To investigate clinical manifestations of temporomandibular disorders in adult patients at Hue University of Medicine and Pharmacy Hospital

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Abstract

Background: Temporomandibular disorders are relatively common disturbances in the world and Vietnam. The Diagnostic Criteria for Temporomandibular Disorders suggested by Schiffman in 2014 is a frequently used diagnostic system to classify temporomandibular disorders into subtypes, toward therapeutics purposes. **Objectives:** (1) To investigate clinical features of temporomandibular disorders in adult patients. (2) To classify temporomandibular disorders using the Diagnostic Criteria for Temporomandibular Disorders of Schiffman. **Materials and method:** Cross-sectional study in 50 adult patients with temporomandibular disorders who visited Dental Clinic, Hue University of Medicine and Pharmacy Hospital from May 2020 to May 2021. Patients were clinically examined by a calibrated doctor, using Symptoms Questionnaires and Examination Form which are the main tools of The Diagnostic Criteria for Temporomandibular Disorder. **Results:** The popular age group was 18-44 years old (94%). The female/male ratio was 2.8/1. Patients mostly came to the hospital due to pain (70%). Myalgia accounts for the highest proportion (70%) of all subtypes. The most common intra-articular joint disorder subtype was disc displacement with reduction (68%). **Conclusions:** Temporomandibular disorders were common in young, women adults; the chief complaint of patients was pain. Myalgia and disc displacement with reduction were two frequent TMD subtypes.

Keywords: temporomandibular disorders, intra-articular disorders, Diagnostic criteria for Temporomandibular Disorders, disc displacement.

1. INTRODUCTION

Temporomandibular disorders (TMD) are a group of musculoskeletal and neuromuscular conditions that involve the temporomandibular joint (TMJ), the masticatory muscles, and all associated tissues [1]. The three most common symptoms of TMD include orofacial pain, mandibular movement dysfunction, and the joint sound of TMJ [2]. The most common age group having TMD is from 20 to 50 years old; women account for more proportion than men; the most prevalent symptom of TMD is TMJ joint sounds [3-5]. TMD are becoming a prominent health problem in most countries around the world. In the past few decades, studies have shown that TMD are common in the community. In the world, the prevalence of TMD is rather high, about 17% according to the study of Jivnani HM et al (2019) [6]. In Vietnam, Pham Nhu Hai et al (2006) conducted research on 544 Hanoi residents about the status of TMD. The result pointed out that the percentage of participants with at least one sign or symptom of TMD was 64.7%; among them, 20.6% of subjects showed moderate to severe dysfunction [7]. Hoang Anh Dao et al (2015) performed a study on 201 Dental students at Hue University of Medicine and

Pharmacy, which revealed that 72.6% of students have at least one sign or symptom of TMD [8]. There is a difference in the proportion of TMD among participants between the studies mainly due to the diversity in the diagnostic criteria used in each study, as well as the research subjects. Previous studies in Vietnam have focused on reporting signs and symptoms of TMD without using a specific diagnostic system to classify TMD [7-9].

Currently, there are many diagnostics or classification systems of TMD designed for clinical assessment or research purposes. Diagnostic Criteria for Temporomandibular Disorders - DC/TMD, suggested by Schiffman in 2014, is the most commonly used classification system in the world [10]. DC/TMD illustrates the standardized methods and procedures for the evaluation and diagnosis of TMD. It classifies TMD into three groups, including (1) pain-related TMD and headache, (2) intra-articular joint disorders, and (3) degenerative joint disorder, establishing fundamentals for the physicians in treating each subtype of TMD [11]. DC/TMD has become very popular and got the consensus of clinicians around the world. However, in Vietnam, DC/TMD has not been well-known by

dentists. Therefore, we performed this study for the following purposes:

1. To investigate clinical characteristics of temporomandibular disorders in adult patients visiting the hospital of Hue University of Medicine and Pharmacy;

2. To classify temporomandibular disorders based on Diagnostic Criteria for Temporomandibular Disorders suggested by Schiffman in 2014.

2. MATERIALS AND METHODS
2.1. Subjects

Fifty patients had at least one of four following signs or symptomps: pain, joint sound, restristed mouth opening, movement disorders, and were diagnosed TMD through clinical examination using DC/TMD. All patients aged 18 years or older, visited the Dental Clinic of Hue University of Medicine and Pharmacy Hospital from May 2020 to May 2021. Exclusion criteria include orofacial swelling or pain caused by infection or trauma of the head and face, systemic diseases such as rheumatoid arthritis and polyarthritis, and a history of joint trauma or mandibular condyle fracture.

