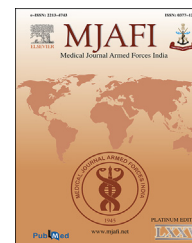




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Original Article

Level of work stress and factors associated with bruxism in the military crew of the Peruvian Air Force

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ABSTRACT

Background: Military life leads to a great personal sacrifice and labor in the aircrew because they are constantly subjected to innumerable activities which have a great work pressure; therefore, the aim of this study was to determine the level of work stress associated with bruxism in the aircrew of the Peruvian Air Force.

Methods: This was a cross-sectional study. A total of 204 crew members of the Peruvian Air Force from the Air Group were surveyed, and the stomatological clinical inspection was carried out. Each crew member was evaluated using the validated International Labor Organization-World Health Organization (ILO-WHO) Work Stress Scale, and clinical records were used to diagnose bruxism using the Smith and Knight wear index.

Results: It was found that 93.7% (n = 191) of the crew members were men and 6.3% (n = 13) were women; and the percentage of intermediate-level stress was found to be high in the grade of non-commissioned officers, whereas in the officer grade, the level of stress was low. There was also a statistically significant association between the variables military grade, sex, and age group. The sub-officers presented a higher percentage in the category "with bruxism", while in the rank of officers the category of "non-bruxism" was the most prevalent.

Conclusions: This study showed a statistically significant association between the variable bruxism and the level of work stress between the military aviators of the Peruvian Air Force (p<0.001).

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Introduction

The Armed Forces of each country represent a unique work environment that implies exclusive dedication. The training

exposes the military to chronic stress that can lead to a variety of physical and emotional problems among which are the health problems to which they are constantly exposed because of the discipline and obligations they must face during their military training. For example, some investigations

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mention that members of military crews in particular represent a population that is constantly exposed to work-related stress even in times of peace.^{1,2}

In multiple investigations, it has been found that the military has a higher prevalence of parafunctional muscle activity, which is estimated in the 60–70% of the pilots of the Second World War; however, this assumption is not based on scientific evidence.¹ Piloting is one of the most stressful activities; therefore, the pilots are vulnerable to temporomandibular disorders (TMDs).^{3–7}

Some problems such as sleep disorders, drug dependence, smoking, and alcohol consumption have been linked to bruxism; although there may be other psychological factors such as stress and personality disorders that could also be related to bruxism.^{8,9} According to Shokry et al. stress and its association with dental practices have been widely demonstrated. Stress can be caused due to various factors that involve a certain level of risk, concern, etc. Therefore, work stress can cause absence and decrease in productivity; it also determines the lack of delivery and concentration during military activity.¹⁰

It can be considered that the labor stress is the result of the interactions between individuals and the way people perceive the demands of their work; for example, some investigations reflect the degree of control people exert over the work and the amount of support they receive from their coworkers and/or supervisors.^{11–14} Therefore, the aim of this cross-sectional study was to determine the knowledge about the level of work stress associated with bruxism in the aircrew of the Peruvian Air Force.

Materials and methods

This research was authorized and approved by the Ethics Committee of the Universidad Privada San Juan Bautista with code CEPB-FCS 0011, and it adheres strictly to the tenets of the Declaration of Helsinki in addition to elaborating with the methodological guideline parameters by the Strengthening of Reporting of Observational Studies in Epidemiology.

The analysis unit was formed by the aircrew personnel of the Peruvian Air Force during the year 2017, located in Lima and Callao. The sample consisted of 204 military crew members, who met the inclusion and exclusion criteria, and applying the formula for estimating a proportion, the sample was calculated with an alpha (level of significance) of 0.05 and a beta (power of test) of 0.80. Finally, the sample was selected by means of a simple random probabilistic sampling. The crew members of the Peruvian Air Force who met the following criteria were evaluated:

Inclusion criteria:

- Tripulants without psychological or psychiatric issues.
- Tripulants in good general health condition previously diagnosed by the Health Department of the air base.
- Tripulants who are designated performing as risky activity (emergency zones, antidrug trafficking zones, etc).

Exclusion criteria:

- Tripulants with a history of chronic systemic diseases

- Tripulants who do not sign the informed consent
- Tripulants with no history of dental evaluation before the study.

A clinical dental examination was carried out on each of the crew members who fulfilled the selection criteria. Being a cross-sectional study, there were no previous records of the state of dental wear of each evaluated member in the Peruvian Armed Forces; only existing records of diseases such as caries, gingivitis, and periodontitis were available. The crew members, being full-time workers of the Peruvian State, are constantly exposed to their work stress daily; for example, the stress increases when there are operations against drug trafficking, natural disasters, etc. Therefore, it is complicated to quantify the time to which they are subjected to job stress.

