Case Study

PREVALENCE OF TEMPOROMANDIBULAR JOINT DISORDERS AMONG ADULTS IN SAUDI ARABIA POPULATION: CROSS-SECTIONAL STUDY

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ABSTRACT

The "temporomandibular joint disorder" (TMD) is a term to describe conditions that have an impact on the masticatory system and it involves the muscles of the temporomandibular joint. TMD affects the temporomandibular joint greatly and also includes other problems such as osteoarthritis and Internal derangement. The study aims to assess the prevalence of TMDs in Saudi Arabia in different age populations. This Cross-sectional study was conducted population in Saudi Arabia. Data was collected using an online questionnaire distributed to participants through social media. the questionnaire was translated into the Arabic language. The questionnaire consists first of demographic features such as age, gender, and city, then ten questions of the Fonseca questionnaire. It was transferred to (SPSS) program, version 20 (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp). The study included 1085 participants, 54.3% of whom were females. 26.7% of participants were found to be free of TMJD. Mild TMJD was observed in 41.4% of individuals, while 20.5% had moderate TMJD. The remaining 11.4% of participants had severe TMJD. Prevalence of TMJD was significantly associated with participants' gender and monthly income. In conclusion, TMD is a common problem among adults in Saudi Arabia, with studies suggesting that the prevalence of TMD may be higher than in other parts of the world. Females had a higher prevalence of TMJD with significance. Further research is needed to better understand the burden of TMD in the country and to develop effective strategies for prevention and management.

Key words: TMD, TMJD, Prevalence, Adult, KSA.

Introduction

The temporomandibular joint is a complicated structure that includes the mandibular condyle, glenoid fossa, and articular eminence [1]. The term "temporomandibular joint disorder" (TMD) refers to a group of conditions affecting the masticatory system, which includes the muscles of the temporomandibular joint (TMJ), surrounding tissue, and nerve structure. TMD is a chronic disorder that also affects the TMJ and its surrounding structures [2]. TMD is regarded as one of the main reasons patients seek dental care for pain that is not caused by dental issues [3]. Temporomandibular joint disorders (TMD) include diseases such as osteoarthritis, myofascial pain, internal derangement, and arthralgia that affect the masticatory system and temporomandibular joint (TMJ). It can manifest as a variety of clinical signs and symptoms, such as joint pain, noises, and restricted jaw opening [4]. The precise cause of TMD is still unknown, but many researchers suggest a multifactorial cause that includes occlusal disturbance, parafunctional habits (bruxism), stress, and psychological factors [5].

Oral parafunction and temporomandibular disorders (TMD) are common issues in contemporary society. The muscles, occlusion, and periodontium are associated with the etiopathology of the TMJ [6]. It is estimated that TMDs affect about 31% of the adult population and 11% of children and adolescents [7]. The prevalence of TMD in AS individuals varies across studies, mainly because of the population studied and the method used to assess TMD [8]. To prevent or reduce the incidence of TMD, it is essential to identify early signs and symptoms and raise awareness among patients and healthcare providers [9].

Multiple questionnaires and indexes were developed for the assessment of TMJ conditions and the diagnosis of TMD, such as the Helkimo index (HI), DC/TMD criteria developed by Schiffman, the craniomandibular index (CMI), and Fonseca's anamnesis questionnaire (FAI) [10].

To determine the prevalence of temporomandibular dysfunction (TMD) among adults in Jeddah, Saudi Arabia, a cross-sectional study was conducted in 2019 that showed a significantly high prevalence [11]. In 2022, Albraa Alolayan

et al. stated that participants from Al-Madinah in their research had a higher incidence of mild temporomandibular joint disorder [12]. According to Komo HA *et al.*, TMD is a difficult condition with a wide range of prevalence rates in various groups, with a high prevalence in the adult Saudi Arabian population [13].

Even with previous research regarding the prevalence of TMDs in Saudi Arabia, with such a large geographic area, more study is needed to determine the prevalence.

