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Prevalence of craniomandibular disorders in orthodontic pediatric population and possible interactions with anxiety and stress

ABSTRACT

Aim *To analyse the presence and prevalence of gnathologic problems in a sample of children, candidate for orthodontic treatment, and evaluate the relationship between psychological factors and gnathological problems. The purpose of this study was also to evaluate a simple protocol with specific psychological test and a questionnaire for the rapid diagnosis of gnathologic problems, useful for possible screening studies on a wider population.*

Materials and methods *Study Design: Observational, cross-sectional study. Among the patients coming for a first orthodontic evaluation 106 children, aged between 8 and 16 years, were examined. A complete orthodontic evaluation was performed in all patients; the RCMAS (Revised Children's Manifest Anxiety Scale) was used in the study to test the psychological condition, while the selected test for the diagnosis of gnathologic problems was the Fonseca Test. The prevalence of temporomandibular disorders (TMD) was evaluated with descriptive statistical analysis, and the eventually present correlation with a positive psycological test for anxiety has been evaluated with correlation parameters: χ^2 test of Pearson, and Cramer's V index.*

Results *The mean age of the children was 10.74 years. Females accounted for 55.66% of the total compared to 44.34% males. Signs and symptoms of TMD were present on average in 82% and 32% respectively. A remarkable amount of children also showed signs of psychological problems, mostly represented by anxiety. Positive correlation resulted between TMD (Fonseca scores) and increased overbite. Cross-correlations have been obtained, tested with Pearson χ^2 test and Cramer's V index, between level of anxiety, muscle pain on palpation, bad habits, and headache. The Class II subdivision molar class and altered canine relationship have been related to the presence of articular noise.*

Conclusions *The protocol largely respected the need for speed of administration, comprehensiveness and reliability that we set out to achieve. Limited correlations have been assessed between occlusal conditions and positivity to the administrated tests. Further studies are desirable to increase the sample population.*

Keywords *Anxiety; Fonseca; Temporomandibular disorders; RCMAS.*

Introduction

Many studies have been conducted on Temporomandibular Disorders (TMD), especially in the last 10 years. In 1996 the conference of the National Institute of Health (NIH) established that TMD have upon a multifactorial aetiology: muscular, occlusal, bone-related, postural and psychic factors are involved in the initial input and in the evolution of the condition [NIH, Conference Statement 1996]. The literature shows that there is not a single TMD study model, available for the paediatric population, that allows for a quick and easy evaluation of such population.

The present study focuses on those patients who have not yet completed the growth process and therefore can be still considered in the paediatric age.

Prevalence studies have shown that symptoms of TMD increase with age, with a peak of incidence in middle age [LeResche, 1990; De Kanter, 1992; Egermark et al., 2001]. According to the most recent literature, the prevalence of TMD in the general population varies between 12-60%. The prevalence

of temporomandibular disorders in children and adolescents varies between 6-68%; this lead us to consider that about 1/3 of the population is affected [Bonjardim et al., 2005, Köhler et al., 2009] . This wide range depends on the different diagnostic criteria used, and the different clinical examination performed. Aepidemiological studies show a higher frequency and severity of TMD in females than in males. It would seem that TMD is 4 times more frequent in women, with a need for treatment 3 times higher than males [De Kanter, 1992; Ballanti et al., 2013]. However, studies on the importance of the interaction between TMD and psychological aspects of personality have attracted great interest. Psychological factors have joined the aetiology of TMD, while remaining yet unclear their mechanism of action [Slade et al., 2007].

TMD diagnosis criteria consider the different clinical aspects of the disease, such as pain experience, in order to classify characteristics, severity and psychological aspects of the disease, especially in more severe cases, potentially disabling for the subject. However, sometimes the classification system RDC/TMD, later defined as DC/TMD, may conduct to multiple diagnoses [List et al., 1999; Schiffman et al., 2014].

The psychological aspect plays an important role as initiating and perpetuating factor of TMD. A distinctive personality tract can be identified, related with the chronic pain experience [Manfredini et al., 2005]. As initiating factor, the role acted in the pediatric population seems to be, for this reason, particularly interesting, as it is attested that children and adolescents are not immune to the stress factors [Kuch et al., 1979;Restrepo et al., 2001, 2008]. The most frequent signs and symptoms of TMD are: sounds of TMJ, reduced joint mobility, limitation of mouth opening, preauricular pain, facial pain, headache, pain and soreness during function. The prevalence of signs is estimated between 33-86%; the incidence of symptoms varies from 16-59% [LeResche, 1990].

