

## Temporomandibular joint dysfunction syndrome and police work stress: an integrative review

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**Abstract** *This study aimed to investigate whether stress found in activities performed by Brazilian police workers is associated with the risk of developing a temporomandibular joint dysfunction syndrome (TMD), a disorder that is commonly associated with stressful conditions. An integrative literature review on stress, TMD and police work was carried out. We identified several stressors in the work of Brazilian police officers and observed that stress influences the development, aggravation and treatment of TMD symptoms. The quality of life and health of TMD carriers is compromised. The fact that studies have shown the association between stress and activities carried out by Brazilian police officers, as well as between stress and TMD, has led to the assumption of a possible relationship between stress caused by police work and the risk of these workers developing TMD. It is recommended that individuals be thoroughly examined before being treated and that such treatment be multidisciplinary. The literature on TMD in police workers is still incipient, which is why we recommend the development of further studies on the topic.*

**Key words** *Occupational stress, Temporomandibular joint dysfunction, Police officers, Worker's health*

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## Introduction

Stress is part of the physiological nature of the human being and is associated with the individual's adaptive capacity in the face of a relevant event or situation<sup>1</sup>. However, when stress becomes intense or persistent, exceeding the individual's physical, cognitive and emotional capacity to cope with the stressful situations, it will generate a disorganizing effect in the organism and can lead to a pathological condition<sup>2</sup>.

The temporomandibular joint dysfunction syndrome (TMD)<sup>3</sup> is a term used to characterize a group of diseases that affect the masticatory muscles, the temporomandibular joint (TMJ) and adjacent structures<sup>4</sup>. TMD patients evidence symptoms ranging from discomfort, such as cracking joint, muscle tenderness and limited mouth opening<sup>5</sup>, to profoundly disabling symptoms, such as orofacial pain and difficulties in the masticatory function<sup>4</sup>. Also, otologic symptoms are noted, such as tinnitus, otalgia, dizziness/vertigo, hearing fullness, hypoacusis and hyperacusis<sup>6</sup>. All these factors interfere in the daily social and work activities of the individual, as well as in their emotional and physical health<sup>7</sup>.

The scientific literature points to work as a vital source of stress<sup>1,8</sup>, where there is a theoretical distinction about stress acting, or being perceived as a positive source of motivation (eustress), when some individuals experience feelings of self-confidence, optimism, robustness to overcome challenges<sup>9</sup>. Conversely, Rossi *et al.*<sup>9</sup> denominate as distress the one related to the perceived stimuli as "negative stress", associated with the prevailing sensation of frustration, excess of fatigue and feeling unable to control situations or facts, causing physical and emotional imbalances.

This paper is in the field of Occupational Health, with due connotation in Brazil, which can be understood as "a body of interdisciplinary – technical, social, human – and interinstitutional theoretical practices, developed by different actors located in different and informed social places from a common perspective"<sup>10</sup>. It addresses the individual and organizational aspects of work-related stressors, sources of distress, because of their association with reduced quality of life and higher costs for individuals, organizations and society<sup>11,12</sup>.

In this context, some studies have exposed the situation of vulnerability, which generates a high degree of stress, in which Brazilian public security staff work, and also drawn the attention to the need for studies and actions that contribute to changing this situation<sup>1,13-15</sup>.

Considering that stress is directly related to TMD<sup>3,16</sup> and that the police officers' work process generates stress<sup>15</sup>, this study aimed to investigate whether the stress found in the activities of Brazilian police workers may be related to the development of TMD, a disease commonly associated with stressful conditions.

## Methods

This is a qualitative, exploratory and descriptive study developed through an integrative review of the literature on stress, TMD and activities of police workers. The research was guided by the following questions: What sources of stress are related to the activities performed by police workers? What is the importance of stress in the etiology of TMD?

The scientific production was retrieved from the Latin American and Caribbean Literature in Health Sciences (Lilacs), Scientific Electronic Library Online (SciELO), Medical Literature Analysis and Retrieval System online (Medline) and the Virtual Library in Health of the Ministry of Health (BVS/MS). Considering that the subject, particularly TMD, is less explored in public health, course completion papers (dissertation and monographies), available in Google Scholar, that were pertinent and could support the questions raised by the study were also used.