Objectives
This present study aims to assess the prevalence of TMDs in Saudi Arabia in different age populations.

Materials and Methods

Study design
The cross-sectional study was in different regions among the population of Saudi Arabia.

Study setting
Participants, recruitment, and sampling procedure
In this study, our participants consist of the general population from Saudi Arabia, including Males and Females with an age of more than 18 years.

Inclusion and exclusion criteria
Our included participants were the general population from Saudi Arabia, including Males and Females with an age greater than 18 years. We excluded participants who were younger than 18 years old.

Sample size
Using the Roasoft Sample size calculator, the recommended sample size for this study was determined to be minimum 385 individuals with a 95% confidence interval, an error rate of less than 5%, and a prevalence of 50% in a population of 32,175,224.

Method for data collection and instrument (Data collection Technique and tools)
We will collect data from an online questionnaire (Fonseca questionnaire) distributed to participants through social media. We will translate the questionnaire questions into Arabic language. First, in the questionnaire, we will ask about demographic features such as age, gender, and city.

Scoring system
The study tool that has been used in this study was the Fonseca Anamnestic Index (FAI) questionnaire. After examining pertinent research completed in Saudi Arabia and overseas, this tool was developed. To gather information from adult patients in Saudi Arabia, the data collectors will create and disseminate an online questionnaire. The questionnaire consists of two major sections that were to be filled out by the participants. Demographic information was requested in the first section of the questionnaire. The 10

questions posed by Fonseca in the second section were translated into Arabic by researchers. The 10 questions should be answered with "yes," "no," and "sometimes," and only one response should be marked for each question, the participants were instructed. Each 'yes' answer was assigned a value of 10, each "sometimes" response received a value of 5, and each "no" response received a value of 0. The participants were divided into four groups according to the sum of the points: Temporomandibular joint disorder -free (Zero to Fifteen points); mild Temporomandibular joint disorder (Twenty to Forty points), moderate temporomandibular joint disorder (Forty-five to sixty points), and severe temporomandibular joint disorder (seventy to one hundred points). Before the participants responded to the questionnaire, they were required to sign an informed consent form.

Analyzes and entry method
The data was entered using a computer on the "Microsoft Office Excel Software" program (2016) for Windows. The data then was transferred to the Statistical Package of Social Science Software (SPSS) program, version 20 (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.) to be statistically analyzed.

Collected Data was entered on a computer using the Microsoft Excel program (2016) for Windows. Data was then transferred to the Statistical Package of Social-Science Software (SPSS) program, version 20. To be statistically analyzed

Results and Discussion

The majority of the respondents fall within the 20-30 age bracket, accounting for 45.5% of the total sample. This is followed by the 31-40 age group at 17.4% and the 41-50 age group at 15.6%. 54.3% of the respondents are female and 45.7% are male. The location distribution reveals that the majority of the respondents are from the Middle region, comprising 64.6% of the sample. This is followed by the South region at 19.1% and the West region at 7.4%. The East and North regions constitute smaller proportions at 6.8% and 2.1% respectively. Students account for the largest proportion at 32.9%, followed by government employees at 24.1% and individuals who do not work at 21.3%. In terms of annual income, the majority of the respondents reported an income of less than 5,000 Saudi Riyals, comprising 55.1% of the sample. This is followed by the 5,000 - 10,000 and 11,000 - 15,000 income brackets at 18.2% and 13.3% respectively. A smaller proportion reported an income of over 15,000 Saudi Riyals at 13.4%. A significant portion of the respondents are either married (46.8%) or single (50.9%), with a smaller proportion being widowed at 2.3% **(Table 1)**.

