

# Presence of Parafunctional Habits in Temporomandibular Articulation Disorders in University Students

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## Abstract

**Objective:** To identify the presence of parafunctional oral habits and to evaluate its association with signs and symptoms of Temporomandibular Joint Disorders in university students. **Methods/Statistical Analysis:** A non-experimental design with a transversal descriptive cut was assumed. The sample was non-probabilistic at convenience: 168 students of the Physiotherapy Program. Students who will use the orthodontic devices were excluded. The instruments used were the self-report questionnaire for Parafunctional Oral Habits, the Mobility Tests and the Krogh-Paulsen Test. The data were analyzed statistically, by means of the  $\chi^2$  and Fisher Exact Tests. **Findings:** In relation to Parafunctional Habits, 69% share large fruits with their mouths; 40% had temporomandibular joint disorder. The application of the Krogh Paulse Test found an association between pain areas and Parafunctional Habits ( $p < 0.05$ ). Using a multivariate analysis, the results showed that chewing gum has a significant relationship with the pain that originates when speaking ( $p = 0.025$ ), yawning ( $p = 0.011$ ) and biting ( $p = 0.01$ ). The introduction of hard objects to the mouth is significantly related to facial swelling ( $p = 0.042$ ). **Application/Improvements:** High presence of Parafunctional Oral Habits was observed, such as splitting large fruits with the mouth, introducing hard objects to the mouth and chewing gum, which were the most significantly associated with TMJ disorder in university students who did not present orthodontic device.

**Keywords:** Disorders, Parafunctional Oral Habits, Temporomandibular Articulation, , University Students.

## 1. Introduction

The Temporo Mandibular Joint (TMJ) is one of the most important joints in the human body and-as well as the most common non-dental and facial pain-represent clinical problems of variable origin related to the muscles of chewing and TMJ. The reported prevalence is 10%, in which the majority is women older than 18 years<sup>1</sup>. Also, this joint is responsible for connecting the jaw with the lateral part of the head, which is in constant functional activity because-apart from the main function of chewing-makes movements to speak, swallow, laugh, kiss, and suck and other. In turn, they are associated in a continuous way to the functions of chewing, phonation, swallowing and breathing<sup>2</sup>. Due to these displacements, sometimes

its functionality can be affected throughout life, appearing what is called Temporomandibular (TMJ) Disorders or dysfunctions, leading people suffering from it to present problems in the joint and surrounding muscles to this, severely affecting the quality of life of the person<sup>3</sup>.

Currently, the multifactorial character of Temporomandibular (TMJ) Disorders is accepted by<sup>4</sup>. Occlusal, structural, psychological, traumatic, Oral Parafunctional Habits and health conditions in general are factors that can be considered as predisposing, triggering and perpetuating<sup>5</sup>. TMJ Disorders are considered the most common cause of facial pain-after dental pain-and can affect up to 15% of the general population. Epidemiological and clinical studies, conducted in the United States and the Scandinavian countries, showed that more than 50% of

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the adult population suffers from some sign or symptom of TMJ Disorders<sup>6</sup>. Regarding the epidemiology of TMJ Disorders, it affects women more frequently, because they are conditioned by social, neurophysiological and hormonal factors, influencing the perception and modulation of pain<sup>7</sup>. The latter is very interesting, because the studies specify that women between the ages of 25 and 35 have Craniomandibular Dysfunction with more regularity. Apparently, the estrogenic condition of women makes this population group one of the most affected, although there must be other factors of Occlusion and Mandibular Parafunction<sup>8</sup>. In Colombia, the epidemiology of TMJ Disorders is not well known, and, currently, only the data obtained in the Third National Study of Oral Health, ENSAB III (1999), which reported a prevalence of TMJ Disorders of 47.4% in patients older than 15 years<sup>9</sup>.

The denomination “TMJ Disorders” is recognized as a non-specific term, which represents a wide variety of dysfunctional and/or painful conditions. These conditions include symptoms and disorders of the muscles of chewing, articulation, nervous system and behavior. 90% to 95% of cases of TMJ Disorders are manifested by multiple musculoskeletal facial pains, sensitivity in the muscles of mastication and sensation of spasm when the patient opens his mouth<sup>10</sup>. Also, there may be changes in the movement of the condyle/disc, which produces joint noise that can go from clicking to crepitus. The latter has been considered as an indication of advanced joint disease, such as degenerative arthritis<sup>11</sup>.

