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Prevalence of signs and symptoms of temporomandibular dysfunction in male adolescent athletes and non-athletes

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ABSTRACT

Purpose: The aim of the study was to compare the prevalence of signs and symptoms of temporomandibular dysfunction (TMD) in male adolescent athletes—basketball players and non-athletes and to examine the association between signs and symptoms of TMD in male adolescents in different Tanner stages.

Methods: The subjects were 46 male basketball players ages 10–13 years and 41 male adolescent non-athletes ages 10–18 years selected from the Department of Pediatrics (School of Medicine, Federal University of São Paulo) as a control group. A questionnaire was used to assess the signs and symptoms of TMD. According to the answers on the questionnaire the adolescents were classified in two categories: no signs or symptoms present (score A—absent), at least one sign or symptom present (score P—present). The ones who got score "P" were submitted to a standardized functional examination of the masticatory system by the same examiner. Pubertal status was assessed based on physical examination by physicians from our Division. The adolescents were classified according to Tanner stages into three subgroups: subgroup 1 (before the growth spurt), subgroup 2 (growth spurt period), subgroup 3 (end of growth spurt). Significant differences between athletes and non-athletes were assessed using non-parametric Wilcoxon test for continuous variables and the Fisher's exact test for categorical variables. The level of significance used was 5%.

Results: There was no significant difference between the athletes and non-athletes in exhibiting at least one sign or symptom of TMD ($p = 0.1148$). When comparing the adolescents who presented at least one symptom of TMD to the different subgroups of Tanner Stages no statistically significant differences were found ($p = 0.8357$).

Conclusion: The lack of significant differences among male adolescents athletes and non-athletes may be caused by the size of the sample, the age of the athletes or by a probable protective action of testosterone levels in male athletes. The lack of statistical difference comparing the adolescents who presented at least one sign or symptom of TMD to subgroups of Tanner is probably because estrogen is the risk factor hormone and the levels of estrogen in male adolescents are very low.

1. Introduction

Temporomandibular disorders are considered a heterogeneous group of psycho-physiological disorders and for this reason are one of the most controversial issues in clinical dentistry [1–4]. Most studies of temporomandibular signs and symptoms and of temporomandibular dysfunction have been conducted on adults [5]. There has been a growing interest in treating temporomandibular disorders (TMDs) in children in recent years, and also in recognizing the signs and symptoms at an early age in order to prevent possible cranio-mandibular dysfunction in adulthood [6].

Epidemiological data suggest that sexual hormones may be important in the pathogenesis of TMD: dysfunctional symptomatology normally begins after puberty. TMD prevalence is higher in females than in males (3:1 ratio) and is lower in postmenopausal women. Estrogen therapy (oral contraceptives or estrogen replacement therapy) seems to be an important risk factor [2]. Immunohistochemical analysis also showed the presence of estrogen and progesterone receptors in the human articular disc. A study found a higher concentration of estrogen receptors in disc samples of women with signs and symptoms of TMD compared to those of asymptomatic subjects. According to the authors, the signs and symptoms of TMD may be due to the presence of these

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receptors, and specific circulating hormone levels might lead to connective tissue alterations in the TMJ disc [7].

In both clinical and research settings, the pubertal stage of a child may be more important than age alone [8]. Tanner self-ratings are particularly useful in large epidemiologic studies, where physical examination and blood sampling may not be feasible due to cost, access or psychosocial barriers. Tanner self-staging is at least as accurate as estradiol and FSH measurements alone [9].

According to data published by American Dental Association in 1990, 44–99% of temporomandibular joint (TMJ) problems are caused by trauma [10]. The risk of injury in contact sports is greater than in non-contact sports [11]. Basketball is an example of a sport with an extremely high potential for injury [12]. It has been reported that female basketball players have a 7.5% oral injury rate, which is 15 times greater than the injuries reported for men's football [13]. The athletes reported in these studies were not wearing mouthguards. There is a sevenfold increased risk of orofacial injury in athletes competing in basketball who do not use mouthguards [14].