**Table 1.** Sociodemographic characteristics of participants (n=1085)

Parameter		No.	Percent
Age	Less than 20	101	9.3
	20 30	494	45.5
	31 40	189	17.4
	41 50	169	15.6
	51 60	106	9.8
	More than 60	26	2.4
Gender	Male	496	45.7
	Female	589	54.3
Location	East	74	6.8
	Middle	701	64.6
	North	23	2.1
	South	207	19.1
	West	80	7.4
Occupation	free work	28	2.6
	Government employee	261	24.1
	Private employee	86	7.9
	Retired	91	8.4
	I do not work	231	21.3
	student	357	32.9
	Other	31	2.9
Monthly Income (in Saudi Riyals)	Less than 5,000	598	55.1
	5,000 - 10,000	198	18.2
	11,000 - 15,000	144	13.3
	Over 15,000	145	13.4
Marital Status	Married	508	46.8
	Single	552	50.9
	Widowed	25	2.3

Table 2 shows that a substantial portion of respondents find it challenging to open their mouths wide, with 7.8% responding "Yes," 62.9% responding "No," and 29.3% responding "Sometimes." Similarly, 5.4% find it difficult to move their jaws to the sides, while 74.5% do not, and 20.1% experience this issue occasionally. Furthermore, the survey highlights that 11.2% of participants feel tired or have muscle pain when chewing, and 25.0% suffer from headaches. Additionally, 19.9% experience neck pain or stiffness, and 13.7% report ear pain or pain in the temporomandibular joint area. Another significant finding is that 22.3% have noticed noise in the TMJ while chewing or opening their mouths, with 19.3% reporting habits such as clenching or grinding their teeth. Moreover, 34.2% feel that their teeth do not fit well, and 26.9% consider themselves tense or nervous individuals.

Table 2. Symptoms of TMJD among Study Participants (n=1085).

	Yes	No	Sometimes
Do you find it difficult to open your mouth wide?	85 7.8%	682 62.9%	318 29.3%
Do you find it difficult to move your jaw to the sides?	59 5.4%	808 74.5%	218 20.1%
Do you feel tired or have muscle pain when chewing?	121 11.2%	630 58.1%	334 30.8%
Do you suffer from headaches?	271 25.0%	354 32.6%	460 42.4%
Do you suffer from neck pain or neck stiffness?	216 19.9%	486 44.8%	383 35.3%
Do you suffer from ear pain or pain in the area (temporomandibular joint)?	149 13.7%	627 57.8%	309 28.5%
Have you ever noticed any noise in the TMJ while chewing or opening your mouth (cracking sound)?	242 22.3%	589 54.3%	254 23.4%
Do you have any habits such as clenching or grinding your teeth?	209 19.3%	632 58.2%	244 22.5%
Do you feel that your teeth do not fit well?	371 34.2%	516 47.6%	198 18.2%
Do you consider yourself a tense (nervous) person?	292 26.9%	315 29.0%	478 44.1%

Figure 1 shows the prevalence of TMJD among participants as 26.7% were found to be free of TMJD. Mild TMJD was observed in 41.4% of individuals, while 20.5% had moderate TMJD. The remaining 11.4% of participants had severe TMJD.
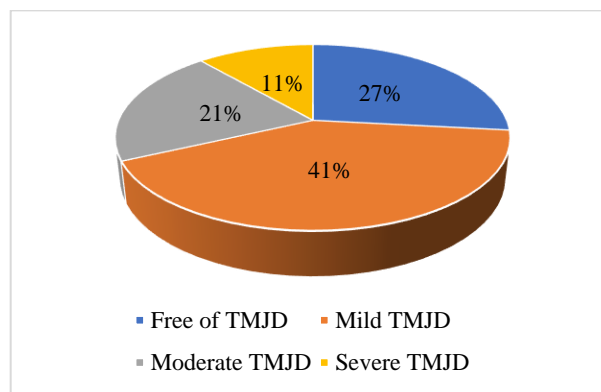
Figure 1. Prevalence of TMJD among participants (n=1085).

As illustrated in **Table 3**, the prevalence of TMJD was significantly associated with participants' gender and monthly income. The data shows that individuals in the age group of 20-30 have the highest prevalence of TMJD, with 45.5% of the total cases falling within this age range. Females have a higher prevalence of TMJD compared to males, with 54.3% of the total TMJD cases being female.