2.2. Study methods

We conducted a cross-sectional study on fifty patients. Each participant received a Symptom Questionnaire of DC/TMD (SQ), firstly completed by themselves, afterward confirmed by a doctor at the chair-side. Then, the same doctor clinically examined the patient and filled the results in the Examination Form of DC/TMD (EF). Signs and symptoms of TMD are analyzed using detailed results in the SQ and EF. We diagnosed patients with or without TMD and classified the subtypes of TMD based on the Decision Trees given in the DC/TMD [10]. SQ and EF were translated into Vietnamese by a TMD specialist with an eligible English level. Only one doctor, who got the certificate of DC/TMD Clinical Training and Calibration, performed the translating DC/TMD documents and assessing all the patients in this study.

Investigated variables consist of:

- (1) age of participants: we divided into 3 age groups: 18 - 44, 45 - 60, and > 60

- (2) gender of participants: male or female

- (3) chief complaint: the main reason made patient go to the hospital

- (4) duration of symptoms: length of time from symptoms onset to the examination day

- (5) opening pattern: straight, corrected deviation, and uncorrected deviation

- (6) TMJ noises: no sound, clicking sound, and crepitus

- (7) pain sites during the examination: we palpated temporalis muscle, masseter, TMJ, posterior mandibular region, submandibular region, lateral pterygoid area, and temporalis tendon on both sides to define the site of pain when pressing.

- (8) subtypes of TMD: 3 groups: pain-related to TMD and headache (including myalgia, arthralgia, and headache attributed to TMD), intra-articular joint disorders (including disc displacement with reduction and disc displacement without reduction), and degenerative joint disorder

Variables from (5) to (8) were selected from SQ, EF or the Decision Trees of DC/TMD, which are completely described in DC/TMD protocol [11].

The collected data were processed and statistically analyzed using SPSS 20.0 software. Descriptive data were shown in numbers, percentages, mean, and standard deviation.

3. RESULTS
3.1. Clinical characteristics of temporomandibular disorders

The most common age group was 18-to-44-year-old, occupying 94% of patients. Women were more prominent than men (74% versus 26%) (Table 1).

The main reason for the patients to come to the clinic was pain, with 35 patients, accounting for 70%, followed by noise in the TMJ with 9 cases (8%). The patients with joint sound had the longest waiting time from suffering the symptom till visiting the doctor, lasting about 17.5 months on average (Table 2).

About features of opening mouth movement, the predominant pattern of mouth opening in TMD patients was corrected deviation, with 74% of patients, followed by straight opening in 20% of patients. The deviation without correction was less common with rate of 6% (Table 3).

Click was the most common type TMJ sound, detected in 60% of patients (Table 4).

The most common pain site on examination was the masseter with the rate of 66% of patients, followed by temporomandibular joint area with 52%. Temporalis muscle and posterior mandibular region were two areas that were also often painful on examination with the rate of 32% and 38% of patients, respectively. Other sites were less painful during examination, only seen in some patients (Table 5).

Table 1. Age and sex distribution of the study sample

Gender / Age group	Male		Female		Total		Mean age
	n	%	n	%	n	%	Mean ± SD
18 - 44	13	26%	34	68%	47	94%	24.9 ± 0.83
45 - 60	0	0%	2	4%	2	4%	51.5 ± 2.5
> 60	0	0%	1	2%	1	2%	68 ± 0
Total	13	26%	37	74%	50	100%	26.8 ± 9.7

Table 2. Main reason for hospital visiting and duration of symptom

Chief complaint (n, %)	Shortest time (Months)	Average (Months) Mean ± SD	Longest time (Months)
Pain (n = 35, 70%)	0,5	8.7 ± 2.0	48
Join sound (n = 9, 18%)	0,5	17.5 ± 9.1	84
Restricted mouth opening (n = 4, 8%)	1	7.3 ± 5.6	24
Movement disorders (n = 2, 4%)	0,5	1.3 ± 0.8	2

Table 3. Features of opening mouth movement

Opening pattern		Number of patients	
		n	%
Straight		10	20
Corrected deviation		37	74
Uncorrected deviation	To the right	1	2
	To the left	2	4
Total		50	100

Table 4. Characteristic of TMJ noises

Side / Joint sounds	Right		Left		Patient	
	n	%	n	%	n	%
Click	19	38	18	36	30	60
Crepitus	1	2	0	0	1	2
No sound	30	60	32	64	19	38
Total	50	100	50	100	50	100

