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# Headache complaints increase the risk for temporomandibular disorder among Brazilian adolescents: A population-based study

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## INTRODUCTION

Headaches (HA) are one of the most frequent symptoms observed in children and adolescents diagnosed with temporomandibular disorders (TMD).<sup>(1)</sup> A Brazilian research with adolescents from a tertiary care center found a significant increase in signs and symptoms of TMD in those with HA,<sup>(2)</sup> similarly to what was recently observed in adults.<sup>(3)</sup>

Although the association between HA and TMD has been studied in adolescents, results are not yet conclusive,

in part because of methodological design. Indeed, there is a lack of studies in population-based samples, and in most cases, TMD pain characteristics are not explored deeply.

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## AIM

The aim of the present study was to verify if headache complaints (HAc) are associated to TMD diagnosis and pain characteristics, by using standardized methods of sampling and data collection in a population-based sample of adolescents.

**MATERIALS AND METHODS**

The sample consisted of public school students, 12 to 14 years age, from Araraquara - SP, Brazil. Overall, 24 public schools were visited and 3,117 adolescents were invited to participate of the present study.

This study received full approval of the Research Ethic Committee of Faculdade de Odontologia de Araraquara, UNESP – Universidade Estadual Paulista (process # 70/10).

The Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD)<sup>(4)</sup> Axis I (intra-examiner kappa values 0.529-0.884) and questions #3 (Have you had pain in the face, jaw, temple, in front of the ear or in your ear in the past month?), #4 (How many time did your facial pain begin for the first time?), #14 (Have you ever had your jaw lock or catch so that it won't open all the way) and #18 (During the last six months have you had a problem with headaches or migraines? - kappa = 0.688) of Axis II questionnaire were used to collect data.

**RESULTS**

The sample consisted of 1,307 individuals, 56.8% (n=742) girls. Among them, 80.7% (n=599) already presented menarche, mean age was 12.72 years. Overall, 397 (30.4%) adolescents were diagnosed with TMD and 595 (45.5%) presented HAC.

Comparing to boys, girls showed higher risks for presenting both, TMD and HAC (Relative Risk (RR) = 1.39; 95% Confidence Interval (CI) = 1.15-1.67), significantly those with menarche (1.38; 1.16-1.66) (Table 1).

Individuals reporting HAC presented higher risks for TMD (1.88; 1.62-2.17). The risk was particularly significant for painful TMD diagnosis (1.51; 1.40-1.62) (Table 2).

Regarding TMD painful subtypes, risks were higher for combined (muscle and joint) painful TMD (1.24; 1.18-1.31), followed for muscle TMD (1.23; 1.16-1.30) and joint TMD (1.04; 1.01-1.07) (Table 3).

Considering chronicity, not only HAC slightly increased the risk for acute TMD pain (1.09; 1.05-1.14), but also

Table 1. Risk for TMD and HAC stratified per gender and menarche

TMD/ HAC groups	Gender / menarche							
	Boys n (%)	Girls Overall n (%)	RR (95% CI)	Girls (-) menarche n (%)	RR (95% CI)	Girls (-) menarche n (%)	RR (95% CI)	Total n (%)
-TMD	282	296	(ref.)	55	(ref.)	241	(ref.)	578
-HAC	(49.9)	(50.1)		(38.5)		(40.2)		(40.2)
+TMD	62	72	1.054	15	1.039	57	1.035	134
-HAC	(11.0)	(89.0)	(0.8627-1.289) p=0.6320	(10.5)	(0.9221-1.171) p=0.5027	(9.5)	(0.8561-1.251) p=0.7603	(10.3)
-TMD	129	203	1.256	47	1.142	156	1.191	332
+HAC	(22.8)	(77.2)	(1.071-1.472) *p=0.0045	(32.9)	(1.032-1.263) *p=0.0072	(26.0)	(1.025-1.384) *p=0.0224	(25.4)
+TMD	92	171	1.395	26	1.0793	145	1.389	263
+HAC	(16.3)	(83.7)	(1.159-1.678) *p=0.0002	(18.2)	(0.9645-1.194) p=0.1647	(24.2)	(1.162-1.660) *p=0.0001	(20.1)
Total	565 (100.0)	742 (100.0)		143 (100.0)		599 (100.0)		1307 (100.0)