The purpose of this study was therefore to assess the prevalence of gnathologic problems in a sample of children coming to observation for orthodontic evaluation at the Unit of Orthodontics of the Department of Oral Sciences, "Sapienza" University of Rome (Italy) and to investigate their relationship with the presence and relevance of psychological problems, assessed with the aid of a specific questionnaire.

Another aim of the study is the validation of the proposed medical chart with the clinical characteristics of speed, ease of use and completeness, suitable for large-scale studies.

Materials and methods

From an initial sample of 150 patients, sequentially presented at the unit of Orthodontics of the Department of Oral and Maxillofacial Sciences, "Sapienza" University of Rome, between March and June 2014, 106 patients aged between 8 and 16 years old were selected. Exclusion criteria were previous orthodontic treatment, the presence of systemic disease, syndromes or craniofacial malformations, age outside of the inclusion criteria.

All the patients were subjected to medical history recording and complete orthognatodontic clinical examination; to all of the subjects two specific investigation questionnaires were administered. The medical form consisted of two sections. In the first part, filled by the clinician, personal data, intra- and extra-oral examination, functional and gnathological tests are included. The second section, filled by the patient, investigates oral bad habits, parafunctions, sports played, musical instruments played, eye problems. To investigate the presence and level of anxiety and the presence and gravity of TMD, two self-report questionnaires were administrated to the patients: the RCMAS (Revised Children's Manifest Anxiety Scale) and the Fonseca questionnaire (Fig. 1, 2).

The RCMAS, also called "What I think and feel", is a self-report questionnaire of 37 dichotomous items used to assess anxiety symptoms in children and adolescents between 6 and 19 years old. It consists of 4 subscales (factors) devised to obtain more information on the subject: physiological anxiety (10 items); worry - oversensitivity (11 items); social concern and concentration (7 items); social desirability or lie scale (9 items) [Mattison et al., 1988; Wilson et al., 1990; Muris et al., 2002; Santaniello et al., 2006].

The questionnaire proposed by Fonseca in 1992 is used to classify the severity of TMD [Bevilaqua-Grossi et al., 2006; de Santis et al., 2014]. It consists of 10 items with three possible answers: yes, no and sometimes; it considers the presence of pain in the head and neck during mastication; it also records data about parafunctions, temporomandibular joints sounds and other symptoms related to the presence of TMD. For both the questionnaires a final score is elaborated on the basis of the answers obtained. Adaptation for use in children and for the Italian language has been performed for the readability and then checked by the use of specific readability indices for the Italian language (GULPEase) [Lucisano et al., 1988].

All the subjects were examined by two experienced examiners, and the time needed to completely fill the charts included in the protocol was also recorded. On a random base some subjects were evaluated twice from both examiners to ensure corrected conduction of the exam. To quantify the measurement error, numeric data were evaluated with the Dahlberg's method, with a not significant result.

Statistical analysis was performed to evaluate any correlations between TMD and anxiety, and to validate the proposed protocol. The χ^2 test of Pearson, PR

Revised Children's Manifest Anxiety Scale (RCMAS)		
I'm going to read some sentences that tell how some people think and feel about themselves. Say "Yes" if you think it is true and "No" if you think it is NOT true of you. There are no right or wrong answers. Only you can tell us how you think and feel about yourself (right now)		
I often have trouble making up my mind	Y	N
Others seem to do things easier than I can		
I like everyone I know		
Often I have trouble getting my breath		
I worry a lot of the time		
I am afraid of a lot of things		
I am always kind		
I get mad easily		
I worry about what my parent will say to me		
I feel that others do not like the way I do things		
I always have good manners		
It is hard for me to get to sleep at night		
I worry about what other people think about me		
I feel alone even when there are people with me		
I am always good		
Often I feel sick in my stomach		
My feelings get easily hurt		
My hands feel sweaty		
I am always nice to everyone		
I am tired a lot		
I worry about what is going to happen		
Other people are happier than I		
I tell the truth every single time		
I have bad dreams		
My feelings get easily hurt when I am fussed at		
I feel someone will tell me I do things the wrong way		
I never get angry		
I wake up scared some of the time		
I worry when I go to bed at night		
It is hard for me to keep my mind on my school work		
I never say things I shouldn't		
I wiggle in my seat a lot		
I am nervous		
A lot of people are against me		
I never lie		
I often worry about something bad happening to me		

FIG. 1 The psychological tests RCMAS (Revised Children's Manifest Anxiety Scale), 1978. The scale is subtitled "What I think and feel" and it consists of four subscales: 1. Physiological anxiety, 2. Worry anxiety – Hypersensitivity, 3. Social anxiety, 4. Social desirability bias.