In order to retrieve the information, we used terms that are controlled and indexed in Descriptors in Health Sciences (DeCS), and their combinations in the Portuguese and English languages: "occupational stress", "temporomandibular joint syndrome", "police", "etiology" and "risk". Boolean operators (AND, OR, NOT) were used in the combination of descriptors to increase sensitivity (retrieval of studies aligned with the research questions) and avoid studies addressing TMD therapeutic procedures.

Inclusion criteria were applied as follows: publication between 2005-2014, full-text papers published in Portuguese and English. Also, in order to be eligible, studies should address TMD issues and the occupation/activity of Brazilian police officers; and, raise discussion or information that would fit the guiding questions of this study. We chose studies with Brazilian police officers since the authors assume that the reality of public security in Brazil may be different from that in other countries.

For purposes of critical analysis, the selected papers were organized into three categories: (1) sources of occupational stress in police workers;

(II) stress as an etiological or risk factor for the development of TMD, regardless of the professional category; and (III) stress as a risk factor for the development of TMD in a study population of police workers.

The synthesis of the scientific production and critical analysis of the contributions on the subject were used to describe and correlate the data to investigate the relationship between the police activity's stress and the risk of TMD occurrence in this population. Although the focus of the study is the Brazilian police, works from other countries were used in the discussion to expand the analysis of the findings.

Table 1 shows the synthesis of the scientific production retrieved, according to the databases, and used according to the inclusion criteria. The final sample consisted of 26 materials, between papers and final works of postgraduate studies (dissertation and monography).

## Results

Of the total of 383 jobs recovered, only 26 were classified in the categories analyzed. The boxes shown next summarize the main findings of the research, by author, year, documentary type, type of study, the primary objective of the work and the main factors found on stress, TMD and police.

Chart 1 shows the synthesis of the primary sources of occupational stress in the Brazilian police officers, as pointed out by the scientific production. In this category of analysis, eleven work works were used, which mainly address stress in public security workers.

As can be verified in the studies, police activity carries several stressors, namely: pressure, responsibility, work overload, inefficient work infrastructure, personal and third-party life risk, authoritarian environment, centralized decisions, besides

dissatisfaction with the profession due to low salaries and non-recognition of their work<sup>1,14,17,18</sup>. Souza and Minayo<sup>19</sup> highlighted the increased victimization of public security workers.

Among the elements that generate stress, organizational and operational issues of work are cited as damaging to police welfare<sup>14,20,21</sup>. Likewise, police officers understand that society and government do not recognize the work performed by the service of public safety, which according to them leads to the devaluation of the profession, and in turn generates stress<sup>17,18,21</sup>. Some police officers carry out another professional activity in their spare time, which translates into little time available to rest and have an adequate diet<sup>14,22</sup>.

Studies have shown a high level of stress among policewomen, caused by discrimination, the working woman's workload and the physiological and psychological features of women who, as the authors would have it, make them more susceptible to stress<sup>13</sup>.

However, despite being unhealthy and risky, police activity has few alternatives to ease the stress it generates<sup>15</sup>.

Chart 2 shows the synthesis for category (II), consisted of 11 papers (10 papers and 01 monography) that address stress as an etiological or risk factor for the development of TMD, regardless of the professional category.

TMD is a syndrome whose carriers may range from simple discomfort<sup>5</sup> to painful and sometimes disabling symptoms. Among the etiological and risk factors for TMD is stress, and there is proper documentation of the relationship between the development of the syndrome and the presence of stress<sup>3,16,24-27</sup>. There are citations of bruxism, a sign of stress, as a risk factor for TMD<sup>24,28</sup>. TMD adversely affects the quality of life, health and work of those who suffer from the disease because of the pain it causes<sup>5,7,29,30</sup> and is a disease more commonly found in women<sup>27</sup>. Psychosocial factors may make pain caused by TMD<sup>7</sup> a chronic one.

In Chart 3, referring to category III, four papers and one dissertation were included, totaling five studies that explain stress or its manifestations as a risk factor for TMD in police officers. Only jobs in which the study population consisted of military police officers were found. However, it should be noted that both activities carried out by military police and those carried out by civilian police have similarities and peculiarities.

