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Stress generated by remote exams during the Covid-19 crisis and its relationship to physical activity: a cross-sectional study among medicine students

Estresse gerado por exames remotos durante a crise do Covid-19 e sua relação com a atividade física: um estudo transversal entre estudantes de medicina

Estrés generado por los exámenes a distancia durante la crisis del Covid-19 y su relación con la actividad física: un estudio transversal entre estudiantes de medicina

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Abstract
Background: Stress Generated by Remote Exams During the Covid-19 Crisis and its Relationship to Physical Activity: A Cross-Sectional Study Among Medicine Students. The study aimed to verify the autonomic alterations that occur in medical students in remote exams during the Covid-19 crisis and their relationship with physical activity. Study conducted with 22 medical students (9 women and 13 men) with a mean age of 19±1.5 years (18-24 years). The dependent variables were: changes in HRV. The independent variables of the study were physical activity (number of steps/day), age and sex. The results showed that the evaluation did not generate changes in the measured autonomic indicators, indicating that this model minimizes stress. It was evident that the greater the number of steps, the lower the stress index (r=-0.920). The other autonomic variables did not show a significant correlation with the number of steps. The remote assessment model used in the medical course during the Covid-19 crisis did not generate autonomic alterations indicative of stress in medical students. However, there was a low level of physical activity in this sample through the number of daily steps, on the other hand, those who had a higher number of steps had a lower stress rate.
Keywords: Tests; Depression; Step numbers.

Resumo
Introdução: Estresse gerado por exames remotos durante a crise do Covid-19 e sua relação com a atividade física: um estudo transversal entre estudantes de medicina. O estudo teve como objetivo verificar as alterações autonômicas que

ocorrem em estudantes de medicina em exames remotos durante a crise da Covid-19 e sua relação com a atividade física. Estudo realizado com 22 estudantes de medicina (9 mulheres e 13 homens) com média de idade de 19±1,5 anos (18-24 anos). As variáveis dependentes foram: alterações na VFC. As variáveis independentes do estudo foram atividade física (número de passos/dia), idade e sexo. Os resultados mostraram que a avaliação não gerou alterações nos indicadores autonômicos medidos, indicando que este modelo minimiza o estresse. Ficou evidente que quanto maior o número de passos, menor o índice de estresse (r=-0,920). As demais variáveis autonômicas não apresentaram correlação significativa com o número de passos. O modelo de avaliação remota utilizado no curso de medicina durante a crise da Covid-19 não gerou alterações autonômicas indicativas de estresse em estudantes de medicina. No entanto, observou-se um baixo nível de atividade física nesta amostra por meio do número de passos diários, por outro lado, aqueles que possuíam maior número de passos apresentaram menor índice de estresse.
Palavras-chave: Testes; Depressão; Números das etapas.

Resumen
Introducción: Antecedentes: El estrés generado por los exámenes a distancia durante la crisis del Covid-19 y su relación con la actividad física: un estudio transversal entre estudiantes de medicina. El estudio tuvo como objetivo verificar las alteraciones autonómicas que se presentan en estudiantes de medicina en exámenes a distancia durante la crisis del Covid-19 y su relación con la actividad física. Estudio realizado con 22 estudiantes de medicina (9 mujeres y 13 hombres) con una edad media de 19±1,5 años (18-24 años). Las variables dependientes fueron: cambios en la VFC. Las variables independientes del estudio fueron la actividad física (número de pasos/día), la edad y el sexo. Los resultados mostraron que la evaluación no generó cambios en los indicadores autonómicos medidos, indicando que este modelo minimiza el estrés. Se evidenció que a mayor número de pasos, menor índice de estrés (r=-0,920). Las demás variables autonómicas no mostraron una correlación significativa con el número de pasos. El modelo de evaluación a distancia utilizado en la carrera de medicina durante la crisis del Covid-19 no generó alteraciones autonómicas indicativas de estrés en los estudiantes de medicina. Sin embargo, hubo un bajo nivel de actividad física en esta muestra a través del número de pasos diarios, por otro lado, aquellos que tenían un mayor número de pasos tenían una menor tasa de estrés.
Palabras clave: Pruebas; Depresión; Números de paso.