Table 5. Pain sites during examination

Side / Site of pain	Right (n = 50)		Left (n = 50)		Patient (n = 50)	
	n	%	n	%	n	%
Temporalis muscle	12	24	11	22	16	32
Masseter	19	38	26	52	33	66
Temporomandibular joint	12	24	21	42	26	52
Posterior mandibular region	13	26	14	28	19	38
Submandibular region	3	6	3	6	4	8
Lateral pterygoid area	2	4	2	4	2	4
Temporalis tendon	2	4	2	4	3	6

3.2. Classification of TMD according to Diagnostic Criteria DC/TMD

Each patient may have one or more than one classification of TMD according to DC/TMD. In the group of pain-related TMD and headache, myalgia accounted for the largest proportion with 70% of patients, followed by arthralgia with 50% of patients, and finally headache with the rate of 8%. In the group of intra-articular joint disorders, the disc displacement with reduction was more common than the disc displacement without reduction (68% versus 10%) (**Table 6**).

Table 6. Classification of TMD according to DC/TMD, Schiffman 2014

	Side	**Right** (n = 50)		**Left** (n = 50)		**Patient** (n = 50)	
Classification of TMD		**n**	**%**	**n**	**%**	**n**	**%**
Pain-related TMD and headache	Myalgia	23	46%	28	56%	35	70%
	Arthralgia	10	20%	20	40%	25	50%
	Headache attributed to TMD	3	6%	3	6%	4	8%
Intra-articular joint disorders	Disc displacement with reduction	23	46%	24	48%	34	68%
	Disc displacement without reduction	4	8%	4	8%	5	10%
Degenerative joint disorder		1	2%	0	0%	1	2%

4. DISCUSSIONS

4.1. Clinical Manifestations of Temporomandibular Disorders

4.1.1. Characteristics of research samples

The study recruited fifty adult patients visiting Hue University of Medicine and Pharmacy. The 18-44-year-old group was predominant, accounting for 94%. The result is consistent with findings in the study of Gonçalves et al. (2009) when it found that the most common age group having signs of TMD was 20 - 50 years old [3]. The mean age of patients was 26.8 ± 9.7. TMD is more popular in young adults than in the elderly because TMD is a self-limited condition [12]. Two reasons are suggested to explain this special feature. The first reason is that the structure of the articular cartilage covering the condyle and the articular surface of the temporal bone is fibrocartilage instead of hyaline cartilage like other movable joints in the body, so it is capable of changing to adapt to the force loading on joints during functional activities as well as to the effects of macro-trauma or micro-trauma [13]. Moreover, occlusion might be a local causative factor of TMD, and it often changes in the adolescence period, afterward, gradually becoming more stable in adulthood and middle age.

In our study, TMD was more common in women than in men (74% *vs.* 26%), which is in agreement with the result in the study of Gonçalves et al. (2009) and of Jussila et al. (2017) [3], [4]. Women are often more concerned about their health and likely to visit a dentist rather than men.

4.1.2. Reason for hospital visiting and duration of symptoms

The main reason why TMD patients seek the treatment was mainly because of pain, found in 70% of cases, followed by the sound in the TMJ with the rate of 18%. Although the most common reported symptom is a joint sound, patients often come to the hospital when suffering from pain. Joint sounds occur in the early stage of TMD but usually do not cause any pain or discomfort, leading to patients often ignoring this symptom [1, 13]. Recording the length of time from symptom onset to examination of pain and joint sounds was also consistent with this finding when joint sounds were the main reason for the patient to come to the clinic with the longest waiting duration (meantime is 17.5 ± 9.1 months).

4.1.3. Characteristics of opening mouth movement

There are three types of opening mouth movement: straight, corrected deviation, and uncorrected deviation, in which the straight opening is normal. In this study, the corrected deviated opening happened in almost three-quarters of the patients (74%). During the opening, the mandible shifts to one side then returns to the midline at the maximum opening. This pattern usually occurs in patients with TMJ disc displacement with reduction. The dislocation of the articular disc (anteriorly or anteriorly combining with medially/laterally)

in one side hinders the anterior translation of the affected condyle. Therefore, when the mandible opens, the condyles on both sides are incapable to move simultaneously, resulting in the mandibular movement deviating toward the joint with the dislocated disc. If the patients continue to open their mouth, the disc returns to its normal position which is above the condyle. At that moment, the affected condyle can translate anteriorly, and the mandible returns to the midline. The uncorrected deviation occurs in patients with TMJ disc displacement without reduction. In the early stages of mouth opening, there is a lateral shift of the mandible due to disc displacement as explained above. However, in this situation, even though the patient continues to open, the articular disc cannot return to the correct initial position above the condylar head. In this case, the more the patient opens, the more the mandible deviates to the disc-dislocated side [1].