Among the studies on TMD on police officers found by this study, some had a dental focus<sup>23,31</sup>,

**Table 1.** Synthesis of scientific production retrieved and used.

Base	Studies retrieved	Studies used
Lilacs	168	06
SciELO	51	14
Medline	149	02
BVS/MS	09	02
Google Acadêmico	06	02
Total	383	26

**Chart 1.** Sources of occupational stress in police workers, 2005-2014.

Author, Year	Title	Type of document – Type of study	Objective	Key data on police officers stress generators
Andrade et al., 2009 <sup>15</sup>	Intervention aiming at the self-esteem and quality of life of the civil police officers of Rio de Janeiro	Paper – Research-Action	To show data on the self-esteem and quality of life of civil police officers in Rio de Janeiro, from an intervention process	They perform unhealthy and risky activities in their daily life and almost do not have alternatives to perform the catharsis of the stress generated by such activities
Bezerra et al., 2013 <sup>20</sup>	Occupational stress in female police officers	Paper – Cross-sectional	To present and discuss the occupational stress experienced by military police women	Work organizational and managerial issue; gender discrimination; harassment; occupation of managerial positions; operational activities
Caria et al., 2014 <sup>23</sup>	Efficiency of occlusal splints on police officers with TMD	Paper – Cross-sectional	To evaluate the effect of two occlusal splints on different police officers with TMD	Constantly face danger and risk life at any time
Costa et al., 2007 <sup>13</sup>	Stress: diagnosis of military police officers in a Brazilian city	Paper – Cross-sectional	To diagnose the occurrence and the stress phase in military police offices of Natal, Brazil, besides determining the prevalence of physical and mental symptomatology.	Higher level of stress among women, perhaps due to double working hours, domestic obligations, female tendency to present more sources of stress, since they suffer more from poor interpersonal relationships, and also from physiological and psychological characteristics women.
Dela Coleta e Dela Coleta, 2008 <sup>17</sup>	Occupational stress and coping factors among civilian police officers	Paper – Cross-sectional	To identify occupational stress factors and verify coping strategies used by civilian police officers	Main stressors: working conditions, employment conditions (salary and stability), relationships with colleagues and superiors, negative image of the class by society and the media, and lack of legal and governmental support to police work.
Gomes e Souza, 2013 <sup>18</sup>	The identity of police officers and successive mirroring	Paper – Cross-sectional	To analyze the perceptions of civilian police officers about their professional identity and the institution in which they operate, as well as their opinion about the image that society has about its performance.	Negative image that the police officers believe that society has on them, which implies and reinforces a devaluation of the profession.
Minayo et al., 2011 <sup>22</sup>	Impact of professional activities on the physical and mental health of civil and military police officers in Rio de Janeiro (RJ, Brazil)	Paper – Cross-sectional	To know the health conditions of the civil and military police officers of Rio de Janeiro, from several angles: that of pleasure and suffering	Having two jobs, working night and day, spending 12 hours in the street having had only one meal, working under pressure, having to stay alert and sleep little.

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**Chart 1.** Sources of occupational stress in police workers, 2005-2014.

Author, Year	Title	Type of document – Type of study	Objective	Key data on police officers stress generators
Minayo et al., 2007 <sup>14</sup>	Perceived risks and victimization of civilian and military police offices in public (in) security	Paper – Cross-sectional	To analyze and compare victimization and risks perceived by military and civil police officers from the State of Rio de Janeiro, Brazil, in the exercise of their profession, within and outside the work environment.	Working conditions and involvement in other activities during the time off
Oliveira e Bardagi, 2009 <sup>1</sup>	Stress and commitment to career in military police officers	Paper – Cross-sectional	To evaluate the levels of occupational stress and career commitment among military police officers of the First Military Brigade of Santa Maria, RS.	Direct confrontation with crime and emergencies, which eventually expose them to risks, in relation not only to their own life and physical integrity, but also that of third parties
Souza e Minayo, 2005 <sup>19</sup>	Police officer, risk as a profession: work-related morbimortality	Paper – Bibliographic review	To analyze deaths and health problems to the civil, military and municipal police officers of Rio de Janeiro within and outside their working day, due to their social activity	Victimization growth in the three categories studied; The servants of the three corporations make up a specific category of workers at high risk for deaths and morbidity due to violence and accidents, with internal differences between the three groups.
Spode e Merlo, 2006 <sup>21</sup>	Police work and mental health: a survey with the Military Police Captains	Paper – Cross-sectional	To understand the relationship between the work of the Military Brigade Captains - name received by the Military Police in the State of Rio Grande do Sul / Brazil - and their mental health	Work organization; Pressures imposed by disciplinary surveillance and control mechanisms; Non-recognition of the work actually carried out and efforts to carry it out with quality

but all the studies were unanimous in pointing out the professional category investigated as being very likely to develop chronic diseases and disorders such as TMD, due to the very high level of stress inherent to the profession<sup>23,31-34</sup>.