1. Introduction

Stress is a much discussed topic in recent times (Baum A. 1990), especially in the academic environment linked to the Medicine course (Stewart et al., 1997; Dyrbye et al., 2008; El-Masry et al., 2013; Fares et al., 2016; Shadid et al., 2020), due to the large amount of information that medical schools present to students, added to the involvement in various extracurricular activities which they occur in a short period of time (Batista JB, Carlotto MS, Coutinho AS, Augusto LG. 2010), requiring great skill with time management from the students (Shadid et al., 2020). This high allostatic load (Tonello, et al. 2014), which is understood as the cost that the human body has to reestablish homeostasis in a stressful situation (McEwen, B. S. 1998), is identified by the central nervous system as a threat (Sterling, P. 2004), which can lead to exhaustion (Batista et al., 2010), depression (Mirza et al., 2021) and suicide (Chahal et al., 2021).

Depression is a serious psychological illness that affects people all over the world and has become a public health problem, prompting the World Health Organization to create an action plan (Organização Mundial de Saúde. 2013) to minimize the impacts. It is noteworthy that the etiology of depression is closely linked to stress and anxiety, which are psycho-emotional diseases (Hammen, C. 2005).

It is known that excessive exposure to stress can trigger pathophysiological changes, and that assessments (tests) carried out in medical schools are one of the main sources of stress (Liu et al., 2020).

It is noteworthy that the body's physiological responses to a stressful situation is reflected on the autonomic nervous system (ANS), a variable that can be monitored by heart rate variability (HRV), a technique that reflects the autonomic balance between the sympathetic nervous system and parasympathetic (Oliveira-Silva, I et. al. 2016) and is indicative of adaptive capacity to stress, as HRV increases (ie desirable condition) (Hynynen et al., 2011) when stress is low. On the other hand, studies show that the best previous aerobic condition can minimize symptoms.

The present study focused on original aspects, still little explored in the literature and that portray a very important

theme related to the mental health of medical students and aimed to verify the autonomic changes that occur in medical students in remote exams during the covidence crisis and its relationship with physical activity.

2. Methodology

This study had an analytical cross-sectional character and followed the health recommendations due to the Covid-19 pandemic. The dependent variables were changes in HRV. The independent variables of the study were body mass index (BMI), physical activity (via number of steps), age and sex.

Subjects

The study included 22 medical students (9 women and 13 men) with a mean age of 19±1.5 years (18-24 years), body mass index of 22.3±3.48 kg/m2 (17 ,7-30.3 kg/m2), and a mean of 3,625±1372 steps/day (1751-6248 steps/day) who consented to participate in the study and signed an informed consent form (FICF) in Table 1. The study was approved by the Ethics Committee of Universidade Evangélica de Goiás (n. 2.735.140), following Helsinki Declaration and Brazil Nacional Health Council Resolution N° 466/2012.

Table 1. Characteristics of medical students.

Variables	Position and dispersion measures
Age(years)	19±1.5
BMI (kg·m^{-2})	22.3±3.48
Steps/day	3,625±1372

BMI – body mass index. Source: Authors.

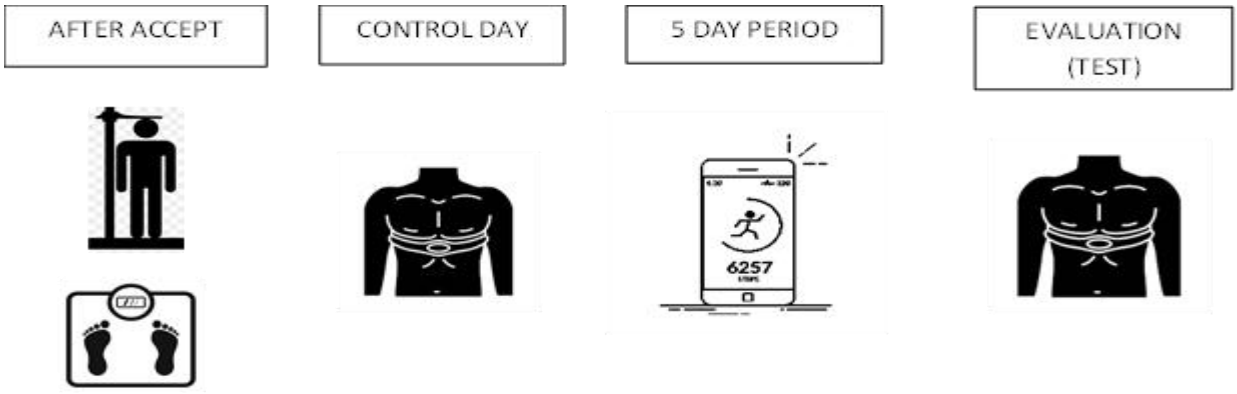
Procedures

After acceptance, the participants informed their body mass (kg), height (m) and scheduled with the researcher to record the HRV at the individual's residence.