(Probability of Association) and the Cramer's index were used to calculate the correlation between the variables, setting the level of significance at p= 0.005.

Results

The mean age of the subjects was 10.8 + 2.3 years, most of whom were concentrated in the age group 8-12

Fonseca's questionnaire	Y	N	sometimes
1- Is it hard for you to open your mouth?			
2- Is it hard for you to move your mandible from side to side?			
3- Do you get tired /muscular pain while chewing?			
4 - Do you have frequent headaches?			
5- Do you have pain on the nape or stiff neck?			
6- Do you have earaches or pain in craniomandibular joints			
7- Have you noticed any TMJ clicking while chewing or when you open your mouth?			
8- Do you clench or grind your teeth ?			
9- Do your feel your teeth do not articulate well?			
10- Do you consider yourself a tense (nervous) person?			

FIG. 2 The Fonseca questionnaire consists of 10 items for the evaluation of the presence of TMJ pain, pain in the head and/or shoulders, pain during chewing, parafunctions, limitation of motion, joint sounds and perception of emotional stress. The questionnaire has been further adapted in the Italian translation, to improve legibility, using GULPEase index.

years, with a peak frequency (22 subjects) at the age of 8 years. Female were the 55.66% of the total, males 44.34%. The distribution of the patients per dental class is the following: 50.7% Class I, 37.98 % Class II, and 9.06% Class III, while in the remaining 2,24% of the patients the dental class was not clear (Fig. 3). The overall number of subjects with at least one sign or symptom of TMD was of 86.79%. Afterwards the percentage of either sign or symptoms was separately calculated: 82.07% of the subjects presented at least one sign, while 32.07% presented at least one symptom. With regard to the incidence in the two sexes, the 88.13% were females, 85.10% were males. The 39% of the females has a symptom present, compared with 23% of males. Among those who had at least one sign, females were 67% versus 33% of males (Fig. 4).Among these sign and symptoms the most present are muscle soreness upon palpation and headache. Analysis of pain upon palpation showed that the muscle with the highest frequency of soreness is the lateral pterygoid, followed by the masseter, tested at the level of the mandibular angle. Regarding the symptoms, headache is definitely present among this paediatric population; it mostly occurs once a month, while 30% of the sample shows a frequency of at least once a week. Localisation is predominantly unilateral (Fig. 5). Moreover the 67.9% of the sample reported bad habits, of these 59.72% were females. The 46.27% of the patients reported being bruxer or clencher.

The distribution of the score obtained by the RCMAS scale was evaluated either dividing the subjects into 4 groups (slightly anxious, very anxious, mildly anxious,

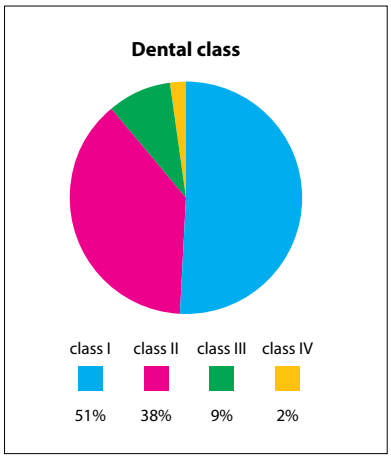


FIG. 3 Distribution of the patients per dental class: 50.7% Class I; 37.98% Class II and 9.06% Class III; in the remaining 2.24% the dental class was not clearly detectable.

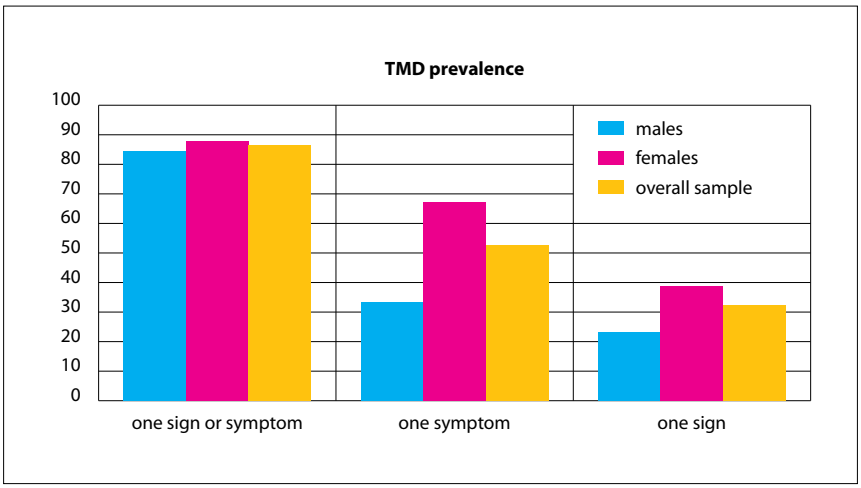


FIG. 4 Prevalence of TMD signs or symptoms in the sample.