4.1.4. Characteristics of joint sounds

In this study, the most common type of joint sounds was the click that was detected in 60% of patients. Only 2% of the patients had crepitus. The study of Hoang Anh Dao et al (2015) showed that the rate of click and crepitus was 39.2% and 12.5%, respectively [8]. When the joint experiences disc displacement with reduction, the changing position of the articular disc, from anterior to condyle to superior the condylar head or reversely, creates a clicking sound during open/close or eccentric movements. The crepitus results from the direct friction between the two bony components of the TMJ: the mandibular condyle and the articular eminence of the temporal bone, especially when the protective articular cartilage surface is eroded. TMJ clicking sounds often appear in the early stages of intra-articular disorders whilst the crepitus develops later when the TMJ already suffers from osteoarthritis or osteoarthrosis [1,13].

4.1.5. Pain sites during the examination

Most patients (66%) experienced pain when palpated on the masseter. The masseter is a large muscle and plays a major role in lifting the jaw. In case patients have parafunctional habits such as teeth grinding or clenching, overloading on masseter during a long period of time leads to excessive contraction, thereby resulting in fatigue or pain of the masseter [1,13]. The second most common pain on examination was the TMJ (52% of patients). The TMJ has the posterior attachment structure that is a non-bearing loose connective tissue containing many blood vessels and nerves. When the TMJ articular disc is displaced anteriorly,

the posterior attachment is the main bearing area during mandibular functions. Damaging posterior attachment is the main reason for the TMJ pain [13]. In our study, pain on examination in the lateral pterygoid area was uncommon. Otherwise, research by Cooper et al (2007) reported that the lateral pterygoid muscle was the most common site of pain on examination (85.1%) [14]. Unlike the other examination methods, DC/TMD suggests assessing the lateral pterygoid muscle pain by pressing in the lateral pterygoid area with light force (0.5kg), instead of pressing the muscle directly. The lateral pterygoid muscle is, in fact, too complicated to examine by direct palpation because of its deep location.

4.2. Classification of Temporomandibular Disorders according to Diagnostic Criteria DC/TMD suggested by Schiffman in 2014

In Vietnam, research about TMD is increasingly popular. Previous studies have mainly described clinical features, symptoms, and signs of TMD, but have not used any classification systems for TMD. Currently, DC/TMD - the classification of TMD, suggested by Schiffman, has been widely used. Moreover, it is accessible with standardized examining procedures. Therefore, we want to apply it to clinical examinations in Vietnam.

In this study, many patients were diagnosed with two or more subtypes of TMD. In the pain-related TMD and headache group, muscle pain was more common than joint pain. This result is consistent with Jussila's study (2017) [4]. Myalgia was also the most common subtype of TMD, in agreement with the findings of Yap et al' s study (2003) [15]. In the study, myalgia was at a high rate (70%), quite similar to the study of Winocur et al (2009) (65%) [16]. In the intra-articular joint disorders group, disc displacement with reduction was more common than disc displacement without reduction. This result is concordant with the study of Graue (2016) and Jussila (2017) [4,17]. When collecting patients' medical history, we found that a single symptom, such as pain, noise, and limited jaw movement, has been present for a long time before. However, patients usually go for a check-up when they experience more than one sign or symptom. TMD can clinically manifest in any form of pain-related TMD and headache, intra-articular joint disorders, or degenerative joint disorder. These subtypes are closely related and interact with each other. A disorder can trigger or aggravate another pre-existing one, under the influence of many pathophysiological factors [1].

Only 2% of patients in this study had degenerative joint disorder (DJD). This finding is consistent with the

study of Wiese et al. (2008), Winocur et al. (2009), with the rate of DJD being 1% and 2.9%, respectively [16,18]. DJD was less common than other subtypes of TMD. DJD, including osteoarthritis and osteoarthrosis, can be an advanced stage of disc displacement and occur in the late stages of TMD. The symptoms of the pain-related TMD and headache or intra-articular joint disorders are often severe enough for patients to visit a dentist before TMD progress to the degenerative stage [13]. Besides the feature that TMD is more common in young adults, the low rate of DJD in the study also indicates that TMD is a self-limiting condition.

5. CONCLUSIONS AND RECOMMENDATIONS

TMD was popular in young people, more in women than men, patients come to the clinic mainly

due to pain. The masseter and the TMJ were the two most frequent sites of pain. The click was the most common type of joint sound. Myalgia and disc displacement with reduction were two predominant subtypes of TMD.