The recording was performed with the aid of a recording strap (H-10, Polar, Finland) positioned on the participants' chest, in the region of the distal third of the sternum, with the individual in a seated position; with the trunk erect and supported on the back of the chair, lower limbs with the hips and knees flexed at 90º, and feet flat on the floor, with the upper limbs resting on the knees, until the stabilization of the heart rate was obtained. Registration time was 5 minutes. At the time, they received instructions from the researcher regarding the registration of the number of steps in a period of 5 days via cell phone (pedometer app). At the end of this step, they informed the day and time that they would carry out the assessment (test) and the researcher returned to the site to repeat the HRV record and the subject showed the app with the average number of steps in the last 5 days, according to the procedure described in Figure 1.

It is noteworthy that when completing the registration of the HRV, the participant was released to start their evaluation, which in this period was being carried out online.

Figure 1. Experimental Procedure: After accepting, Pedometer (5 day) and HRV (Control Day and Test Day).



Source: Authors.

Statistical Analyses

All statistical analysis was performed by using Statistic Package for the Social Sciences (SPSS for Windows version 24.0, Chicago, IL, USA).

Mean ± SD descriptives were presented. Normality was tested using the Shapiro Wilk test, with Lilliefors correction. A p value <0.05 was adopted as the level of significance.

The effect size (ES) was reported as the partial eta-squared. An alpha level of 0.05 was used to determine the statistical significance.

3. Results and Discussion

The evaluation (test) did not generate changes in the measured autonomic indicators, suggesting that this evaluative model can be an alternative to minimize the stress that these interventions generate in the student.

It was evident that the greater the number of steps, the lower the stress index (r=-0.920).

Table 2. Autonomic changes (Means ± SD).

	Control day	Test day	*Effect Size*	p
HR (bpm)	81±10	82±11	0,09	0,62
RR (ms)	748±97	749±126	0,01	0,94
SDNN (ms)	51±13	53±17	0,13	0,45
rMSSD (ms)	35±12	39±17	0,27	0,21
SD1	25±8	27±12	0,19	0,23
SD2	67±17	70±22	0,15	0,53
Stress índex	9,63±2,1	9,59±2,9	0,15	0,94

p: significance; ms: milliseconds. Source: Authors.

Remote tests do not generate considerable autonomic changes in medical students, according to a study (Felippe et al., 2021), students who had suspended practical classes had lower levels of stress, compared to students who had already returned to in-person practices. Due to the low level of physical activity in the studied sample, the relationship with the number of steps/day was discreet. And when it comes to the perception of stress and level of physical activity (Mendes et al., 2020) observed that the highest level of physical activity had the lowest level of stress. The mental health of medical students has been a matter of concern due to the large number of psychiatric problems caused in this public (Batista et al. 2014; McEwen,

1998). This model can, perhaps, help in reducing these.

However, in the studies by Elsalem et al (2020) with 1019 students of Medicine courses (51.32%) and the other half were composed of Nursing, Dentistry, Pharmacy and Applied Medical Sciences. Among respondents, 32% said more stress between remote tests, in addition to less physical activity (exercise). In addition, there was a negative impact on students' eating habits (increase in caffeine and high-energy drinks, foods rich in sugar, fast food), smoking habits (increase) and sleep (decrease in sleep hours, more consumption of insomnia medication).

4. Conclusion

The remote assessment model used in the medical course during the Covid-19 crisis did not generate autonomic alterations indicative of stress in medical students. However, there was a low level of physical activity in this sample through the number of daily steps, on the other hand, those who had a higher number of steps had a lower stress rate. It is noteworthy that further studies must be carried out to understand the impact of this evaluative model in this population so that we have fewer psychological illnesses arising from medical training, but at the same time the quality of training is maintained.

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