

Prevalence of Temporomandibular Disorder (TMD) in Special Region of Yogyakarta Archery Athletes

Arief Waskitho*, Dhea Aleyda Muthmainnah**

* Department of Prosthodontics, Faculty of Dentistry, Universitas Muhammadiyah Yogyakarta, Yogyakarta 55183, Indonesia

** School of Dentistry, Faculty of Dentistry, Universitas Muhammadiyah Yogyakarta, Yogyakarta 55183, Indonesia

Correspondence: arief.waskitho@umy.ac.id

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ABSTRACT

Background: The temporomandibular joint (TMJ) is an important component of the masticatory and stomatognathic system, responsible for opening and closing the mouth, chewing food, and breathing. Anchoring, which refers to the hand placement on the chin, can lead to dysfunction of the TMJ known as temporomandibular disorder (TMD)

Method: This study utilized a descriptive observational approach with a cross-sectional design. It was conducted in various archery fields involving 57 respondents. The examination used the ID-TMD index.

Result: Out of 57 respondents, 28 (49,13%) experienced symptoms of TMD: 45.61% experienced mild TMD, and 3,50% experienced moderate TMD. Adolescent women are the group that complains most about TMD, with the most common symptom being headache, which is felt by 77,19% of all respondents.

Conclusion: There is a tendency that the anchoring position is associated with the occurrence of TMD among archery athletes, as indicated by the ID-TMD index.

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INTRODUCTION

The stomatognathic system is a functional complex of tissues and organs located in the oral and craniofacial cavities. The functions of the stomatognathic system include swallowing, breathing, phonation, and facial expression during speech.¹ The stomatognathic system comprises main elements, including mandible, maxilla, tooth-supporting tissue, muscles, and the temporomandibular joint.² The temporomandibular joint (TMJ), also known as the mandibular joint, is a joint related to the masticatory or stomatognathic system. The TMJ connects the condyle surface and the articular temporal bone articular fossa.³ TMJ-related disorders or temporomandibular disorders (TMD) are the most common pain in the orofacial area, with a global incidence of 34%.⁴

Various factors can cause TMD. The main factor is occlusal conditions, which are related to the relationship of the teeth during mastication. The second factor is trauma, both microtrauma, such as blows to the face, accidents, sports, chewing hard food, or opening the mouth wide for a long time, as well as microtrauma caused by functional overload due to hyperactivity and occlusal instability.⁵ The third factor is emotional stress, which can cause TMD symptoms by reducing the patient's physiological tolerance.^{5,6} The fourth factor is parafunctional habits, such as supporting the chin, breathing through the mouth, biting objects, and bruxism.⁵

Archery is a type of sport that uses functional muscles and requires physical endurance. There are many basic techniques in archery that archery athletes must carry out, one of which is the anchoring arm position.⁷ Anchoring is a movement made when anchoring the arrow drawing hand on the chin or jaw. In this position, pull completely under the chin bone (jaw) or jaw (mandible), and the rope touches the nose. The pulling hand must be in firm contact with the jawbone to ensure consistency.⁸

According to a study by Tse et al., repetitive, prolonged movements can cause muscle fatigue. Over time, fatigue worsens and is likely to lead to injury.⁹ In most competitions, an archer must shoot at least 72 arrows in the qualifying round, which means 72 arrows and even more if you count the previous training phase. This repetitive movement often leads to injuries among archers.⁸ ID-TMD (Indeks Diagnostik-Temporomandibular Disorders) is a special diagnostic index that has been developed for Indonesia. The index design is a simplified design intended for early detection of TMD cases in Indonesia.¹⁰ This study aims to assess the prevalence of TMD in archery athletes using the ID-TMD index, because there has been no previous research on the incidence of TMD in archery athletes in Yogyakarta.

RESEARCH METHOD

This research employs a descriptive observational study design with a cross-sectional design, indicating a one-time observation at a single point in time without follow-up. The entire population of Yogyakarta archers, totaling 120 individuals, is the focus of the study. The sample size is determined using the Slovin formula with a 10% tolerance limit for sampling error, resulting in a sample of 55 participants. Sampling is conducted using the cluster random sampling method from 5 archery clubs in Yogyakarta.

Inclusion criteria for participants involve Yogyakarta archers who regularly participated in training for at least the past 1 year and are willing to be research respondents. Exclusion criteria include

individuals who have experienced trauma to the jaw, mouth, and surrounding areas, those with genetic disorders, or those with parafunctional habits.

The study was conducted at the archery fields of Kopertis, SSA, Kenari, Bantul, and Jogja Archery School from June to July 2023. Archers include individuals actively engaging in archery for more than a year and practicing regularly. Health Research Ethics Committee, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, approved this study with No. 218/EC-KEPK FKIK UMY/VI/2023. Informed consent was obtained from each participant.