Individuals with an annual income of less than 5,000 Saudi Riyals have a higher prevalence of TMJD compared to those with higher incomes. Similarly, single individuals show a slightly higher prevalence compared to married individuals.

The Middle region shows the highest prevalence of TMJD, with 64.6% of the total cases falling within this region.

Table 3. Prevalence of TMJD in association with sociodemographic characters of participants (n=1085).

		Prevalence of TMJD				Total (N=1085)	P value
		Free of TMJD	Free of TMJD	Free of TMJD	Free of TMJD		
Age	Less than 20	26	40	24	11	101	
		2.4%	3.7%	2.2%	1.0%	9.3%	
	20 30	142	199	95	58	494	
		13.1%	18.3%	8.8%	5.3%	45.5%	
	31 40	42	85	36	26	189	
		3.9%	7.8%	3.3%	2.4%	17.4%	0.679
	41 50	40	74	38	17	169	
		3.7%	6.8%	3.5%	1.6%	15.6%	
	51 60	34	43	20	9	106	
		3.1%	4.0%	1.8%	0.8%	9.8%	
	More than 60	6	8	9	3	26	
		0.6%	0.7%	0.8%	0.3%	2.4%	
Marital status	Single	157	225	109	61	552	
		14.5%	20.7%	10.0%	5.6%	50.9%	
	Married	129	215	107	57	508	0.392
		11.9%	19.8%	9.9%	5.3%	46.8%	
	Widow	4	9	6	6	25	
		0.4%	0.8%	0.6%	0.6%	2.3%	
Gender	Male	179	192	88	37	496	
		16.5%	17.7%	8.1%	3.4%	45.7%	0.001
	Female	111	257	134	87	589	
		10.2%	23.7%	12.4%	8.0%	54.3%	
Location	East	22	28	13	11	74	
		2.0%	2.6%	1.2%	1.0%	6.8%	
	Middle	185	294	145	77	701	
		17.1%	27.1%	13.4%	7.1%	64.6%	
	North	6	8	7	2	23	0.958
		0.6%	0.7%	0.6%	0.2%	2.1%	
	South	54	88	43	22	207	
		5.0%	8.1%	4.0%	2.0%	19.1%	
	West	23	31	14	12	80	
		2.1%	2.9%	1.3%	1.1%	7.4%	
Occupation	Free work	9	10	2	7	28	
		0.8%	0.9%	0.2%	0.6%	2.6%	0.191
	Government employee	73	109	48	31	261	
		6.7%	10.0%	4.4%	2.9%	24.1%	

	Private employee	31	37	12	6	86	
		2.9%	3.4%	1.1%	0.6%	7.9%	
	Retired	23	36	21	11	91	
		2.1%	3.3%	1.9%	1.0%	8.4%	
	Don't work	98	147	73	39	357	
		9.0%	13.5%	6.7%	3.6%	32.9%	
	Student	49	94	61	27	231	
		4.5%	8.7%	5.6%	2.5%	21.3%	
	Other	7	16	5	3	31	
		0.6%	1.5%	0.5%	0.3%	2.9%	
Monthly Income (in Saudi Riyals)	Less than 5,000	143	253	134	68	598	0.005
		13.2%	23.3%	12.4%	6.3%	55.1%	
	5,000 - 10,000	62	80	32	24	198	
		5.7%	7.4%	2.9%	2.2%	18.2%	
	11,000 - 15,000	30	60	30	24	144	
		2.8%	5.5%	2.8%	2.2%	13.3%	
	Over 15,000	55	56	26	8	145	
		5.1%	5.2%	2.4%	0.7%	13.4%	

Temporomandibular Joint Disorders (TMD) are a group of conditions that cause pain and dysfunction in the jaw joint and the muscles that control jaw movement. These disorders can have a significant impact on an individual's quality of life, affecting their ability to eat, speak, and even sleep. TMD is a common problem, with studies suggesting that up to 15% of adults may be affected by some form of TMD [2].