It is important to recognize the various types of problems that may exist in the TMJ and the variety of risk factors that cause them. For the diagnosis, several factors were taken into account. The first factor is the Biopsychosocial, in which anxiety, depression and stress can play a significant role in the development and maintenance of masticatory muscle tension and chronic orofacial pain<sup>12</sup>. The second factor is the Parafunctional type, that is, bad oral habits such as muscle hyperactivity or

Bruxism; tooth migrations, which exceed the capacity of adaptation of the individual, and the loss of teeth that leads to the decrease of the vertical dimension (4); the bite of objects or lips; unilateral chewing; and Behavioral, such as opening the mouth exaggeratedly, chewing gum regularly, bad postures such as recharging the jaw on the hand and protrusion of the head<sup>13</sup>. Many of these problems are caused by anxiety disorders, stress, tension headache, earaches, insomnia and fatigue<sup>14</sup>.

This research was conducted with the objective of identifying the presence of Parafunctional Habits, and their association with the signs and symptoms that predispose to TMJ Disorder in university students.

## 2. Materials and Methods

### 2.1 Study Design

The research is located in a non-experimental cross-sectional descriptive design, in which some instruments are applied to a group of subjects, in order to identify the presence of Parafunctional Habits and their association with the signs and symptoms that predispose TMJ Disorder.

### 2.2 Sample

The selection of participants was intentional, with a total sample of 168 students of the Corporación Universitaria Antonio José de Sucre-corposucre, of Sincelejo, Sucre, Colombia, belonging to the Faculty of Health Sciences see (Table 1).

The inclusion criteria defined in the study are:

- Students who do not use an orthodontic device.
- Students belonging to the Faculty of Health Sciences.
- The exclusion criteria defined in the study are:
- Students using an orthodontic device.

**Table 1.** Variables

Variable	Instrument	Validity/Reliability
Habits: These are repetitive behaviors that require little or no reasoning and are learned rather than innate.	Questionnaire of closed questions of self report.	Delphi Technique
Dysfunction. Alteration or functional deficiency of an organ.	Krogh-Paulsen Test.	

### 3. Process

For the information gathering process, the following moments are followed:

1. Location of students in the Corporación Universitaria Antonio José de Sucre.
2. Once potential persons have been located to be part of the study, they are explained the ethical implications of the study and proceeds to the signing of the informed consent, which informs the benefits and risks of participating in the study.
3. Proceed to the application of the self-report questionnaire of closed questions of the Oral Parafunctional Habits, which consisted of questions such as the presence of pain in the neck, mouth and neighboring parts; the periodic habits with the mouth; the difficulties when chewing or biting; the presence of buzzing, clicking, cracking, clicking; the presence of tension, dizziness, swelling, among others.
4. The Evaluation Process was carried out by three<sup>3</sup> researchers, who performed a clinical examination and applied the tests, such as mobility range, which consists of measuring the opening and closing, laterality; and protrusion and retrusion, taking into account that the parameters required for opening are when the condyles are in rotation until the incisors are separated from the upper ones approximately 45 millimeters. Also, for the movement of Protrusion, the lower jaw is directed forward, retaining contact with the upper jaw, being located about 4 or 5 millimeters in front of the upper dental arch and in the movement of the Retrusion the lower jaw slides in the opposite direction, returning to the starting point. Finally, Lateral Movement occurs when one of the two condyles moves forward, placing itself under the corresponding transverse root; while, the other condyle remains fixed, acting as axis of rotation, in which the displacement range should not exceed one centimeter. Taking into account the previous measurements, it is considered to be positive when the normal limits are exceeded and Negative when it complies with the established parameters<sup>15</sup>.
5. The current state of the Articulation is detected, by means of the TMJ mobility tests and the Krogh-Paulsen test, which evaluates the function of the stomatognathic system, determining the existence or not of TMJ Dysfunctions, both on the right side as of

the left, with duration of 20 minutes. It contains nine<sup>9</sup> items which are:

- Opening <40 mm
  - Irregularities in opening and closing movement.
  - Muscle pain on palpation.
  - Pain in TMJ.
  - Click or crack.
  - Lock in opening and closing.
  - Instability between RC and PMI (Revisar N. Del T.).
  - Previous glide > to 1 mm
  - Lateral sliding.
6. The quantitative variables-such as the Mobility Range-were subjected to statistical tests in order to determine the level of significance thereof, for which the X<sup>2</sup> and Fisher Exact tests were applied, using the software SPSS version 23.0.