The ID-TMD questionnaire is the Indonesian version of the early detection of TMD symptoms. The questionnaire consists of 7 questions, with 4 scoring items: 0: never; 1: rare; 2: common; 3: Always. The scoring criteria are 0-3: no TMD, 4-7: Mild, 8-14: Moderate, >14: Severe.¹⁰

RESULTS

The study examined the prevalence of TMD among arrow athletes, with 57 athletes included, and the following data were collected.

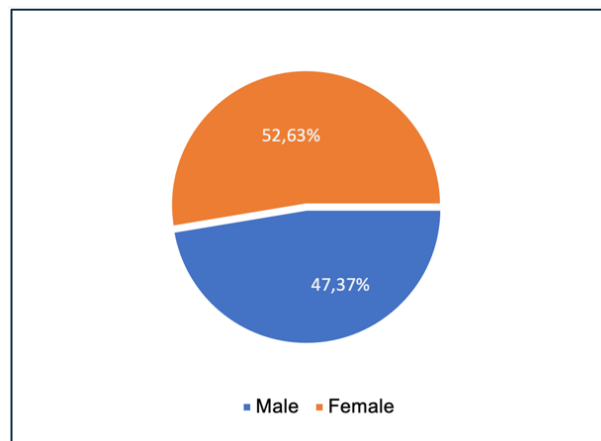


Figure 1. Criteria by gender

From Fig.1 can be found that the ratio of the number of male (47,37%) and female (52,63%). This reflects the total population of athletes in each Yogyakarta district, where the number of women athletes is more than the number of male athletes.

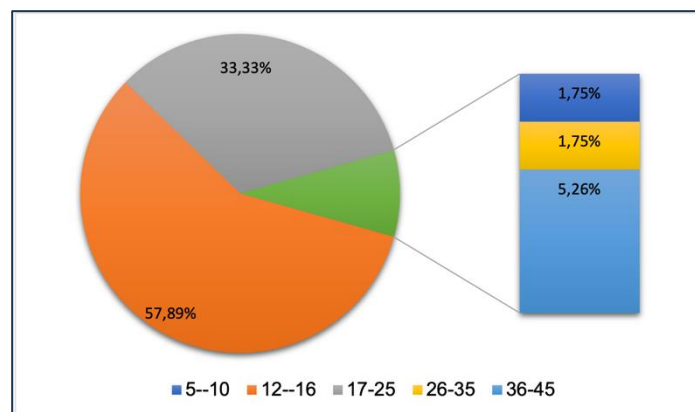


Figure 2. Criteria based on age

Fig.2. indicates that based on age characteristics, research subjects consist mostly of early age 12-16 years old, amounting to 33 subjects (57,89%), late teenage age 17-25, in 19 subjects (33,33%).

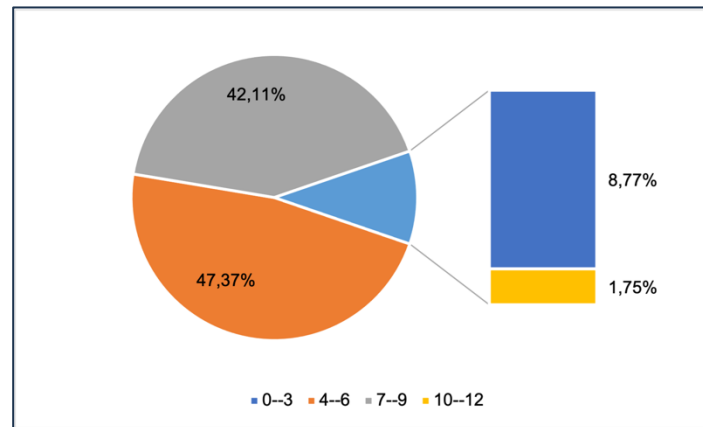


Figure 3. The length of time as an archery athlete

Fig.3 shows that the length of time as an archery athlete is mostly either 4-6 years (47,37%) or 7-9 years (42.11%).

Table 1. ID-TMD score

No.	ID- TMD Score	n	%	TMD(%)
1	0-3	29	50,87	No TMD (50,87)
2	4-7	26	45,61	
3	8-14	2	3,50	TMD (49,13)
4	>14	0	0	

Based on Table 1, it can be seen that 49,13% of respondents showed TMD incidents, and 50,87% of respondents did not experience TMD incidents (non-TMD).

Table 2. Distribution of TMD symptoms according to ID-TMD

No.	Index ID- TMD	n	%
1	Do you have pain around your jaw joint?	16	28,07
2	Do you often have headaches?	44	77,19
3	Is there pain when you open or close your mouth?	9	15,78
4	Do you feel pain in the neck and surrounding area?	29	40,87
5	Are your ears ringing for no apparent reason?	35	61,40
6	Do you often bring your upper and lower teeth together with hard pressure when you are angry?	17	29,82

7	Do you often bring your upper and lower teeth together with hard pressure when you are fully concentrating?	21	36,84
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Based on Table 2, the symptoms that were felt more frequently by respondents were headaches, 44 (77,19%) of the total number of respondents, ear ringing (61,40%), and pain around the neck (40,87%).