ref.= reference values. \*chi-square test

Table 2. Risk for painful TMD according to HAC

HAC	Painful TMD							
	No TMD n (%)	TMD Overall n (%)	RR (95% CI)	Non painful TMD n (%)	RR (95% CI)	Painful TMD n (%)	RR (95% CI)	Total n (%)
no	578	134	(ref.)	48	(ref.)	86	(ref.)	712
	(63.5)	(33.8)		(71.6)		(26.1)		(54.5)
yes	332	263	1.882	19	0.9762	244	1.510	595
	(36.5)	(66.2)	(1.626-2.178) *p<0.0001	(28.4)	(0.9438-1.010) p=0.1901	(73.9)	(1.400-1.629) *p<0.0001	(45.5)
Total	910 (100.0)	397 (100.0)		67 (100.0)		330 (100.0)		1307 (100.0)

ref.= reference values. \*chi-square test

Table 3. Risk for painful TMD subtypes according to HAc

HAc	Painful TMD subtypes									
	No TMD +non painful TMD n (%)	Painful TMD overall n (%)	RR (95% CI)	Painful TMD joint n (%)	RR (95% CI)	Painful TMD muscle n (%)	RR (95% CI)	Painful TMD muscle + joint n (%)	RR (95% CI)	Total n (%)
no	626 (64.1)	86 (26.1)	(ref.)	11 (33.3)	(ref.)	48 (29.3)	(ref.)	27 (20.3)	(ref.)	712 (54.5)
yes	351 (35.9)	244 (73.1)	1.490 (1.386-1.602) *p<0.0001	22 (66.4)	1.044 (1.016-1.073) *p=0.0007	116 (70.7)	1.236 (1.168-1.307) *p<0.0001	106 (79.7)	1.248 (1.184-1.316) *p<0.0001	595 (45.5)
Total	977 (100.0)	330 (100.0)		33 (100.0)		164 (100.0)		133 (100.0)		1307 (100.0)

ref.= reference values. \*chi-square test

Table 4. Risk for chronic painful TMD (&gt; 3 months) according to HAc

HAc	Chronic painful TMD							Total n (%)
	No TMD +non painful TMD n (%)	Painful TMD overall n (%)	RR (95% CI)	Acute TMD n (%)	RR (95% CI)	Chronic TMD n (%)	RR (95% CI)	
no	626 (64.1)	86 (26.1)	(ref.)	30 (36.1)	(ref.)	56 (22.7)	(ref.)	712 (54.5)
yes	351 (35.9)	244 (73.9)	1.490 (1.386-1.602) *p<0.0001	53 (63.9)	1.098 (1.1054-1.145) *p<0.0001	191 (77.3)	1.417 (1.327-1.514) *p<0.0001	595 (45.5)
Total	977 (100.0)	330 (100.0)		83 (100.0)		247 (100.0)		1307 (100.0)

ref.= reference values. \*chi-square test

increased the risk in higher magnitude for chronic TMD pain (1.41; 1.32-1.51) (Table 4).

## DISCUSSION

The first finding of the present study refers to the high prevalence rates of HAc and TMD. According to literature, headache prevalence are up to 51% in children/adolescents,<sup>(5)</sup> although mostly rates are of 2% to 5%.<sup>(6)</sup> Brazilian data about TMD and HAc in adolescents agree with international rates for headaches prevalence but not for TMD, which was surprisingly very high (about 30%). However, a recent study with adolescents from Mexico demonstrated similar prevalence of TMD, with 33.2%.<sup>(7)</sup> The reasons which may underlie this higher prevalence should be further explored.

The second finding of this study refers to gender differences. After stratifying adolescents by gender, females demonstrated significant risks for the presence of HAc but not for TMD, as similar previously observed in adults.<sup>(3)</sup> However, in the presence of both conditions, higher risks were observed for girls with menarche. Based on this find, we suggest that the hormonal related pain changes should

be explored in the future. It would be important to verify how these changes affect the relationship between headache and TMD, since most of researches exploring gender differences in pain never consider these conditions together.

Although a strong association between headaches and TMD has been demonstrated, this relationship is still poorly explored in adolescents. Considering TMD and HA pain characteristics, it becomes also evident that the relationship between them is complex, from both pathophysiological and clinical perspectives. Basically, there are two hypotheses to justify the association. Clinically, TMD pain can characterize a "secondary headache", since the temporalis is a masticatory muscle located in the head. Considering pathophysiology, the comorbidity of these two chronic pain conditions seems to be related to central sensitization,<sup>(8)</sup> especially in trigeminal subnucleus caudalis.

When interpreting the results, some points deserve attention. First, HAc are based on adolescents responses to one question, and consequently, no headache diagnosis could be attributed. Second, a cross sectional study allows the detection of association, but no causal

relationship can be established. Strengths include the standardized methodology for epidemiology and for TMD classification.

It could be concluded that HAc increased the risk for TMD in adolescents, especially in girls with menarche. The risk was particular higher for painful and chronic TMD.

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