In Saudi Arabia, the prevalence of TMD among adults has been a topic of interest for researchers and healthcare professionals. While there is limited data available on the exact prevalence of TMD in the country, studies have suggested that TMD is a common problem among Saudi adults, with some estimates indicating that the prevalence of TMD may be as high as 30% [11].

According to our study results, 26.7% of our participants were found to be free of TMJD. Mild TMJD was observed in 41.4% of individuals, while 20.5% had moderate TMJD. The remaining 11.4% of participants had severe TMJD. This was comparable to a previous Saudi study that reported a prevalence of 35% significantly more prevalent in females (105 participants, 42%) than in males (70 participants, 28%) with p = 0.0008 [11]. Alzarea *et al.* evaluated 400 edentulous patients while they were attending the Al-Jouf dentistry school in Skaka, Kingdom of Saudi Arabia. It was reported that TMD affected 60.5% of the patients in this group. Occlusal instability could be the reason for their results' high occurrence rate [14]. Considering and in line with our findings, The results of Nadersha *et al.* [11] showed that women had a significantly higher risk of TMD (p = 0.0008) than men did. This is consistent with many previous studies. Investigations into the exact origin of this gender gap are still ongoing. Some possible explanations include laxity of the joint ligaments, hormonal factors, increased intra-articular

pressure, and different types of joint collagen in the TMJ retro-distal zone. Hilgenberg-Sydney *et al.* investigated the variations in TMD prevalence between genders in adulthood. For the meta-analysis, they selected five papers totaling 2518 patients. They discovered that the likelihood of developing TMD was twice as high in women [15]. In contrast to our results, a recent study that evaluated the prevalence of TMD among dentistry clinic patients at King Faisal University in Jeddah was published in 2021. According to Alogaibi *et al.*, there was a correlation between patient age and TMD prevalence, with older patients having higher rates. The authors also discovered that women were more likely than men to have TMDs [16].

As compared to global outcomes, A study that was published in 2020 included 1,557 participants who were 18 years of age or older and sought to determine the prevalence of TMD in the adult population in Finland. Less than 10% of the research sample experienced pain symptoms, whereas more than a third of them displayed at least one TMD symptom, according to Qvintus *et al.* [17]. Conversely, in the 19–30 age range, TMD was present in 19% of men and 30% of women. According to Jain *et al.*, there was a greater prevalence of TMD in the 19–30 age group compared to the 12-18 age group [18].

Several factors may contribute to the high prevalence of TMD in Saudi Arabia. One potential factor is the high prevalence of risk factors for TMD, such as stress, poor posture, and teeth grinding. Additionally, cultural and dietary factors may also play a role in the development of TMD in the Saudi population [11].

Given the significant impact that TMD can have on an individual's quality of life, it is important for healthcare

professionals in Saudi Arabia to be aware of the prevalence of TMD and to be able to effectively diagnose and treat these disorders. Early intervention and appropriate management of TMD can help to alleviate symptoms and improve the overall well-being of affected individuals [14].

Research into the prevalence of TMD among adults in Saudi Arabia is ongoing, and it is hoped that future studies will provide a more comprehensive understanding of the burden of TMD in the country. This information was valuable for healthcare professionals, policymakers, and individuals affected by TMD, as it can help to inform the development of targeted interventions and support services for those living with these disorders.

Conclusion

In conclusion, TMD is a common problem among adults in Saudi Arabia, with studies suggesting that the prevalence of TMD may be higher than in other parts of the world. Females had a higher prevalence of TMJD with significance. Further research is needed to better understand the burden of TMD in the country and to develop effective strategies for prevention and management. By raising awareness of TMD and its impact, healthcare professionals can work towards improving the quality of life for individuals living with these disorders in Saudi Arabia.

