The analysis of temporomandibular disorder based on RDC/TMD axis I revision 2010 in dentistry students

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ABSTRACT

Introduction: Temporomandibular joint disorders is a pathologic conditions as a caused of musculoskeletal pain and dysfunction syndrome in stomatognathic system. This disorder was suffered in the population and affected the quality of life. This study was done to know how was the condition of temporomandibular joint disorders in the student of Faculty of Dentistry Universitas Padjadjaran population. Another objective of this study was the diagnosis classification of revised RDC-TMD Axis I could be applicated in Indonesian population, and to calibrate the diagnostic. Methods: The research sample was 65 student of Faculty of Dentistry Universitas Padjadjaran, with 43 female and 22 male. Result: The result showed that 50% of the student of Faculty of Dentistry Universitas Padjadjaran minimally suffered one diagnosis of temporomandibular joint disorders; with the most disorder was disc displacement with reduction, in left or right joint, followed by myofacial pain with limited opening. Conclusion: The conclusion of this research there was a high percentage of temporomandibular joint disorders in student population based on Revised Research Diagnosis Criteria for Temporomandibular Joint Disorders 2010, with the most disorder were disc displacement with reduction. So, it was important to socialize this sign and symptom of these disorders to community.

Keywords: Temporomandibular joint disorders, diagnosis, revised RDC/TMD 2010

INTRODUCTION

Temporomandibular joint disorders (TMD) are mastication systems disorders that affecting the temporomandibular joints, teeth, and chewing muscles, which have major signs and symptoms of joint or muscle pain during function and nonfunction, movement abnormalities, and joints sound.[1] The etiology of TMD is multifactorial, with local and systemic factors may jointly cause clinical symptoms.[1] The prevalence of age of this disorders is around the age of 20-40 years with the

ratio between female and male population around 3-4:1.[3] Prevalence of presence signs and symptoms of TMD ranged from 60-70% in the population, and those who felt the need to seek treatment were only 5%.[4]

Because the etiology of TMD is multifactor, the management of TMD treatment must start with careful observation and examination to determine the actual etiology. Errors in determining the cause of the disturbance will slow the healing and increase the likelihood of recurrence.[4] Other signs and symptoms of TMD

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may include craniomandibular pain, earache, tinnitus, dizziness, neck pain, and headache.[5] This symptom can occur acutely with mild symptoms and disappear by itself or develop into a chronic disorder with physical symptoms and more severe pain that can be accompanied by psychological and psychosocial symptoms and bad habits.[6]

Chronic changes lead to impaired or disrupted functional ability of the stomatognathic system that can degrade the patient's quality of life and increase socioeconomic costs. Therefore, an appropriate diagnosis, which includes a schematic, sensitive and specific etiology and classification, should be made as early as possible to facilitate TMD care management.[7] To determine the exact diagnosis of STM disorder, a tool that can be used to determine the exact classification of the disorder, now widely used is the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) introduced by Dworkin and LeResche in 1992.[8] Later in 2010, Revised Research Diagnostic Criteria for Temporomandibular Joint Disorders (RDC/TMD Revision 2010) was developed.[8]

RDC/TMD revision 2010 has been developed to be Diagnostic Criteria for Temporomandibular Joint Disorders (DC/TMD), but for this research is still used revised 2010 because it is more simple. The classification of RDC/TMD is a diagnostic classification of TMD disorders first established on the basis of etiology and is used for clinical and epidemiological research purposes because it has proven its reliability and validity internationally.[8] Although this classification has been translated and applied in more than 50 countries, in Indonesia, this classification is still not widely used. Before applying this classification, it is usually necessary to first calibrate to determine whether the measurement is appropriate to the conditions in each country.

METHODS

The population of this research is student of Faculty of Dentistry of Universitas Padjadjaran who is working at Dental Hospital Universitas Padjadjaran Jl. Sekeloa Selatan 1 Bandung, which meets the research criteria and is willing to be a research respondent. The subjects of the study were chosen by consecutive sampling, i.e. every student who met the criteria of research within

a certain period of time (January-February 2013) included in the study, so that the number of patients determined was met.