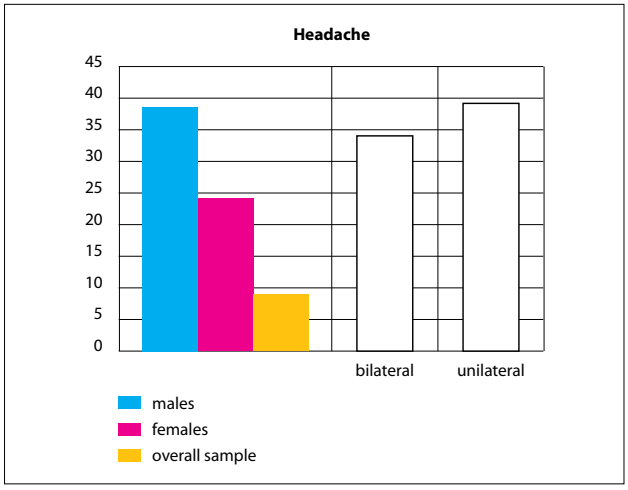


FIG. 5 The total number of subject suffering of headache is 71. The occurrence of 1once a month is the more frequent, but 30% of the positive subjects suffers of headache at least once a week. The headache was unilateral or bilateral. The total number of subjects reporting unilateral/bilateral pain is higher than the total of subjects suffering of headache because of the frequent indication of both localisations.

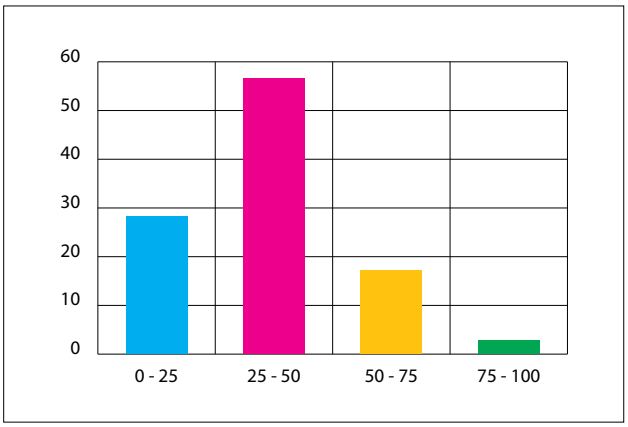


FIG. 6 Distribution of RCMAS score divided into four groups: the range between 0 and 25 indicates the absence of anxiety, between 25 and 50 mild anxiety, between 50 and 75 moderate anxiety, and 75 and 100 a high level of anxiety.

slightly or non anxious) of equal amplitude and divided by gender and reported to 100 for total affirmative responses, or analysing the result by the subscales, Physiological Anxiety, Worry-Oversensitivity, Social Concern and Concentration, Lie Scale (Fig. 6). The number of females in the groups "slightly anxious" to "very anxious" is always higher than that of males (Fig. 7).

Cross-correlations between level of anxiety, muscle pain on palpation, bad habits, and headache were tested with χ^2 test and Cramer's index.

Among the patients with an RCMAS score greater than 50, 78.95% had pain on palpation of the lateral pterygoid, 57.90% of the masseter and 36.84% of the temporalis muscle. Patients with recurrent headache (3 times per week) and RCMAS score higher than 50 were the 30.3% (Fig 8). The analysis of the correlations showed in all cases a χ^2 and Cramer's index with a level of significance of $p < 0.001$.

The analysis of the Fonseca index showed that 46.23% of patients scored between 0 and 15; 45% between 20 and 40; 38% between 45 and 65 and 0.94% between 70 and 100. The 14.29% of patients with joint sounds had a score greater than 45 and 64.29% (Fig. 9). Among the occlusal variables significant correlations have been found between the Class II subdivision molar class rand articular noise (χ^2 value of 243.03, p= 0 and a Cramer's index= 0.5353) and canine class and articular noise (χ^2 value of 139.56, p< 0.001 and Cramer's index= 0,5717) with a high level of significance. The correlation between the distribution of overbite and muscle pain on palpation was not significant (Fig. 10).