Studies with police with TMD correlated the symptomatology of the syndrome with biopsychosocial symptoms, such as stress, sleep disorders, pain and smoking<sup>33,34</sup>, as well as with para-functional habits.

## Discussion

The production of knowledge is a fundamental element for promoting health and improving the quality of life. In the face of the still incipient number of national and international publications on TMD in police officers, this work shows the need to develop research that provides information that increases the knowledge about the relationship between police activity and the development of the syndrome to analyze and intervene in the factors involved in the problem.

**Chart 2.** Stress as an etiological or risk factor for the development of TMD, 2005-2014.

<b>Author, Year</b>	<b>Title</b>	<b>Type of document – Type of study</b>	<b>Objective</b>	<b>Main data on stress as an etiologic or risk factor for TMD</b>
Biasotto-Gonzalez et al., 2009 <sup>29</sup>	Quality of life in patients with temporomandibular dysfunction - a cross-sectional study	Paper – Cross-sectional	To classify TMD patients and correlate with impact on quality of life	There is a direct influence of the degree of TMD on the quality of life of the symptomatic participants
Bortolletto, et al., 2013 <sup>24</sup>	Analysis of parafunctional habits and association with temporomandibular joint dysfunction	Paper – Cross-sectional	To verify the prevalence of the most common parafunctional habits found among students and servants of the State University of Campinas (Unicamp), São Paulo, Brazil and to analyze its association with TMD in this population	Bruxism, which has one of its etiologies in stress, is a risk factor for the development of TMD
Campi et al., 2013 <sup>7</sup>	Influence of biopsychosocial approaches and self-care in the control of chronic temporomandibular disorders	Paper - Literature review	To carry out a literature review on the impact of education and simple modes of self-care on pain and dysfunction related to chronic painful TMD.	Positive results regarding the application of education and self-care methods in chronic painful TMD, contributing to the improvement of pain symptoms and discomfort.
Figueiredo et al., 2009 <sup>5</sup>	Prevalence of signs, symptoms and associated factors in patients with temporomandibular dysfunction	Paper - Cross-sectional	To analyze the prevalence of signs, symptoms and associated factors in patients with temporomandibular dysfunction.	TMD patients are afflicted with a high prevalence of signs and symptoms that can directly affect quality of life.
Goyatá et al., 2010 <sup>16</sup>	Evaluation of signs and symptoms of Temporomandibular Dysfunction among the students of the course of Dentistry of Severino Sombra University, Vassouras-RJ	Paper - Cross-sectional	To evaluate the clinical signs and symptoms of temporomandibular dysfunction among the students enrolled in the course of Dentistry of the Severino Sombra University	Correlation between emotional factors and temporomandibular dysfunction
Kuroiwa et al., 2011 <sup>30</sup>	Temporomandibular disorders and orofacial pain: a study on the quality of life as measured by the Medical Outcomes Study 36 - Item Short Form Health Survey	Paper - Cross-sectional	To evaluate the quality of life of patients with temporomandibular dysfunction and / or orofacial pain	Patients with TMD and OFP had a negative impact on quality of life due to impairment of physical and mental aspects.
Manfredi et al., 2006 <sup>25</sup>	Environmental stress and temporomandibular disorder (TMD) among members of a public university in Brazil	Paper - Cross-sectional	To identify individuals with TMD and correlate with environmental stress among members of a public university	Positive association between TMD and environmental stress

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**Chart 2.** Stress as an etiological or risk factor for the development of TMD, 2005-2014.