#### 3.1 Clinical Tests Performed

Figure 1 the opening of the mouth is shown; then, in Figure 2 the laterality test is carried out and, additionally, in Figure 3 the performance of the Protrusion and Retrusion Test is shown, where it was sought to identify the alterations in the TMJ.



Figure 1. Opening of the mouth.



Figure 2. Laterality test.



**Figure 3.** Protrusion and Retrusion Test.

## 4. Results

The validation and reliability of the instrument was carried out through the Delphi Technique, in which -according to its methodology-it was sent to a group of experts and based on the assessment of these, the final version of the questionnaire was structured and applied. It yielded the following results:

- The average age of the students was between 18 and 25 years old, the average age is 22 years and the standard deviation was 2.21, the gender that most prevailed was the female sex with 160 students; of the male sex only 8 students. The socioeconomic stratum that prevailed most was the Low one.
- In relation to Parafunctional Habits, 64.3% state that hard objects are inserted into the mouth; 69% share large fruits with the mouth, this being one of the Parafunctional Oral Habits most significantly associated with TMJ Disorder; additionally, 52% tend to bite the nails and the cuticle.
- In the application of the measurement of Mobility Range Tests, it was evidenced that 57% of the students presented Protrusion and Retrusion. Likewise, for the Laterality Test 62% of the students were positive. And in the Range of Mobility of opening and closing of the mouth, 67% of the students were positive (Table 2).
- With regard to the Krogh Paulsen test (Table 3), it is clear that 40% of the students have TMJ Dysfunction, which means that the vast majority of students present alterations in this joint, while 28% are at risk of suffering it.

**Table 2.** Measurement of mobility range

Mobility Range	Positive	%	negative	%
Protrusion and Retrusion	95	57%	73	43%
Laterality	104	62%	64	38%
Opening and Closing of the Mouth	112	67%	56	33%

Source: parafunctional habits questionnaire

**Table 3.** Krogh Paulsen test

Categorization	N°	%
Healthy	23	14
Disturbance	30	18
Risk	47	28
Dysfunction	68	40

Source: parafunctional habits questionnaire

Among the habits (has the habit of chewing gum, usually biting the nails and cuticles, part large fruits with the mouth, remains in front of the computer with the head flexed, pensive position), areas of pain (neck, around the ear, talk, yawning, biting), and signs and symptoms (stress, excessive opening, swelling of the face, dizziness).

Regarding the Variables, there is a significant relationship between the habit of chewing gum and the pain that can arise at the time of speaking, yawning and biting. Biting the nails and the cuticle can cause pain in the neck if the habit is frequent; splitting large fruits with the mouth causes pain around the ear (Table 4). Biting the nails and cuticles can be due to stress and can generate swelling in the face; keeping the thoughtful position for a long time can cause dizziness (Table 5).

**Table 4.** Areas of pain

	Statistic analysis Significance Value (p <0.05)	Áreas of Pain								
		Neck		Around the Ear	Speaking		Yawning		Biting	
Hábits	Has the habit of chewing gum	P<0,0001	P<0,0001		0,023	0,025	0,008	0,011	P<0,0001	0,001
	Accustomed to biting the nails and cuticles	0,05								
	Share large fruits with the mouth			0,003	0,004					
	Stand in front of the computer with your head bent	0,046			0,003	0,003				
	Thoughtful position	0,009	0,011	0,034	0,043					

The habits whose p-value is less than or equal to 0.05 ( $P \leq 0.05$ ), means that there is an association or dependence between them; the values shown in the table as  $P < 0.0001$ , mean that their p values are very small