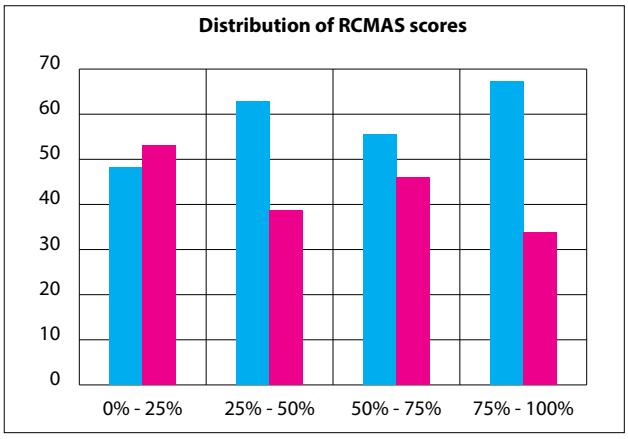


FIG. 7 Distribution of the RCMAS scale score broken down in groups and displayed according to the number of males (red) and females (blue) in each group. The number of females ranging from slightly anxious to very anxious is always higher than males.

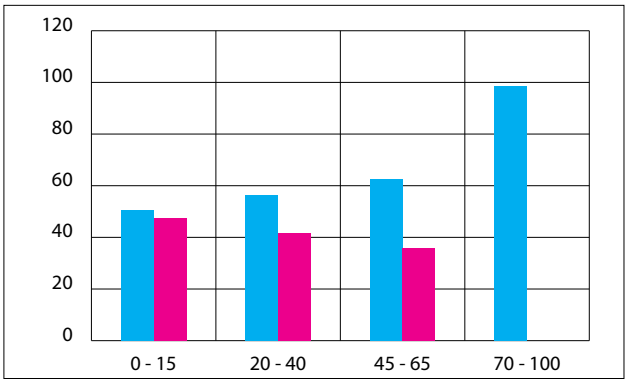


FIG. 9 Distribution of Fonseca index in the four scores, divided between males (red) and females (blue).

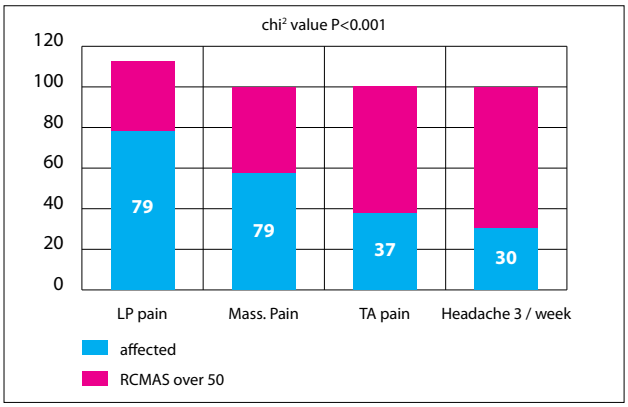


FIG. 8 Prevalence and correlation between anxiety (RCMA over 50) and muscle pain and recurrent headache. The correlations analysis showed in all cases a χ^2 value $p< 0.001$

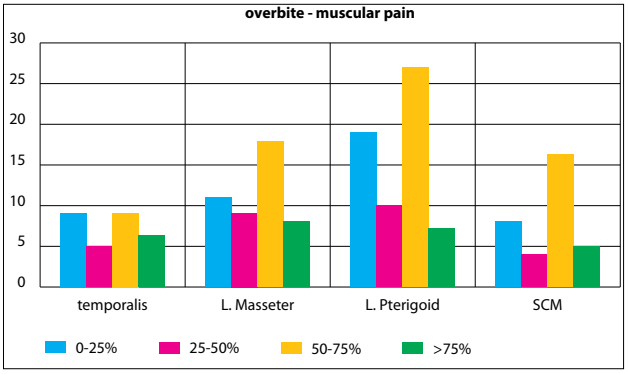


FIG. 10 Distribution of the overbite measurement in the subjects with muscle pain upon palpation.

Discussion

The purpose of this study was to evaluate the prevalence of gnathologic problems in children, presented at the visit for an orthodontic evaluation, and the possible correlations with anxiety and stress. The lack of uniformity of approach found in the literature and the complexity of diagnostic protocols used [Wahlund et al., 2003] suggested to develop a rapid diagnostic protocol for use in large-scale studies.

Monitoring the population ignoring the paediatric age group would distort the extent of the current problem and therefore what might need to be addressed in the future. The limited number of studies on the paediatric population motivated the choice of the sample of the present study. The age group of choice ranges from 8 to 16 years. This allows study patients with erupted first molars, a stable and predictable molar class, able to interact with the operator in an independent manner, without the need of a parental figure.