Author, Year	Title	Type of document – Type of study	Objective	Main data on stress as an etiologic or risk factor for TMD
Martins et al., 2007 <sup>3</sup>	Association between economic class and stress in the occurrence of temporomandibular dysfunction	Paper - Cross-sectional	To verify the association between economic class and stress with the occurrence of TMD	Economy class does not influence the occurrence of TMD, but there is a direct association between stress and temporomandibular dysfunction
Michelotti et al., 2010 <sup>28</sup>	Oral parafunctions as risk factors for diagnostic TMD subgroups	Paper - Case control	To investigate the possible association between parafunctional habits (grinding teeth and nail biting) and TMD	Teeth grinding is a significant risk factor for the occurrence of TMD
Monteiro et al., 2011 <sup>26</sup>	Relationship between anxiety and chronic orofacial pain of Temporomandibular Disorder in a group of university students	Paper - Cross-sectional	To evaluate the relationship between anxiety levels and degrees of severity of TMD chronic orofacial pain in Brazilian university students.	Possible relationship between TMD chronic orofacial pain and anxiety
Schmidt, 2007 <sup>27</sup>	Temporomandibular dysfunction associated with stress	Monography – Literature review	To show through the national and international bibliographic survey the relationship between temporomandibular dysfunction, its possible causes, signs, symptoms, diagnoses and possible treatments suggested in the literature related to stress	TMDs have multifactorial causes and are directly related to stress; they are found with higher prevalence in females.

### Factors generating occupational stress in police workers

Exposure to stressful working conditions can have a direct influence on the individual's physical and emotional health. Occupational stress is established when the job requirements do not correspond to the worker's skills, resources or needs<sup>8</sup>. Oliveira and Bardagi's study<sup>1</sup> reported psychological symptoms and, to a lesser degree, physical symptoms in military police officers diagnosed with stress, which, according to the authors, may be related to insecurity with the professional career that, in turn, results from a context of vulnerability in which military activity is inserted. In Italy, a study found an association between organizational issues of police work and emotional exhaustion/cynicism among workers,

as well as between operational issues and psychosomatic symptoms<sup>35</sup>.

The environment, pressure and police work discipline mechanisms can hinder the relationship between colleagues and bosses, becoming agents of stress<sup>17,20-22</sup>.

Factors triggering stress in Brazilian police officers are also cited by police officers from Italy<sup>35</sup>, India<sup>36</sup>, Malaysia<sup>37</sup>, Australia<sup>38</sup> and the United States<sup>39</sup>, corroborating studies indicating that due to direct and constant contact with danger and violence, as well as by the in situations of conflict and tension, the police officers are the workers with the highest level of exposure to stress<sup>20,21,23</sup>, regardless of their country of residence. However, the number of police officers killed in Brazil is significantly higher when compared to developed and non-violent countries (Table 2), which

**Chart 3.** Stress as a risk factor for the development of TMD in a study population of police workers.

Author, Year	Title	Type of document – Type of study	Objective	Principal findings on stress as a risk factor for TMD in police officers
Caria et al., 2014 <sup>23</sup>	Efficiency of occlusal splints on police officers with TMD	Paper – Cross-sectional	To evaluate the effect of two occlusal splints on different police officers with TMD	Police officers are highly likely to develop chronic diseases and disorders such as TMD because they are exposed to extremely high levels of stress
Carvalho et al., 2008 <sup>33</sup>	Association between bruxism and stress in military police	Paper – Cross-sectional	To measure the prevalence of bruxism and stress in military police officers and their possible association	Citation of a study that related bruxism, biopsychosocial symptoms (stress, sleep disorders and pain symptoms) and smoking to TMD symptoms
Cavalcanti et al., 2011 <sup>32</sup>	Degree of severity of temporomandibular dysfunction and parafunctional habits in military police officers	Paper – Cross-sectional	To estimate the occurrence of TMD and its degree of severity, as well as the presence of parafunctional habits in a population of non-patients represented by military police officers	Significant association between temporomandibular dysfunction and parafunctional habits of grinding or clenching teeth and biting objects (linked to stress)
Faria, 2006 <sup>31</sup>	Clinical and electromyographic evaluation of chewing muscles in military police with TMD, before and after the use of inter-occlusal devices	Dissertation – Cross-sectional	To investigate, through clinical and electromyographic examination, the behavior of the temporal, masseter and suprahyoid muscles in Military Police Officers of the 18th Military Police Battalion of the State of São Paulo, with myogenic or mixed TMD, before and after use of different inter-occlusal devices for four weeks	High incidence of TMD in military police officers, more frequent in women
Graciola e Silveira, 2013 <sup>34</sup>	Evaluation of the influence of stress on the prevalence of temporomandibular disorders in the state military of Rio Grande do Sul	Paper – Cross-sectional	To verify the influence of a professional activity seen as quite stressful, as is the case of military police officers, and its correlation with the prevalence of temporomandibular dysfunction	Medium correlation between TMD and stress

suggests a situation of vulnerability, generating a high degree of stress for Brazilian workers in this professional category. Table 2 shows that, in 2015, deaths of police officers on duty in Brazil accounted for 0.03% of the total number of police workers, triple the percentage of deaths in the

United States (0.01%) and 30 times that of the United Kingdom (0.001%)<sup>40-42</sup>.