Usually sports-related TMJ injuries are not immediately apparent. Most blows to the mandible do not result in fractures. Significant forces that are transmitted to the temporomandibular disc and supporting structures may result in severe injuries. The condyle may be forced posteriorly compressing the retrodiscal tissues. In some cases trauma to TMJ may cause intracapsular bleeding, leading to ankylosis of the joint [15].

The aim of the present study was:

- To compare the prevalence of signs and symptoms of temporomandibular dysfunction in male adolescent athletes – basketball players and non-athletes.
- To examine the association of signs and symptoms of temporomandibular dysfunction in male adolescents in different Tanner stages.

2. Materials and methods

This study was done at the Federal University of São Paulo, in São Paulo, Brazil, and was approved by the Institutional Ethics Review Board (protocol number 2052/08). Informed consent was obtained from all subjects prior to participation in the study.

2.1. Subject selection

This study comprises 46 male basketball players referred to our clinic at the Federal University of São Paulo between 10 and 13 years of age and 41 male non-athlete adolescents between 10 and 18 years of age selected from the Adolescent Medicine Clinic of the Department of Pediatrics (School of Medicine, Federal University of São Paulo) as a control group. The Adolescent Clinic is part of the Outpatient Pediatric Clinic and provides medical services for adolescents between the ages of 10–19 years.

The control group consisted of adolescents undergoing routine check-ups. None of them were athletes.

The basketball players were federated athletes training at least 1 year, for 10 h/week and regularly taking part in competitions from March to December. They were referred to the Outpatient Sport Clinic, part of the Adolescent Clinic. The Sport Clinic provides medical services to adolescents involved in sports of high performance of Olimpic Center of São Paulo in order to prevent problems in their development caused by excessive training programs. All adolescents undergoing check-ups in our Sport Clinic (that were basketball players) fulfilled the inclusion criteria, so they could be selected for the study. None of them used mouthguards. The number of high-level athletes enrolled in our clinic determined our sampling size, characterizing the choice process of the sampling unit as a convenience criterion for the study [16].

The inclusion criteria for this study group were:

- Dentition was complete.
- Demonstration of a neutral occlusion at the molars and canines according to the existing dental stage.
- Overjet from 2 to 4 mm, and overbite from 1 to 5 mm.

Subjects who were undergoing any type of orthopedic or orthodontic treatment or were suffering from systemic health disease were excluded from the study.

2.2. Measuring instrument

Complete medical and dental histories were taken from the patients and a questionnaire was used to assess the following signs and symptoms [17], jaw pain when chewing, unusually frequent headaches (more than once a week and of unknown etiology), stiffness/tiredness in the jaws, difficulty in opening the mouth wide, grinding teeth, and sounds at the TMJ. Each question was explained by the examiner, who asked all the questions verbally and in the same manner for each group.

The questions could be answered with either a "yes" or a "no".

According to the answers to the questionnaire the adolescents were classified in two categories:

- no sign or symptom present: score *A* (absent)
- at least one sign or symptom present: score *P* (present)

The ones who scored "P" were submitted to a standardized functional examination of the masticatory system by the same examiner. This was performed measuring maximal jaw movements, recording joint sounds, evaluating pain on movement of the jaw as well as tenderness to palpation of either TMJ or masticatory muscles (m. temporalis, m. masseter, m. sternocleidomastoideus, m. trapezius). The following signs were recorded: maximal opening, ear noise, opening/closing deviation. The symptoms recorded were: headache, otalgia, opening pain, masticatory

Table 1
Distribution of the subjects according to the group, questionnaire score and Tanner stage subgroups.

	Score	Group					
		Athletes		Non-athletes		Total	
		n	%	*n*	%	*n*	%
Questionnaire score	A	34	74	36	88	70	80
	P	12	26	5	12	17	20
	Total	46	100	41	100	87	100
Tanner stage subgroup	Subgroup 1	7	15	7	17	14	16
	Subgroup 2	35	76	26	63	61	70
	Subgroup 3	4	9	8	20	12	14
	Total	46	100	41	100	87	100