The first part of the diagnostic protocol used in this study was based on the literature, so the most commonly used and studied aspects of the disease, and the gold standard of each parameters, have been included in the questionnaire, to allow for a thorough and complete analysis [Tecco et al., 2011, Oliveira de Santis et al., 2012]; dysfunctional clinical signs were recorded: joint sounds, limitation of mandibular movements, joint and muscle soreness. The most frequent subjective symptoms analyzed were: headache, noise in the joint, bruxism, difficulty in opening the mouth, jaw and facial pain. Signs and symptoms were separately analysed according to the source: articular origin or muscular origin, considering the different incidence between various muscles and their distribution by gender. About 40% of the healthy population has at least one TMJ symptom, while other studies report 16-59% [Bonjardim et al., 2005].

The American Academy of Orofacial Pain (AAOP) states that headache may be secondary to a TMJ dysfunction or to the implication of other stomatognathic component, most commonly represented by muscles.

The headache is usually a dysfunctional tensive pathology, one-sided, often with temporal localisation extending to the periorbital and occipital areas; it lasts

from a few hours to the whole day, and is negatively affected by stress [Celic et al., 2002]. On the basis of these considerations, headache was investigated by frequency and location, and then possible correlations with TMD have been searched.

Signs of pain during opening and closing the mouth have been investigated, since joint pain is dependent on a joint dysfunction and can be continuous, or dependent on jaw movements and/or direct stimulation of capsular inflamed tissues [da Silva et al., 2016].

Details on any muscle pain were recorded: duration of pain, pain or muscle soreness in the morning, nocturnal parafunctions, pain during meals or chewing. Different pain localisations were analysed. Muscle pain is closely related to emotional factors, so that stressful situations can cause the onset, exacerbation and chronicity of the condition [Celic et al., 2002]. For this reason, the correlation between TMD signs or symptoms and anxiety or stress has been studied [Lavigne et al., 2008;Tanboga et al., 2014].

Questions about type and frequency of sport practiced and musical instrument played have been included in the questionnaire. The literature report in fact that sports where physical contact is possible can cause TMJ trauma, and increase tension on teeth, joints and muscles [Steed et al., 2001]. Wind instruments, when played for hours, can cause the unnatural posture of tongue and jaw, and negatively influence muscles and bones of the TMJ area, especially in a growing patient [Amorim and Jorge, 2016]. No significant correlations were found in the present study.

Bad habits and parafunctions were detected, particularly bruxism, as it is usually related with psychological disorders (anxiety and increased susceptibility to stress). Studies on children bruxism are limited, dated and not validated. Restrepo et al. [2001, 2008] highlights a strong correlation between anxiety, tense personality and bruxism, and states that these components, during adolescence, may lead to the development of bruxism as parafunction. Hence, our findings about high levels of anxiety in bruxist children are in line with the literature.

For the evaluation of the anxiety level, the need for ease of administration and understanding – due to the age range of the sample - have guided the choice of the methodology and the questions to use. Both in research and clinical practice, the most widely used questionnaires are self-report. They are easy to administer, do not require much time and can be used in different setting, on a large scale and provide important information on children. They are also important aids for development and implementation of prevention programmes (secondary and tertiary) and for the measurement of anxiety symptoms [Muris et al., 2002; Bevilaqua-Grossi et al., 2006]. On the other hand different questionnaires used in other studies, require too much time to be administered and too long timeframes to be anlyzed; therefore they are not suitable to be included in a routine clinical evaluation, making their use impossible in a standardised protocol, or for large-scale studies.

According to several authors, the onset of most anxiety disorders occurs in early age, usually during childhood or adolescence. Hence the need to identify, as soon as possible, those patients to prevent adverse consequences for the masticatory apparatus. Studies reported in the literature on the effects of anxiety disorders are mainly on adult populations, so that the results of the present study cannot be easily compared with the literature.

Estimation of anxiety is a very complex task that cannot be completed with a single test. The RCMAS scale has proved efficient in measuring anxiety disorders, but it cannot be used alone [Mattison.et al., 1988; Wilson et al., 1990; Muris et al., 2002]. Results should be carefully reviewed and integrated with information from other sources [Kafas and Leeson, 2006].

The Fonseca questionnaire was deemed the most suitable test to evaluate the presence and severity of TMD, because validated and used in several studies. The test has been evaluated on patients with TMD, showing a correlation of 95% when compared to the Helkimo's anamnestic index population [Bevilaqua-Grossi et al., 2006; de Santis et al., 2014]. In our sample the understanding of the test was good, even by young patients. Only 10% of the children required explanation of at least one question. Longer administration times would detract from the purpose of formulating a valid protocol for large-scale studies. The average completion time of the questionnaire was as follows: 3 minutes for the first part, and 5 minutes for the second.