**Table 5.** Signs and symptoms

	Statistic analysis Value Significance (p <0.05)	Symptoms and Signs						
		Stress	Excessive opening		Swelling in face		Dizziness	
Hábits	Hard objects are inserted into the mouth				0,032	0,042		
	Accustomed to biting the nails and cuticles	0,049			0,022	0,03		
	Squeezetheteethconstantly		0,039	-0,047				
	Thoughtful position						0,001	0,001

The habits whose p-value is less than or equal to 0.05 ( $P \leq 0.05$ ), means that there is an association or dependence between them

## 5. Discussion

Among the most important findings of the study are:

Presenting Oral Parafunctional Habits is a risk factor for the occurrence of TMJ Disorder, as can be seen in Table 3. The presence of these can cause pain in the neck, which can cause difficulty and discomfort, as well as it, can generate deviations in the body due to bad postures of the head that lead to permanent pain and even loss of proprioception. The forward posture of the head, the angle between the upper part of the thorax and the spine has a significant correlation with neck pain under the work posture<sup>16</sup> at the moment of speaking, eating and yawning, a situation that can be inferred negatively in the health of the person who has Parafunctional Habits. Among the tests performed to diagnose TMJ Disorder, the Krogh Paulsen Test was carried out, because it has a sensitivity of 78% and specificity of 100% of the muscle scan index, which indicates that it is useful for diagnosis of Joint Dysfunction<sup>17</sup>. It should be noted that, although

statistical tests of probability distribution were performed, such as  $\chi^2$  and f- Fisher, to know the relationship of the Parafunctional Oral Habits with the signs and symptoms of TMJ Disorder, the results showed that they are risk factors that can be significantly associated with Dysfunction.

The results are in line with the study carried out in Havana, where Parafunctional Oral Habits are the most frequent cause of TMJ Disorders, although it is considered a multifactorial disorder, since within the manifestations presented by people, there are headaches, and neck, upper back and around the ear pains<sup>18</sup>. The self-report questionnaire inquired about the clinical manifestations, in which 62% of the students responded that they had presented back pain; 63%, pain in the neck; and 44%, pain around the ear. The previous results are similar to those reported by<sup>7</sup>, where they state that 100% presented some type of muscle pain. Likewise, they are similar to those reported in the study conducted in adolescents-92.6%-where they report presenting a point of muscular pain<sup>19</sup>. The previous statements corroborate the presence of these

clinical manifestations with the study of the prevalence of signs and symptoms of TMD, where it was found that from 15.8% to 37.9% of the population presented them<sup>18</sup>. Among the Parafunctional Oral Habits is found most frequently in the population studied: split large fruits with the mouth 69%; Chewing gum 12%. The above data are related to the study carried out by Bonjardim et al., here the latter constituted the most frequent Oral Parafunction in the studied population, with 88.4%<sup>20</sup>.

In the association of Parafunctional Habits with the signs and symptoms of TMJ Dysfunction, there is a significant relationship between the data. Likewise, in a study conducted by Cortesea and Biondia, they observed a high prevalence of dysfunctions and parafunctions that were significantly associated with symptoms of Temporomandibular Disorders<sup>21</sup>. On the other hand, in a study conducted in Japanese young people they recognized the multifactorial etiology of the TMD, since the studies show little correlation between an isolated etiological factor and the appearance of signs and symptoms<sup>22</sup>. The difficulties for the finding of correlations arise from the multiple combinations of Parafunctional Habits and Dysfunctions, and variables such as duration, frequency and intensity, as well as the susceptibility of the masticatory system, which varies among different individuals<sup>21</sup>.

For the validation of the semiological data in this study, the Mobility Range Measurement Tests were performed, in which 67% of the population presented pain at the opening and closing of the mouth, causing movement limitation. It can be affirmed that the Mobility Range Measurement Tests are reliable to diagnose and evaluate TMD in adult populations<sup>21</sup>. In a study conducted by Anastassaki, the objective was to verify the prevalence of symptoms indicative of TMJ Disorder for 20 years and among the results was found the increase in the prevalence of these, so that a timely intervention is necessary of symptoms in order to improve the perception of health of people suffering from the dysfunction<sup>23</sup>. With the application of the Krogh Paulsen test, it was diagnosed that 40% of the young people presented the dysfunction and 28% found a risk of presenting it. In research developed with Brazilian university students, it was identified that 69.2% had TTM<sup>24</sup>, figures that resemble what was found in this study.

