28–31] This one suggests that as the auricular pavilion is richly innervated by the vagus nerve, and by the great auricular, minor occipital, and auriculotemporal nerves, when stimulated through the pressure of the seeds/crystals or needles of auriculotherapy, afferents are sent to the Central Nervous System, to the brain stem and the posterior horn of the spinal cord, responsible for the sensitivity, favoring communications with neural pathways in the cortex, pituitary, and hypothalamus, which may affect the endorphins release.[32,33] Also, the Vagus nerve is a parasympathetic nerve, responsible for the autonomic innervation of organs such as the lung, heart, stomach, liver, and part of the intestine, and through its auricular stimulation, it can send information to important brain regions in the regulation of anxiety and stress such as the locus coeruleus, amygdala, and hippocampus. Due to this, the literature demonstrates that auriculotherapy is capable of

generating a modulation in vagal tone and consequent repercussions and modulation in these systems.[34–36] As limitations of the study, we cite the absence of a placebo group and a control group. However, the justification for this is because of the contact between Physical Therapy students. All participants met daily at the university, so they could make comparisons between themselves regarding the points placed in the ear, and see which group they would belong to if the control group and the placebo group had been implemented.

Conclusion

Auriculotherapy proved to be effective in reducing BS levels of students in the Physical Therapy program at a Brazilian public university. A significant reduction was observed in the personal and study domains. There was also an improvement in the colleague's and teacher's domains, but with less expressiveness. It was observed that the levels of physical activity remained practically the same with a small reduction in the general classification of the IPAQ, with no statistically significant difference. Due to the anti-stress properties of physical activity, this suggests that auriculotherapy may have been the main factor in reducing the score of the CBI-S, mainly related to study and personal domains. However, there is a gap in studies in the literature that can help to prove the effectiveness of this therapy. Therefore, more researcher is required to reaffirm the present study's findings.

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Conflicts of interest

Authors declare that there is no conflict of interest exists.

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