Results of muscle pain on palpation (Lateral Pterygoid with the highest positive response level), are in agreement with the literature [de Silva, 2016].

The percentage of subjects with articular noise is 26.41%, higher compared to that found in the literature.

Pain was in line with the literature, approximately 32%, with a female predominance.

Important correlation trends were found between pterygoid and masseter muscles pain and anxiety. The temporalis and the sternocleidomastoid muscles pain, show a lower correlation with anxiety and headache. The percentage of patients suffering from headache 30.3% for those subjects with "moderate" or "severe" levels of anxiety.

Conclusions

From the results of the study, that evaluated the presence of TMD in an orthodontic paediatric population, it can be stated that the research substantially produced the expected result of elaborating a simple, reliable

and cost-effective screening procedure. The protocol proved easy to understand and use and the correlation of some signs and symptoms was clinically significant, although with some limitations of the sample, i.e. the low number of subjects and the fact that they required orthodontic treatment; the conclusions are therefore valid for this population and cannot direcly be extended to the general population. The questionnaire met the initial expectations and proved to be easy to use in the age range studied, respecting the need for speed in administration and completeness of the information gathered, both in clinical practice and as a diagnostic tool on large-scale studies, able to highlight possible correlations between signs and symptoms of TMD and anxiety and stress. Our results shows that females have higher levels of anxiety and muscle pain.

The TMD patients with high or medium anxiety levels are 11.32%, while subjects with joint sounds reach 26.41%. These values are slightly higher than those previously reported in the literature. This can be due to both the sample population and to a possible upward trend of gnathological problems in children; the causes of this increase can be traced in part to higher levels of anxiety and stress, which in the past affected mainly only the adult population.

Monitoring the paediatric population in schools and other social structures seems an important resource for monitoring and/or prevention of these disorders.

The Fonseca test should be used in sample surveys, because of its ability to highlight the macroscopic elements of the pathology, in order to suggest targeted visits to specialists for patients who need gnathological evaluation.

It would be important to increase the size of the sample because possible correlations may become visible only with the increase in the number of subjects examined. Further research would therefore be desirable.