The inclusion criteria were: Adults, men and women, healthy and willing to participate in the study, age between 18-30 years; Complete teeth, at least second molar has eruption; Not undergoing medical treatment due to systemic disease or ENT, Not showing symptoms similar to STM disorders, such as: ear inflammation, sinus/nose, throat, parotid saliva glands, rheumatism; Dental nerve abnormalities/acute pulpitis, bleeding gums, shaking teeth, acute pericoronitis, and trigeminal neuralgia; Never treated for TMD; Not experiencing growth and developmental disorders or fractures/direct trauma in the face and head areas; Not being/undergoing orthodontic treatment; Not suffering from pain that reduces the ability to follow operator instructions; Has no congenital or congenital musculoskeletal abnormalities, such as lordosis, kyphosis, and scoliosis. Exclusion criteria: severe malocclusion with skeletal abnormality of grade 2/class 3; Serious systemic disorders; The results are incomplete; or The subjects did not follow the entire study procedure or withdrew.[9]

First, an explanation to the respondents who will be the subject of research, what will be done operator, the purpose to be achieved, and the advantages and disadvantages to participate in this study. If willing to follow the research, are required to sign the informed consent sheet and fill out the questionnaires of TMD. If the respondent is appropriate as the subject of the study, examination of TMD is done based on Revision of RDC-TMD Axis I, the results are recorded. The determination of temporomandibular joint disease classification is performed according to the 2010 Axis I RDC/TMD Revised Algorithm, then tabulated.[9]

RESULT

The research to know the extent of TMD condition in dentistry students based on RDC-TMD Axis I 2010 revision classification found 70 people who meet the criteria of research subject but only 65 can be sampled because 5 samples are not complete.

Based on the result, the distribution of research subject of female students (n=43) and male (n = 22) presented in Table 1, the distribution

of clinical examination results RDC-TMD Axis 1 presented in Table 2-6, An algorithm calculation was performed to obtain a diagnosis of TMD presented in Table 7, and the conclusions of the diagnosis of TMD presented in Table 8.

DISCUSSION

According to Table 1, the number of female research subjects is higher than male subjects. It can be understood because the taking of research subject is done by purposive sampling and research done in Faculty of Dentistry Universitas Padjadjaran which had more female students than male. However, in the general population study, Solberg et al.[10] recognized the same percentage in patient that came to the hospital to treat TMD disorders, whereas Schifmann[9] and Koidis[11] study got female 4 times more than male come to the dentist to treat TMD disorders.

Tabel 1. Research Sample Distribution

Sample Distribution	Male	Female	Total
n	22	43	65
%	33.85 %	64.15 %	100 %
Age range	19-29 year	18-27 year	18-29 year
Average age	24.00 year	22.91 year	23.29 year

Table 2. Distribution of clinical examination of RDC-TMD Axis 1 based on pain area

Examination site	Indicator	Male		Female	
Facial pain	None	17		27	
	Left	1		5	
	Left	-		5	
	Both	4		6	
		Right	Left	Right	Left
Area of pain	None	19	20	34	39
	Joint	-	-	4	1
	Muscle	1	-	1	1
	Both	2	2	4	2

Table 3. Distribution of clinical examination of RDC-TMD Axis 1 based on jaw openings

		Male		Female	
Opening jaw movement	0-straight	7		11	
	1-Right deflection	2		6	
	2- Right deviation (S)	2		5	
	3- Left deflection	3		5	
	4- Left Deviation (S)	6		13	
	5-other	2		3	
Range of vertical opening		Muscle pain	Joint pain	Muscle pain	Joint pain
Maximum unassisted opening	None	19	18	36	40
Right	-	-	4	3	
Left	1	1	2	-	
Bilateral	2	1	3	-	
Maximum Assisted opening	None	18	19	30	32
Right	-	-	3	4	
Left	1	2	2	1	
Bilateral	3	1	8	6	

Table 4. Clinical examination distribution RDC-TMD Axis 1 Based on Joint sound

Joint sound		Male		Female	
		Right	Left	Right	Left
a. While opening	None	16	17	33	29
	Clicking	5	5	5	10
	Rough crepitation	-	-		-
	Smooth crepitation	1		5	4
b. While closed	None	15	16	31	32
	Clicking	5	4	10	9
	Rough crepitation	-	-		-
	Smooth crepitation	2	4	2	2
c. No resiprocal click	No				
	Yes	3	3		6
	Not always	1	-		2
Excursive joint sound		**Right**	**Left**	**Right**	**Left**
Right excursive	None	19	19	39	38
	Clicking	3	3	2	3
	Rough crepitation	-	-		-
	Smooth crepitation	-	-	2	2
Left excursive	None	20	20	40	30
	Clicking	2	2	2	2
	Rough crepitation	-	-	1	-
	Smooth crepitation	-	-	-	11
Protrusive	None	19	19	40	42
	Clicking	3	3	3	1
	Rough crepitation	-			-
	Smooth crepitation	-		1	1

The sample age ranges from 18 to 29 years, with an average age of 23.29 years. The most frequent age range for TMD treatment is age 20 to 49 years, according to Koidis[11] and Ozden[12] statements and almost identical to Mc. Neill[13] research (20-50 years), whereas Reychlera et al.[14] states that ages 20 to 40 years are common age with TMJ disorders.