An instrument was used taking into account the proposal of the International Labour Organization (ILO) - World Health Organization (WHO) Work Stress Scale.¹⁵ To measure the level of work stress of the military personnel of the Peruvian Air Force, data of each participant were recorded in compliance with the confidentiality rules through this questionnaire. On the other hand, bruxism is evaluated through a clinical stomatology examination, with the help of a dental wear scale.

The occupational stress questionnaire created by the ILO-WHO was used and subsequently validated into Spanish by Suarez.¹⁵ This instrument has 25 items measured on a Likert scale, has options to mark according to the questions and as a result shows the values of stress levels (low, intermediate and stress). The diagnosis of bruxism was performed through the clinical examination and evaluation of dental wear with the vestibular/buccal surfaces, lingual/palatal, cervical and occlusal/incisal in the military that have at least 21 teeth. For the purpose of diagnosis, grades 0,1,2,3 and 4 were classified, indicating the severity of tooth wear. From 0 to 2 is considered without bruxism and 3 and 4 with bruxism.¹⁶

Subsequently, the obtained permits were signed and sent to the Callao Air Base in search of the chief-in-charge who gave permission to evaluate the aircrew. First, a preliminary presentation was made that was addressed to the Air Army, explaining the research topic and the steps that would be carried out with those wishing to participate, then, the questionnaires were administered to register work stress and the dental clinical examination was performed to register the levels of bruxism. The time that was used for each participant was approximately 10 min. The survey records and clinical files were stored, keeping the confidentiality of the data.

Statistical analysis

For the elaboration of the univariate analysis, we proceeded to obtain the measures of proportion and frequency of the variables work stress, military grade, sex, age group, degree of dental wear, and bruxism in the aircrew. For the bivariate analysis, Pearson's Chi-square non-parametric test was used to associate the perception of the different study groups according to sex, age group, military grade, degree of dental wear, level of work stress, and bruxism. Databases were created in the Microsoft Excel program, and the results were analyzed using the statistical package Stata®, version 12.0, establishing a level of significance of $p < 0.05$.

Results

This study showed that in the crew of the Air Force of Peru, the female sex did not have much affinity to carry out the military career because only 13 (6.3%) females were found between the degrees of officers and sub-officers. In relation to the age group, it was found that the age range of 31–41 years was the most prevalent, with 101 (49.5%) of the total sample (Table 1).

This research found only statistically significant association between military grade and work stress, with $p = 0.007$, which reveals the great impact to which the military personnel are exposed during their military aerial activity. However, there were no statistically significant associations with age or sex (Table 2).

Table 3 shows that there is only one statistically significant association between the variable bruxism and the degree of tooth wear, with $p < 0.05$. However, this relationship of bruxism was not affected by sex, age, and military grade. This shows that the dental wear is a very important component to be considered in this type of professionals.

Finally, when determining the association between the level of work stress and bruxism in the members of the military crew of the Peruvian Air Force, a statistically significant association was found between both variables evaluated, with $p < 0.05$ (Table 4).

Discussion

Pilots, cabin crew, and all air personnel are vulnerable to suffer from different types of Temporomandibular Disorders (TMDs), bruxism, and other injuries due to chronic stress to which they are subjected daily. The results of the present research can be extrapolated to the clinical scenario because the work stress has a direct impact on the stomatognathic system, triggering pain points and resulting in contractures of the muscles of mastication, parafunctional habits, dental attrition, and dysfunction of the temporomandibular joint, among other pathologies; therefore, it is extremely important to diagnose these lesions early. We recommend periodic clinical and radiographic examinations of the entire military population to prevent the aforementioned injuries from becoming chronic because they can directly compromise their performance in military activity.

The relationship between work stress and bruxism is significant because the load of stress that exists during the course of the day is reflected in the day or night by an involuntary grinding or rubbing of teeth. The population of the military aircrew is vulnerable to dental pathologies in addition to toothache that arises during changes in barometric pressure, that is, barodontalgia and dental fracture in high altitude conditions, and there is evidence of a higher prevalence of added odontogenic diseases among pilots.^{1,17,18}

It has been mentioned and shown that in different types of work, there is work-related stress. This psychological phenomenon is not only seen in office and/or commercial work but also has been documented in different countries that work-related stress occurs in the Armed Forces because it is a

Table 1 – Sociodemographic characteristics of the military grade according to age group and sex.