References

› Amorim MI, Jorge AI. Association between temporomandibular disorders and music performance anxiety in violinists. Occup Med (Lond) 2016 Oct;66(7):558-63. Epub 2016 Jul 12.
› Ballanti F, Ranieri S, Baldini A, Pavoni C, Bollero P, Cozza P: Gnathological features in growing subjects Annali di Stomatologia 2013; 230 IV (3-4): 230-238
› Bevilaqua-Grossi D, Chaves TC, De Oliveira AS, Monteiro-Pedro V. Anamnestic index severity and signs and symptoms af TMD. J Craniomandibular Practice 2006;24(2):112-8.
› Bonjardim LR, Gavaio MB, Pereira LJ, Castelo PM, Garcia RCMR. Signs and symptoms of temporomandibular disorders in adolescents. Braz Oral Res 2005;19(2):93-8.
› Celic R, Jerolimov V, Panduric J. A Study of the influence of occlusal factors and parafunctional habits on the prevalence of signs and symptoms of TMD. Int J Prosthodont 2002;15: 43-48.
› da Silva CG, Pachêco-Pereira C, Porporatti AL, Savi MG, Peres MA, Flores-Mir C, Canto Gde L. Prevalence of clinical signs of intra-articular temporomandibular disorders in children and adolescents: A systematic review and meta-analysis. J Am Dent Assoc 2016 Jan; 147(1):10-18.e8. Epub 2015 Nov 6.
› De Kanter RJ, Kayser AF, Battistuzzi PG, Truin GJ, van't Hof MA. Demand and need for treatment of craniomandibular dysfunction in the Dutch adult population. J Dent Res 1992;71:1607-1612.
› de Santis TO, Motta LJ, Biasotto-Gonzalez DA, Mesquita-Ferrari RA, Fernandes KP, de Godoy CH, Alfaya TA, Bussadori SK. Accuracy study of the main screening tools for temporomandibular disorder in children and adolescents. J Bodyw Mov Ther 2014 Jan;18(1):87-91. Epub 2013 Jul 3.
› Egermark I, Carlsson GE, Magnusson T. A 20-year longitudinal study of subjective symptoms of temporomandibular disorders from childhood to adulthood. Acta Odontol Scand 2001 Feb; 59(1):40-8.
› Kafas P, Leeson R. Assessment of pain in temporomandibular disorders: the bio-psychosocial complexity. Int J Oral Maxillofac Surg 2006;35:145-49.
› Köhler AA, Helkimo AN, Magnusson T, Hugoson A. Prevalence of symptoms and signs indicative of temporomandibular disorders in children and adolescents. A cross-sectional epidemiological investigation covering two decades. Eur Arch Paediatr Dent 2009 Nov; 10 Suppl 1:16-25.
› Kuch EV, Till MJ, Messer LB. Bruxing and non-bruxing children: a comparison of their personality traits. Pediatr Dent 1979;1:182-187.
› Lavigne GJ, Khoury S, Abe S, Yamaguchi T, Raphael K. Bruxism physiology and pathology: an overview for clinicians. J Oral Rehabil 2008;35(7):476-94, .
› LeResche LVK. Epidemiology of signs and symptoms in temporomandibular disorders: clinical signs in cases and controls. J Am Dent Assoc 1990;120:273-281.
› List T, Wahlund K, Wenneberg B, Dworkin SF. TMD in children and adolescents: prevalence of pain, gender differences, and perceived treatment need. J Orofac Pain 1999; 13:9-20.
› Lucisano I, Piemontese ME. GULPEASE: una formula per la predizione della difficoltà dei testi in lingua italiana. «Scuola e città», La Nuova Italia 1988; 3- 31, marzo.
› Manfredini D, Landi N, Fantoni F, Segù M, Bosco M. Anxiety symptoms in clinically diagnosed bruxers. J Oral Rehabil 2005;32:584-588.
› Mattison RE, Bagnato SJ, Brubaker BH. Diagnostic utility of the Revised Children's Manifest Anxiety Scale in children with DSM III anxiety disorders. Journal of Anxiety Disorders 1988;2,147-155.
› Muris P, Merckelbach H, Ollendick T, King N, Bogie N. Behaviour Research and Therapy. Three traditional and three new childhood anxiety questionnaires: their reliability and validity in a normal adolescent sample 2002; 40,753-772.
› National Institutes of Health -Technology Assessment Conference Statement - Management of Temporomandibular Disorders 1996; April 29-May 1.
› Oliveira de Santis T, Jansiski Motta L, Cardoso Guedes C, Santos Z Jr, Santos Fernandes KP, Mesquita Ferrari RA, Bussadori SK. Occlusal contact in children with Temporomandibular Disorders. A pilot study. Eur J Paediatric Dent 2012; 13 (2): 97-100.
› Restrepo CC, Alvarez E, Jaramillo C, Velez C, Valencia I. Effect of psychological technique on bruxism in children with primary teeth. J Oral Rehabil 2001;28:354-360.
› Restrepo C, Vasquez L, Alvarez M, Valencia I. Personality traits and temporomandibular disorders in a group of children with bruxing behaviour. J Of Oral Rehabilitation 2008;35;585-593.
› Santaniello M, Vieno A, Pedrabissi L. Una Scala per la misura dell'ansia in età evolutiva: Contributo all'adattamento italiano della RCMAS. Bollettino di Psicologia Applicata 2006; 248:45-52.
› Schiffman E, Ohrbach R, Truelove E, Look J, Anderson G, Goulet J-P, List T, Svensson P, Gonzalez Y, Lobbezoo F, et al. International RDC/TMD Consortium Network, International Association for Dental Research; Orofacial Pain Special Interest Group, International Association for the Study of Pain. Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) for clinical and research applications: recommendations of the International RDC/TMD Consortium Network and Orofacial Pain Special Interest Group. J Oral Fac Pain Headache 2014;28(1):6–27.
› Slade GD, Diatchenko L, Bhalang K. Influence of Psychological Factors on Risk of Temporomandibular Disorders. J Dent Res 2007; 86(11):1120-1125.
› Steed PA, Wexler GB. Temporomandibular disorders – traumatic etiology vs. nontraumatic etiology: a clinical and methodological inquiry into symptomatology and treatment outcomes. Cranio 2001;19:188-194.
› Tanboga I, Durhan MA, Durmus B, Marks LAM. Temporomandibular disorders in young people with an intellectual disability: prevalence of signs and symptoms. Eur J Paediatric Dent 2014; 15 (4): 349-54.
› Tecco S, Crincoli V, Di Bisceglie B, Saccucci M, Macrí M, Polimeni A, Festa F. Signs and symptoms of temporomandibular joint disorders in Caucasian children and adolescents. Cranio 2011 Jan; 29(1):71-9.
› Wahlund K. Temporomandibular disorders in adolescents. Epidemiological and methodological studies and a randomized controlled trial. Swed Dent J 2003 Suppl.
› Wilson DJ, Chibaiwa D, Majoni C, Masukume C, Nkoma E. Reliability and factorial validity of the Revised Children's Manifest Anxiety Scale. Personality and Individual Differences 1990;11:365-369.