Regarding a study conducted in Mexico City, it was determined that 83.29% of the young adolescents who

participated in it presented at least one Parafunctional Habit<sup>25</sup>. Taking into account the previous results and the analysis performed by the X2 and Fisher's Exacta statisticians, the null hypothesis is rejected and it is assumed that the two variables are not independent, but are associated.

For the correction of the Disorder is necessary preventive and therapeutic intervention involving several disciplines, whose professionals must be able to search and correlate clinical findings, thus offering solutions to the needs of those, affected. The treatment for this type of disorder is generally focused on the management of symptomatology with medications by medicine, and surgical and dental interventions by dentistry and maxillofacial specialists. The intervention-from physiotherapeutic rehabilitation-is aimed at managing pain, improving joint mobility and reducing TMJ Disorders, among others. Therefore, it is important to consider interdisciplinary management for this Dysfunction<sup>26</sup>.

## 6. Conclusion

In this study, the strength that was had was to sensitize the student community about the Dys functions of the TMJ and the damages caused by bad habits in their quality of life. Also, the limitations that were had were the short time in which the research was developed, the non-existence of a specific evaluation protocol for the TMJ and the failure to evaluate each participant by the three evaluators. The researchers of this study propose carrying out investigations with another type of sample, analyzing each of the TMD, in such a way that relationships of greater magnitude can be established and the implications in the clinical practice of this type of evaluations can be made known. At the same time, continue to strengthen and strengthen the line of research in comprehensive rehabilitation, which includes the promotion of health, and the primary, secondary and tertiary prevention of the disease. Therefore, the researchers of this study conclude that splitting large fruits, introducing hard objects to the mouth and chewing gum, are the Parafunctional Oral Habits most significantly associated with TMJ Disorder in university students who did not use an orthodontic device. Data similar to those reported by the scientific literature found, there being a high prevalence of Parafunctional Oral Habits in the university population.