Military grade	Officer		Sub-officer		Total	
		n (%)		n (%)		n (%)
Age group (years)	20–30	39 (19.0)	18 (9.0)		57 (28.0)	
	31–41	47 (23.0)	54 (26.5)		101 (49.5)	
	42–52	16 (7.8)	28 (13.7)		44 (21.5)	
	53–63	0 (0.0)	2 (1.0)		2 (1.0)	
Sex	Female	2 (1.0)	11 (5.3)		13 (6.3)	
	Male	100 (49.0)	91 (44.7)		191 (93.7)	

work environment that requires physical effort and delivery for the nation in times of war.^{17,18}

When evaluating the military grade according to sex, it was found that men in the officer category were more frequently found to have stress 49.0% ($n = 100$), while in women officers it was present in only 1% ($n = 2$) of the sample studied. In a study in Croatia on naval officers in 2011, no difference was found in the distribution by sex (female and male) between the two groups studied.¹⁹

According to the results of the research on age group, and work stress obtained with the help of a questionnaire validated by the (ILO-WHO), the age variable was divided into 4 categories of 10, and the results of a low level of stress were predominantly obtained in the category of the age group of 31–41 years with 41.7% ($n = 85$), in addition, with respect to the stress category, the age groups 31–41 and 42–52 years obtained an equality of 0.5% ($n = 1$), from a total sample of 204 crew members of the Peruvian Air Force. In a study on the Air Force of Mexico with a total population of 35 pilots in 2010, the questionnaire of work stress was used, and the instrument used was the Stress Profile prepared by Kenneth M. Nowack, which evaluates 15 areas related to stress, disease risk, and coping style and consists of 123 items, with a Likert-type response. According to age, it was divided into 5 age groups of 22–26 years, 27–31 years, 32–36 years, 37–41 years, and 42–46 years, finding a higher level of stress giving an equality to the age groups of 22–26 years with 37% ($n = 13$) and 27–31 years with 37% ($n = 13$).²⁰

To assess the results of the diagnosis of bruxism, the dental wear index of Smith and Knight was used, which had 5 scores and/or grades. The age group was divided into 5 groups of 10 years, finding the highest percentage in the age group of 31–41 years with 33.8% ($n = 69$) in the non-bruxism scale, while in the bruxism scale, it was found that the highest percentage was also in the scale of age group of 31–41 years with 15.7% ($n = 32$), in a total of 204 crew members of the Peruvian Air Force. On the other hand, in a research work of naval officers in Croatia in 2011, the age group was divided into 3 groups 20–30 years, 30–40 years, and 40–60 years, and it was found that the highest score with respect to dental wear was in 31% ($n = 338$) of participants of 40–60 years age group, indicating bruxism, and the lowest score was found in 21.4% ($n = 234$) of participants of 20–30 years age group, indicating no bruxism among the 1092 marine servicemen evaluated according to the Pullinger and Seligman index,

Table 2 – Association between level of work stress according to sex, age group, and military grade.

Work stress		Low level	Intermediate level	Stress	Total	<i>p</i> ^a
		<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Sex	Female	9 (4.4)	4 (1.9)	0 (0.0)	13 (6.3)	0.105
	Male	168 (82.4)	21 (10.3)	2 (1.0)	191 (93.7)	
Age group (years)	20–30	50 (24.5)	7 (3.4)	0 (0.0)	57 (27.9)	0.757
	31–41	85 (41.7)	15 (7.3)	1 (0.5)	101 (49.5)	
	42–52	40 (19.6)	3 (1.4)	1 (0.5)	44 (21.5)	
	53–63	2 (1.0)	0 (0.0)	0 (0.0)	2 (1.0)	
Military grade	Officer	96 (47.0)	6 (3.0)	0 (0.0)	102 (50.0)	0.007 ^b
	Sub-officer	81 (39.7)	19 (9.3)	2 (1.0)	102 (50.0)	

^a Fisher's exact test.^b Only found a statistically significant association between military grade and work stress with a level of significance $p < 0.05$.**Table 3 – Association between bruxism according to different risk factors in the military crew of the Peruvian Air Force.**