It should be emphasized that in Brazil there is an aggravation of the number of police officers (civil and military) who are homicide victims outside working hours, and the conditioning fac-



tor is the profession-related aspects. Data from the Brazilian Yearbook of Public Safety (2016)<sup>40</sup> reveal that such workers are killed almost three times more while off-duty (73.79%) than while on duty (26.21%), and that Brazilian police officers' deaths were 113% those of American police officers while on duty, between 2009 and 2015<sup>40</sup>.

The strategies used by police officers to cope with stress include symptom management (self-control, family support, leisure, exercise, support in religion and positive attitude), avoidance (separating social life from work or isolating oneself), efficient behaviors at work (assuming, organizing and distributing tasks, solving problems without delay, seeking information and doing the best they can)<sup>17,20</sup>. Absenteeism can also represent a strategy for coping with stress at work, with leave meaning a "day of mental health" or a change in the stressful routine<sup>39</sup>.

According to Minayo et al.<sup>22</sup>, as a result of aging, police officers accumulate effects associated with work stress, such as inadequate behavior, alcoholism, uncontrolled gambling, aggressive behavior, increased exposure to accidents, anxiety, insomnia, emotional outbursts and various types of chronic pain. This result shows the importance of the fight against stress to avoid the risk of increasing damages to the quality of life and health of police workers.

For the improvement of pain symptoms and discomfort, Campi et al.<sup>7</sup> reported a positive approach to adopting approaches based on the biopsychosocial model of pain, through the application of educational methods and self-care in TMD.

Dåderman and Colli<sup>43</sup> have recommended a greater focus of salutogenesis in research on workplaces with a high level of occupational stress since the enhanced forces opposing the disease stimulus could prevent the sickness of workers undergoing this type of condition.

### **Stress as an etiological or risk factor for the development of temporomandibular joint dysfunction syndrome**

TMD is a multifactorial etiology syndrome, and stress is pointed as one of these factors. Studies have found a direct relationship between stress and TMD<sup>3,16,27</sup> since the syndrome is closely related to stressors such as depression, sleep disorder, psychiatric problems<sup>27</sup> and anxiety<sup>16,26</sup>. In fact, the influence of stress does not occur only on the appearance of the disease, but also its progression and treatment<sup>44</sup>. In this context, the

**Table 2.** Police officers killed on duty in relation to the total workforce - Brazil, United States and United Kingdom - 2015.

Country	Police officers - 2015	
	Total workforce	Deaths while on duty
Brazil	256,053	91 (0.03%)
United States	402,978	41 (0.01%)
United Kingdom	207,140	4 (0.001%)

Sources: FBSP<sup>40</sup>; United Kingdom's National Police Rollof Honour<sup>41</sup>; GOV.UK<sup>42</sup>.

assessment of TMD patients must consider the influence of psychological factors<sup>45</sup>.

However, it is not a matter of fact that the mere presence of stress can sufficient to generate the occurrence of TMD. Studies indicate that, usually, a single factor alone is not sufficient to establish a TMD condition, but that the association between factors may converge to the development of some signs or symptoms of the syndrome<sup>7,25,27,46</sup>.

Therefore, stress associated with intrinsic etiological (pathologies, bad joint formations, bad muscular formations) or extrinsic (occlusal problems, mechanical trauma, orthodontic treatments, accidents) factors can generate a functional imbalance in the biodynamics of TMJ and leave the individual predisposed to the onset of TMD<sup>3,46</sup>.

There is controversy over the role of dental malocclusion<sup>47,48</sup> and orthodontic treatment<sup>49-51</sup> in the development of TMD. Thus, it may be appropriate to suggest that the development of future research on the relationship between stress and TMD should exclude from its study population those individuals who may have orthognathic issues or who have undergone orthodontic treatment.