Table 3. Severity level of TMD incidents by gender

Gender	TMD level					
	Non- TMD		Mild		Moderate	
	n	%	n	%	n	%
Male	15	26,32	10	17,54	2	3,51
Female	14	24,56	16	28,07	0	0

From Table 3, it can be seen that the comparison of results based on gender shows that the majority of female athletes experienced mild TMD incidents according to the ID-TMD index, 16 (28,07%), and male athletes experienced moderate TMD incidents, namely 2 (3,51%)

Table 4. Severity of TMD incidence against age

Age	TMD level					
	Non- TMD		Mild		Moderate	
	n	%	n	%	n	%
5-11	1	1,75	0	0	0	0
12-16	15	26,32	17	29,82	1	1,75
17-25	10	17,54	18	14,04	1	1,75
26-35	1	1,75	0	0	0	0
36-45	2	3,51	1	1,75	0	0

Based on Table 4 above, it can be seen that athletes aged 12-16 years experienced more TMD incidents, 17 (29.82%).

Table 5. Severity of TMD incidence on duration of being an archery athlete

Duration	TMD level					
	Non- TMD		Mild		Moderate	
	n	%	n	%	n	%
0-3	4	7,01	1	1,75	0	0
4-6	12	21,05	14	24,56	1	1,75
7-9	13	22,80	10	17,54	1	1,75
10-12	1	1,75	0	0	0	0

From Table 5, it can be seen that the athletes who experienced TMD were athletes who had been archery athletes for more than 4 years.

DISCUSSION

Based on the research findings, 28 of 57 respondents (49,13%) experienced TMD, as presented in Table 1. The questionnaire results indicate that female athletes experience TMD more frequently than male athletes. Table 3 shows that 28,07% of female athletes experience mild TMD, whereas only 17,54% of male athletes do. Previous research conducted by da Silva et al. found that women tend to have higher stress levels than men, which can lead to excessive pressure on facial muscles by clenching the jaw tightly and causing TMD symptoms.¹¹ Another study by Jedynak et al. indicated that women have higher estrogen levels during menstruation, which can modulate the temporomandibular joint and result in pain, muscle weakness, and a threefold increase in TMD symptoms compared to men.¹²

TMD occurs more frequently in adolescents compared to adults.¹³ It usually emerges after puberty and worsens in terms of signs and symptoms, reaching its peak during the reproductive period.¹² The highest prevalence occurs in adolescent girls, consistent with the findings in Table 4, where 31,57% of teenage athletes are reported to experience TMD.¹⁴ The occurrence of TMD is influenced not only by gender and age but also by factors such as occlusal abnormalities, bad habits, trauma, and psychological factors.⁵ In this study, athletes engage in a holding position involving repetitive and prolonged pressure, which is suspected to contribute to TMD symptoms.⁵ Repetitive activities, such as bracing of the mandible without tooth contact, could be considered as an awake bruxism sign.¹⁵ Bruxism is closely related to the occurrence of painful TMD.¹⁶

The most frequently reported symptoms among respondents, based on the ID-TMD index, are headache in 44 respondents (77,19%), ringing in the ears without apparent cause in 35 respondents (61,40%), and neck and surrounding area pain in 29 respondents (40,87%). Aligns with research by Manent et al., which found that Archers experience pain in the Atlanto-Occipital Joint or neck area.¹⁷ Subsequent research by Vasilis et al. stated that archery athletes who regularly exercise often complain of shoulder and neck pain.¹⁸ The research results show that athletes clench their upper and lower jaws with intense pressure when angry or in full concentration. Aligns with research conducted by Nukaga et al., stating that clenching teeth can increase muscle activity, maintain balance, and enhance focus.¹⁹ At the same time, headaches can be associated with awake bruxism that is related to prolonged tooth clenching or jaw bracing.²⁰

Complaints of neck or shoulder pain are related to TMD.^{21,22} This is due to the common nerve pathway and central sensitization, recognized as key factors in the comorbidity between TMD and neck pain via the trigeminal nerve.²¹ Additionally, the most common injuries in the archery athlete are shoulder injuries.²³ TMD pain and stress are associated with headaches and neck pain.²⁴ In line with this, the finding is that stress, shoulder or neck pain, and headaches are interconnected.²⁵

CONCLUSION

Based on the research on the prevalence of archers in the Special Region of Yogyakarta with the anchoring position who experienced TMD incidents, it can be concluded that the percentage of athletes experiencing TMD is 49,13%. Athletes who experience TMD are more often found in their teens. TMD occurrences are more prevalent in female athletes than male athletes, with the most commonly complained-of symptom being headaches.

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