References

1. Cidrao ALM, Guimaraes AS. Prevalence of Temporomandibular Dysfunction Symptoms in Dental Surgeons. J Young Pharm. 2019;11(4):424-8.
2. Garg R, Neo KC, Lee JY, Ting JK, Sonjaya D. Association of Stress with Prevalence of TMJ Dysfunction in Undergraduate Dental Students. Dentika Dent J. 2023;26(1):35-41. Available from: https://talenta.usu.ac.id/dentika/article/view/11261
3. Kapos FP, Exposto FG, Oyarzo JF, Durham J. Temporomandibular disorders: a review of current concepts in aetiology, diagnosis, and management. Vol. 13, Oral Surgery. Blackwell Publishing Ltd; 2020. p. 321-34.
4. Aggag AM, Allam KA, Hossameldin RH. Prevalence and Severity of Temporomandibular Joint Disorders Among Sohag University Medical Students: A Questionnaire Study. Sohag Med J. 2023;27(3):1-6.
5. Ryan J, Akhter R, Hassan N, Hilton G, Wickham J, Ibaragi S. Epidemiology of temporomandibular disorder in the general population: a systematic review. Adv Dent Oral Health. 2019;10(3):1-3.
6. Alrizqi AH, Aleissa BM. Prevalence of Temporomandibular Disorders Between 2015-2021: A Literature Review. Cureus. 2023;15(4).
7. Ângelo DF, Mota B, João RS, Sanz D, Cardoso HJ. Prevalence of clinical signs and symptoms of temporomandibular joint disorders registered in the EUROTMJ database: a prospective study in a portuguese center. J Clin Med. 2023;12(10):3553.
8. Souza RC, de Sousa ET, Sousa D, Sales M, dos Santos Oliveira R, Mariano MH, et al. Prevalence of temporomandibular joint disorders in patients with ankylosing spondylitis: A cross-sectional study. Clin Cosmet Investig Dent. 2021;13:469-78.
9. Emel DN. Prevalence of temporomandibular disorder in Turkish University Students: a questionnaire study. Balk J Dent Med. 2019;23(2):80-7.
10. Shivhare P, Singh V, Giri R, Singh A, Penumatcha MR, Taparia N, et al. Prevalence of temporomandibular disorders among Nepalese population. J Chitwan Med Coll. 2019;9(3):34-42.
11. Nadershah M. Prevalence of temporomandibular joint disorders in adults in Jeddah, Kingdom of Saudi Arabia: a cross-sectional study. J Contemp Dent Pract. 2019;20(9):1009-13.
12. Alolayan A, Alsayed SS, Salamah RM, Ali KM, Alsousi M, Elsayed S. Temporomandibular joint disorders prevalence and awareness of appropriate clinical practices, among Al-Madinah community: A prospective cross-sectional study. F1000Research. 2022;11:395.
13. Komo HA, Almutairi MH, Addus AA, Almaghrabi AI, Hidah EN, Alraddadi FM, et al. Prevalence, knowledge and awareness level of temporomandibular joint disorder among Saudi population. Med Sci. 2023;27(131):1-12.
14. AlZarea BK. Prevalence of temporomandibular dysfunction in edentulous patients of Saudi Arabia. J Int Oral Health. 2017;9(1):1-5.
15. Hilgenberg-Sydney PB, Wilhelm JM, Pimentel G, Petterle R, Bonotto D. Prevalence of Temporomandibular Disorders and Anxiety State Levels in Ballet Dancers A Cross-Sectional Study. J Dance Med Sci. 2020;24(2):88-92.
16. Alogaibi YA, Murshid ZA, Alsulimani FF, Linjawi AI, Almotairi M, Alghamdi M, et al. Prevalence of malocclusion and orthodontic treatment needs among young adults in Jeddah city. J Orthod Sci. 2020;9:3.
17. Qvintus V, Sipilä K, Le Bell Y, Suominen AL. Prevalence of clinical signs and pain symptoms of

temporomandibular disorders and associated factors in adult Finns. Acta Odontol Scand. 2020;78(7):515-21.

18. Jain S, Chourse S, Jain D. Prevalence and severity of temporomandibular disorders among the orthodontic patients using Fonseca's questionnaire. Contemp Clin Dent. 2018;9(1):31-4.