Bruxism		With bruxism	Without bruxism	Total	<i>p</i>
		<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Sex	Female	4 (1.9)	9 (4.4)	13 (6.3)	0.976 ^a
	Male	58 (28.4)	133 (65.3)	191 (93.7)	
Age group (years)	20–30	15 (7.4)	42 (20.6)	57 (28.0)	0.163 ^b
	31–41	32 (15.7)	69 (33.8)	101 (49.5)	
	42–52	13 (6.3)	31 (15.2)	44 (21.5)	
	53–63	2 (1.0)	0 (0.0)	2 (1.0)	
Military grade	Officer	28 (14.0)	74 (36.0)	102 (50.0)	0.361 ^a
	Sub-officer	34 (17.0)	68 (33.0)	102 (50.0)	
Degree of dental wear	Grade 1	0 (0.0)	25 (12.3)	25 (12.3)	0.000 ^b
	Grade 2	0 (0.0)	117 (57.3)	117 (57.3)	
	Grade 3	60 (29.4)	0 (0.0)	60 (29.4)	
	Grade 4	2 (1.0)	0 (0.0)	2 (1.0)	

Only found a statistically significant association between the degree of tooth wear and bruxism with a level of significance $p < 0.05$.^a Pearson's Chi-square test.^b Fisher's exact test.**Table 4 – Association between work stress according to bruxism in the military crew of the Peruvian Air Force.**

Work stress		Low level	Intermediate level	Stress	Total	<i>p</i>
		<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Bruxism	With bruxism	38 (18.6)	22 (10.8)	2 (1.0)	62 (30.4)	0.000 ^a
	Without bruxism	139 (68.1)	3 (1.5)	0 (0.0)	142 (69.6)	

A statistically significant association was found between the different levels of work stress and bruxism with a level of significance $p < 0.05$.^a Fisher's exact test.

thus finding bruxism.¹⁹ The difference found between the age groups could be due to the fact that in the research carried out in Croatia, the population was much larger than that of the crew of the Peruvian Air Force. Similarly, both in the military and air crew, no statistically significant association was found between both variables, with $p = 0.163$, whereas in a study in India, among computer professionals, 147 people were evaluated to find the association of work, stress, and diurnal bruxism, and it was found that there is no statistically significant association between bruxism and age.²¹ An equality can be observed in the results of both studies

because with respect to age and bruxism, it is not possible to determine an age at which the prevalence of bruxism is the highest and so it is a condition that can affect both children and adults.

This investigation showed that the crew had remarkably high rates of work stress, and this was reflected in the wear of their teeth. Therefore, it is necessary to establish strategies that help prevent and restore these manifestations that affect the quality of life and oral health of the military personnel, establishing the integration of preventive and psychological intervention.^{1–5}

During the data collection, there were certain limitations to be able to carry out the investigation quickly, some of these weaknesses included the location of the air base (N° 8 and N° 3) in the district of Callao and obtaining the permit which took about a month. Once the permit was obtained, the data collection began first with an exhibition in the Peruvian Air Force auditorium that was made possible because of the air group authorities and then with most of the aircrew personnel explaining the research topic and the steps that were to be carried out with each of them. As time passed, one of the limitations was the need to have enough time for each of the crew to be evaluated through the questionnaire and the corresponding clinical examination. It was possible to reach an agreement with the crew members individually, and some of them decided to fill the questionnaire and undergo clinical examination inside their offices and others in the health-care center that was in the same air base.

Another limitation was when there were natural disasters in some provinces, among others; the military personnel went to offer their aid to the victims. Some of the military crew members were affected with dengue and had to be hospitalized, so the investigation had certain delays; other limitations included the festivities and/or meetings that were held within the air base and that prevented entry, the permit to enter and perform the data collection for only 3 days a week, and also delays due to the military personnel leaving commission as part of their military work. Despite all the limitations presented, it was possible to conclude the investigation with great patience because of the collaboration of each of the military participants and the authorities of the Peruvian Air Force.

Another important limitation was that there were no previous records of the state of dental wear of the crew members because the Peruvian Air Force evaluates and treats only injuries such as caries, gingivitis, and periodontal diseases. Unfortunately, as tooth wear is painless, it is not within the priority health-care policies.

Conclusions

To conclude, the present study obtained only a statistically significant association between the variables of work stress and military grade. The officers showed a low level of stress at work, whereas the non-commissioned officers showed intermediate levels of stress at higher intensity.

Besides, only a statistically significant association was found between bruxism and the degree of dental wear. Therefore, it is necessary to establish basic programs for the treatment of work stress, physical condition, and recovery status of the crew to prevent and treat pathologies that may compromise the military performance of this group as a statistically significant association was found between the level of work stress and bruxism.

Conflicts of interest

All authors have none to declare.

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