It should be noted that TMD compromises the quality of life and general health of the individuals affected by the problem<sup>5,7,29</sup>, although many are not aware of the presence of the disease and the existence of treatment<sup>32</sup>. Thus, the individual patient must be evaluated and treated by a suggested multidisciplinary that consists of dental surgeons, psychologists, speech therapists, physiotherapists and neurologists, so as not to fragment health actions, due to the anatomical and functional complexity of the stomatognathic system (consisting of bone structures, temporomandibular joint, ligaments and masticatory muscles, glands and nerve and lymphatic vascular systems, as well as teeth and their structures)

that, although with characteristics of its own, can influence and is influenced by the nervous, digestive, respiratory, circulatory and endocrine systems, for example<sup>52</sup>. According to the proposal of Kuroiwa *et al.*<sup>30</sup>, providing comprehensive actions and better treatment to the individuals would improve their quality of life.

#### **Stress as a risk factor for the development of temporomandibular joint dysfunction syndrome in police workers**

Parafunctional habits such as bruxism (teeth grinding or tightening)<sup>24,26</sup> and nail gnawing<sup>25</sup>, whose contributing factor to their etiology is stress, are risk factors for the development of TMD, as shown in studies with police officers conducted by Carvalho *et al.*<sup>33</sup> and Cavalcanti *et al.*<sup>32</sup>.

Research by Graciola and Silveira<sup>34</sup> found that the military police profession is related to the higher prevalence of TMD and a higher level of stress, and that there is a positive correlation between these events. A study by Faria<sup>31</sup> found a high incidence of TMD in the group of participating military police, especially in women. In Turkey, police were part of a study on the prevalence of TMD symptoms, in which the stress of the profession was cited as responsible for the high frequency of symptoms evidenced by this professional category<sup>53</sup>.

Caria *et al.*<sup>23</sup> pointed out that, because they are exposed to very high levels of stress, police workers are part of the professional category most likely to develop chronic diseases and disorders such as TMD.

Oliveira and Bardagi<sup>1</sup> highlighted the importance of attention and emotional control in the performance of police activity, requirements corroborated by Minayo *et al.*<sup>22</sup> when pointing out the police officer's concern to be always alert. Hilgenberg<sup>6</sup> mentions the incidence of dizziness/vertigo in patients with TMD, a condition that, according to Hueb and Feliciano<sup>54</sup>, destabilizes the posture and position of the individual affected by the problem. Therefore, it is possible to assume that TMD patients may have difficulty concentrating and making decisions, as well as suffering from physical balance and spatial disorientation disorders, conditions that would pose a significant danger to the life of the police workers during the exercise of their profession and to the population to whom they must protect.

#### **Final considerations**

Several sources of stress related to police activities were identified. These sources range from those directly involved in police work, such as the risk of death, pressure and responsibility inherent to the work, to those linked to the corporation's infrastructure, such as overloading and accumulation of tasks due to insufficient staffing and work organization, as well as inadequate facilities, equipment and systems made available for the implementation of the service.

This study could observe that stress exerts influence both in the development of TMD and in the aggravation of its symptoms, but that stress alone is not enough to generate alterations in the health of individuals. The onset of the syndrome depends on the association with other factors such as the individual's emotional capacity to deal with stressors, the accumulation of stressors or the inclination to develop specific pathologies.

Since there is a relationship between stress and development of TMD, and also the presence of several stressors in the police work, we can suppose that there is a relationship between stress in these activities and the risk of police workers developing TMD.

The TMD theme in police workers does not have scientific literature that can contribute significantly to the mitigation of the problem. Thus, we suggest developing specific studies on the subject, favoring the triangulation of methods (qualitative and quantitative approaches)<sup>55</sup>, and the use of different techniques for data collection and analysis, including diagnostic data (physical and imaging tests).

In the quantitative approach, we consider that research on the relationship between occupational stress (organizational and individual stressors) and TMD in police workers can use, for example, a control group, and should exclude from their study population individuals who may have orthognathic problems or are submitted to orthodontic treatment, among others. As an example of qualitative approach techniques, we suggest the (coupled or not) use of individual interviews and mutual interactions (focus group technique) to understand the contexts and the apprehension of feelings towards a specific phenomenon, theme or environment.

Based on the review, the compromised quality of life and general health status of individu-

als with TMD are underscored. We argue that studies on the subject, even if they do not allow a cause-and-effect relationship between the variables studied, may contribute to the non-fragmentation of health actions directed at this pathology, particularly concerning the anatomical and functional complexity and possible emotional damage involved.

### **Collaborations**

G Urbani was responsible for researching and writing the article, LF Jesus was responsible for the methodology and writing of the article, EM Cozendey-Silva was responsible for the methodology and final review.

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## ERRATUM

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