## 7. References

1. Algabri RS. Effect of Hard Versus Soft Occlusal Splint on the Management of Myofascial Pain: Systematic Review and Meta-Analysis. *Indian Journal of Science and Technology*. 2017; 10(16):974–6846. [crossref](#)
2. Piaggio A. Influencia de las funciones y parafunciones en el crecimiento y desarrollo craneofacial. *Acta odontológica*. 2010; 7(1):15–30.
3. Arag MC, Arag F, Torres LM. Trastornos de la articulación temporomandibular. *Revista de la Sociedad Española del Dolor*. 2005; (12):429–35.
4. Okeson JP. Tratamiento. oclusion.afecciones.temporomandibulares. Elsevier: Espa-a. 2013. p.1–504.
5. Okeson JP. Evolution of occlusion and temporomandibular disorder in orthodontics: Past, present, and future. *American Journal of Orthod Dentofac Orthop*. 2015; 216–23.
6. Agerberg G, Carlsson G. Functional disorders of the masticatory system I. Distribution of symptoms according to age and sex as judged from investigation by questionnaire. *Acta Odontol Scand*. 1972; p.597–613. [crossref](#) PMID:15303265
7. Mera N, Morales L, Ordóez D, Gómez G, Osorio S. Signos, síntomas y alteraciones posturales en pacientes diagnosticados con trastornos de la articulación temporomandibular. *Odontológica*. 2015. p. 1–11.
8. R. LB, Manoochehri A, Serrano M, Zabala S. Alteraciones temporomandibulares. Revisión de la literatura. *Acta Bioclínica*. 2016; 6(12):107–21.
9. Sánchez H, Milena C, Collante B, Martínez A, Barros J, Patricia A. Prevalencia de síntomas y signos de trastornos temporomandibulares en una población universitaria del área metropolitana de Bucaramanga, Santander. *Umbral Científico*. 2009;14:80–91.
10. Cortese LG, Palacios S, Oliver L. Trastornos Temporomandibulares en niños y adolescentes. *Revista Gastrohnp*. 2015; 12:10–7.
11. Tanzilli RA, Tallents RH, Katzberg RW, Kyrkanides S, Moss ME. Temporomandibular joint sound evaluation with an electronic device and clinical evaluation. *Clinical Orthodontics and Research*. 2001 May; 4(2): 72–8. [crossref](#) PMID:11553088
12. Algozaín Acosta Y, Vi-as García M, Capote Leyva Dr. E, Rodríguez Llanes R. Comportamiento clínico del síndrome dolor disfunción del aparato temporomandibular en una consulta de urgencias estomatológicas. *Revista Cubana Estomatol*. 2009; 46(2): 7–8.
13. Figueredo LMF, Arango DN, Ileana Grau León C, García RC. Disfunción temporomandibular en la adolescencia tardía. *Revista Cubana Estomatol*. 2012; 49(3):204–14.
14. Pe-ón Vivas PA, Grau León IB SPH. Síndrome de disfunción temporomandibular y factores asociados. *Hospital Miguel*
15. Enríquez. *Revista Habanera Ciencias Médicas*. 2011; 10(4): 448–57.
16. Quijano Y. Anatomía clínica de la articulación temporomandibular (ATM). *Morfología*. 2011. 3.
17. Kim MJ, Lee YJ, Lee DY, Hong JH, Yu JH, Kim JS. The comparisons of tape of different type applied on forward head posture positions. *Indian Journal of Science and Technology*. 2016; 9(43). [crossref](#)
18. Cornejo Salazar JL. Sensibilidad y especificidad del Índice de Krogh-Poulsen en el diagnóstico de los Trastornos Temporomandibulares. *Odontología Sanmarquina*. 1999; 1(3):16–20.
19. Montero Parrilla JM, Semykina O, da MoraisChipombela LC. Trastornos Temporomandibulares y su interacción con la postura corporal. *Revista Cubana Estomatol*. 2014; 51(1): 3–14.
20. De Felício CM, Faria TG, Rodrigues Da Silva MAM, De Aquino AMCM, Junqueira CA. Temporomandibular disorder: Relationship between otologic and orofacial symptoms. *Revista Brasileira de Otorrinolaringología*. 2004; 70(6):786–93.
21. Bonjardim L, Lopes-Filho R, Amado G, Albuquerque R, Goncalves S. Association between symptoms of temporomandibular disorders and gender, morphological occlusion, and psychological factors in a group of university students. *Indian Journal of Dental Research*. 2009; 20(2):190. [crossref](#) PMID:19553721
22. Cortese SG, Biondi AM. Relación de disfunciones y Hábitos Parafuncionales orales con Trastornos Temporomandibulares en niños y adolescentes. *Archivos Argentinos De Pediatría*. 2009; 107(2):134–8. PMID:19452085
23. Diniz MB, Silva RC Da, Zuanon ACC. Bruxismo na infância: um sinal de alerta para odontopediatras e pediatras. *Revista Paulista De Pediatrias*. 2009; 27(3):329–34. [crossref](#)
24. AnastassakiKöhler A, Hugoson A, Magnusson T. Prevalence of symptoms indicative of temporomandibular disorders in adults: cross-sectional epidemiological investigations covering two decades. *Acta Odontologica Scandinavica*. 2012; 70(3):213–23. [crossref](#) PMID:22126531
25. Medeiros SP, Batista AUD, Forte FDS. Prevalência de sintomas de disfunção temporomandibular e hábitos parafuncionais em estudantes universitários. *Revista Gaucha Odontologia*. 2011 Jun; 59(2):201–8.
26. Álvarez A, Ham D, Jiménez J. Trastorno temporomandibular y factores asociados en adolescentes de 12 a 18 años de Montemorelos, Nuevo León. *Temporomandibular disorder and associated factors in teenagers 12 to 18 years in Montemorelos, Nuevo León*. *Revista Mexicana de Estomatología*. 2016; 3(2):37–49.
27. Vélez Uribe J, Vélez L, Pérez Mejía M, Barragán K. Síndrome de disfunción de la articulación temporomandibular y el papel de la educación en su tratamiento. *CES Movimiento y Salud*. 2015; 3(1): 44–52.