



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

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ABSTRACT

Objectives: To compare the prevalence of signs and symptoms of temporomandibular dysfunction (TMD) in female adolescent athletes and non-athletes and to examine the association between signs and symptoms of TMD in female adolescents in different Tanner stages.

Methods: The subjects were 89 female basketball and handball players ages 10–18 years and 72 female non-athlete adolescents ages 10–19 years selected from the Department of Pediatrics (School of Medicine, Federal University of São Paulo) as a control group. A survey was used to assess the signs and symptoms of TMD. According to the answers on the survey 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 four previously calibrated examiners. 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 for categorical variables (Chi-square and Fisher’s exact test) and for continuous variables (Mann–Whitney test). The level of significance used was 5%. There was significant agreement between raters, kappa-values (0.621–1.000) and ICC values (0.757–0.899).

Results: There was no significant difference between the athletes and non-athletes in exhibiting at least one sign or symptom of TMD ($p = 0.301$). 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 ($p = 0.124$).

Conclusion: The lack of significant differences among female adolescent athletes and non-athletes and among the subgroups of Tanner stages may suggest that although contact sports increase the risk of temporomandibular joint lesions and estrogen levels are risk factor for onset of TMD, they do not impact significantly on the onset of this disorder, when considered alone.

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1. Introduction

This study is a continuation of the article published in 2010 [1], which compared the prevalence of signs and symptoms of temporomandibular dysfunction (TMD) in male adolescent athletes (basketball players) and non-athletes and examined the association between signs and symptoms of TMD in male adolescents in different Tanner stages. In the current study, the same aspects are compared between female adolescent athletes

(basketball/handball players) and non-athletes and between female adolescents in different Tanner stages.

There has been an increasing interest in treating temporomandibular disorders (TMDs) in children in recent years, and also in recognizing the signs and symptoms of TMD at an early age in order to prevent possible cranio-mandibular dysfunction in adulthood [2].

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 (2:1 ratio) and is lower in postmenopausal women. Estrogen therapy (oral contraceptives or estrogen replacement therapy) seems to be an important risk factor [3]. Immunohistochemical analysis also showed the presence of estrogen and progesterone

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receptors in the human articular disk. A study found a greater concentration of estrogen receptors in disk samples of women with signs and symptoms of TMD compared to those of asymptomatic subjects [4]. According to the authors, the signs and symptoms of TMD may be due to the presence of these receptors, and specific circulating hormone levels might lead to connective tissue changes in the TMJ disk.

In both clinical and research settings, the pubertal stage of a child may be more important than age alone [5]. Tanner self-ratings are especially helpful 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 [6].

According to data published by American Dental Association in 1990, 44–99% of temporomandibular joint (TMJ) problems are caused by trauma [7]. The risk of injury in contact sports is higher than in non-contact sports [8]. Basketball and handball are example of sports with a great potential for injury [9]. 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 [10]. The athletes reported in these studies were not using mouthguards. There is a sevenfold increased risk of orofacial injury in athletes competing in basketball who do not wear mouthguard [11].

Sports-related TMJ injuries are usually 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 [12].

The aim of the present study was:

- To compare the prevalence of signs and symptoms of temporomandibular dysfunction in female adolescents athletes – basketball/handball players – and non-athletes.
- To examine the association of signs and symptoms of temporomandibular dysfunction in female 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 49 female basketball players and 40 female handball players (89 female athletes of contact sports) referred to our clinic at the Federal University of São Paulo between 10 and 18 years of age and 72 female adolescents non-athlete adolescents between 10 and 19 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 and handball players were federated athletes training at least 1 year, for 10 h/week and regularly taking part in competitions for 9 months of the year. 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 in order to prevent problems in their development caused by excessive training programs. All adolescents undergoing check-ups in our Sport Clinic who were basketball and handball players fulfilled the inclusion criteria. None of them wore mouthguards. The number of high-level athletes registered in our clinic determined our sampling size, characterizing the choice process of the sampling unit as a convenience criterion for the study [13].

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 survey was used to assess the following signs and symptoms [14]: 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 four previously calibrated examiners and could be answered with either “yes” or “no”.

According to the answers to the survey 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 examiners. 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 (temporalis, masseter, sternocleidomastoideus, and trapezius muscles).

Measures of pubertal stages [15] were assessed based by physical examination by physicians from our Division. The adolescents were classified into three subgroups, according to Tanner stages:

| | | |
|------------|----------------------|---------------------------|
| Subgroup 1 | B1 Stage | prior to the growth spurt |
| Subgroup 2 | B2, B3 and B4 Stages | growth spurt period |
| Subgroup 3 | B5 Stage | end of growth spurt |

The gonadal stage (breast stage) was chosen for the classification, since pubic hair growth, one of the characteristics of the Tanner stages is governed by androgenic hormones [6] and not by sexual hormones.

All of the data were evaluated using Excel (Microsoft®). Statistical evaluation of the data collected was calculated for all subjects by use of SAS version 8.2 software. Significant differences between athletes and non-athletes for categorical variables were assessed using the Chi-square test or, when necessary, Fisher's exact test (in the presence of expected values lower than 5). To compare continuous variables between groups we used the Mann–Whitney test due to absence of normal distribution of variables and small sample size. The level of significance used was 5%. To analyze the agreement between the raters, the kappa coefficient of agreement for categorical variables and intraclass correlation

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