Performing precise clinical examinations and determining the correct diagnosis for TMD play a crucial role in planning and selecting the type of treatment for TMD. DC/TMD, suggested by Schiffman in 2014, is a user-friendly tool with standardized examining procedures. Clinicians in Vietnam can use DC/TMD to diagnose TMD during their dental practice. DC/TMD is also probably applied to epidemiological studies to survey the status of TMD in the community, thereby determining the severity as well as the need for treatment of this condition.

REFERENCES

1. Okeson JP. Management of Temporomandibular Disorders and Occlusion. 8th ed. Elsevier Health Sciences; 2019. p. 102, 258.

2. Wright E. Manual of temporomandibular disorders. 2nd ed. John Wiley & Sons; 2009. p. 17.

3. Gonçalves D, Speciali J, Jales LCF, Camparis CM, Bigal ME. Temporomandibular symptoms, migraine, and chronic daily headaches in the population. Neurology 2009; 73(8): 645-646.

4. Jussila P, Kiviahde H, Näpänkangas R, Päkkilä J, Pesonen P, Sipilä K et al.. Prevalence of Temporomandibular Disorders in the Northern Finland Birth Cohort 1966. Journal of Oral & Facial Pain and Headache 2017; 31(2): 159-164.

5. Lung J, Bell L, Heslop M, Cuming S, Ariyawardana A. Prevalence of temporomandibular disorders among a cohort of university undergraduates in Australia. Journal of investigative clinical dentistry 2018; 9(3): 238-242.

6. Jivnani HM, Tripathi S, Shanker R, Singh BP, Agrawal KK, Singhal R. A study to determine the prevalence of temporomandibular disorders in a young adult population and its association with psychological and functional occlusal parameters. Journal of Prosthodontics 2019; 28(1): 445-449.

7. Pham Nhu Hai. Study on epidemiology about masticatory system dysfunctions and suggest intervention solutions [PhD thesis], Hanoi Medical University; 2006.

8. Hoang Anh Dao, Tran Xuan Viet Anh, Nguyen Minh Tam. Prevalence of temporomandibular disorders and its relation to malocclusion among Odontostomatology students in Hue Medical and Pharmaceutical University. Journal of Medicine and Pharmacy 2015; 6(03): 85-90.

9. Nguyen MS, Saag M, Voog-Oras U, Nguyen T, Jagomägi T. Temporomandibular disorder signs, occlusal support, and craniofacial structure changes among the elderly Vietnamese. Journal of maxillofacial and oral Surgery 2018; 17(3): 362-371.

10. Schiffman E, Ohrbach R, Truelove E, Look J, Anderson G, Goulet JP et al. Diagnostic criteria for temporomandibular disorders (DC/TMD) for clinical and research applications: recommendations of the International RDC/TMD Consortium Network and Orofacial Pain Special Interest Group. Journal of Oral & Facial Pain and Headache 2014; 28(1): 6-27.

11. Ohrbach R, Gonzalez, List T. "Diagnostic criteria for temporomandibular disorders (DC/TMD) clinical examination protocol. [Online]. 2014. Available from: www.rdc-tmdinternational.org.

12. Reny de Leeuw, Klasser GD. Orofacial Pain: Guidelines for Assessment, Diagnosis, and Management. 6th ed. Quintessence Publishing; 2018. p. 127.

13. Tran Ngoc Quang Phi. Clinical Functional Occlusion and Masticatory System Disorders. 1st Ed, Medical Publishing; 2018. p. 36, 42-44, 313-323.

14. Cooper B. C., Kleinberg I. Examination of a large patient population for the presence of symptoms and signs of temporomandibular disorders. The Journal of Craniomandibular & Sleep Practice 2007; 25(2): 114-126.

15. Yap AUJ, Dworkin SF, Chua EK, List T, Tan KB, Tan HH. Prevalence of temporomandibular disorder subtypes, psychologic distress, and psychosocial dysfunction in Asian patients. Journal of Orofacial Pain 2003; 17(1): 21-29.

16. Winocur E, Steinkeller-Dekel M, Reiter S, Eli I. A retrospective analysis of temporomandibular findings among Israeli-born patients based on the RDC/TMD. Journal of Oral Rehabilitation 2009; 36(1): 11-17.

17. Graue AM, Jokstad A, Assmus J, Skeie MS. Prevalence among adolescents in Bergen, Western Norway, of temporomandibular disorders according to the DC/TMD criteria and examination protocol. Acta Odontologica Scandinavica 2016; 74(6): 449-455.

18. Wiese M, Svensson P, Bakke M, List T, Hintze H, Petersson A et al. Association between temporomandibular joint symptoms, signs, and clinical diagnosis using the RDC/TMD and radiographic findings in temporomandibular joint tomograms. Journal of Orofacial Pain 2008; 22(3): 239-251.