Table 2-6 illustrates the distribution of clinical examination of RDC-TMD Axis 1. The first examination of the history of pain in the face area, 33% of subjects felt facial pain. Pain is one sign of TMD, along with joint sound (clicking, popping, or crepitation) and limited mouth opening. Pain may not always be confirmed, as only 16% can indicate pain areas. Based on the calculation of diagnosis, not all who have a history of pain diagnosed with miofacial pain, who was diagnosed with miofacial pain only 15 people. Miofacial pain associated with stress, so the history of facial pain that occurs due to stress, will disappear when the stress is reduced. In addition, the signs and symptoms of this disorder are almost identical to other disorders, so to determine the diagnosis requires another examination to make sure.

Myofacial pain-dysfunction syndrome is a psychophysiological illness involving chewing muscles. This myofacial disorder, originally a functional disorder, will cause degenerative changes in TMD and mastication muscles.[15] Since the sample ranges from 18 to 30 years of age, joint degenerative changes have not been so symptomatic, and must be confirmed by other tests, such as radiographic examination.

According to Okeson[16], examination of the jaw opening pattern, it is important to determine the diagnosis of joint disorders. The presence of a deflection jaw opening pattern typically indicates a disc displacement without reduction, and a deviation jaw opening pattern showing

Table 5. Distribution of clinical examination of RDC-TMD Axis 1 based on pain when moved

Excursive movement Muscle pain		Male		Female	
		Joint pain	Muscle pain	Joint pain	
right Lateral	None	21	20	39	42
	Right	-	-	1	1
	Left	-	1	2	-
	Bilateral	1	1	1	-
Left Lateral	None	21	21	42	43
	Right	-	-	1	-
	Left	-	-	-	-
	Bilateral	1	1	-	-
Protrusion	None	21	20	32	42
	Right	-	-	-	-
	Left	-	1	-	-
	Bilateral	1	1	11	1

Table 6. Distribution of clinical examination of RDC-TMD Axis 1 based on muscle palpation

Extraoral muscle palpation Right		Male		Female	
		Left	Right	Left	Right
a. Temporal posterior	0	20	20	43	41
	1	1	1	-	2
	2	1	-	-	-
	3	-	1	-	-
b. Temporalis Medial	0	20	19	41	40
	1	2	2	2	3
	2		1	-	-
	3		-		-
c. Temporalis anterior	0	19	20	41	39
	1	1	-	-	2
	2	1	-	2	2
	3	1	2	-	-
d. Superior Masseter	0	20	20	39	37
	1	1	1	4	6
	2		-	-	-
	3		1	-	-
e. Medial masseter	0	20	20	38	38
	1	2	2	4	4
	2			1	1
	3				-
f. Inferior masseter	0	20	20	38	39
	1	2	1	3	2
	2		1	2	1
	3				-
g. Posterior mandible (stylohioid/digastricus post)	0	20	21	39	
	1				2
	2				1
	3				-

		Right	Left	Right	Left
h. Submandibular (pterygoid medialis/digastricus post.)	0	19	19	42	41
	1			1	1
	2				1
	3	3	3		-
Joint palpation		Right	Left	Right	Left
Preauricular	0	20	19	39	38
	1	1	-	3	2
	2	1	3	1	3
	3	-	-	-	
Intrameatal	0	20	20	39	39
	1	1	-	2	2
	2	1	2	1	2
	3	-	-	1	
Intraoral muscle palpation		Right	Left	Right	Left
Pterygoid lateralis	0	16	16	25	25
	1	1	2	13	14
	2	4	3	4	3
	3	1	1	1	2
Tendon temporalis	0	15	16	30	27
	1	4	2	9	12
	2	3	4	3	3
	3	-		1	1

Table 7. Diagnosis Distribution of Temporomandibular Joint Disorders

Diagnosis of TMD	Grup	Male n = 22	Female n = 43	Total n = 65
Myofasial pain	I a	1	4	5
Myofasial pain with limited opening	I b	2	8	10
Disc diplacement with reduction right joint	II a	6	6	12
Disc diplacement without reduction with limited opening reduction right joint	II b	0	0	0
Disc diplacement without reduction without limited opening reduction right joint	II c	0	0	0
Disc diplacement with reduction left joint	II a	6	6	12
Disc diplacement without reduction with limited opening left joint	II b	0	1	1
Disc diplacement without reduction without limited opening left joint	II c	0	1	1
Athralgia right joint	III a	2	3	5
Osteoathritis right joint	III b	0	1	1
Osteoathrosis right joint	III c	0	2	2
Athralgia left joint	III a	3	3	6
Osteoathritis left joint	III b	0	2	2
Osteoathrosis left joint	III c	0	2	2
Not diagnozed of TMD		12	21	33

a disc displacement with reduction.[16] In RDC-TMD Axis 1, although this examination is not to determine the diagnosis, but can be used as a tool. Based on the calculation, 16 samples were found to be deflected to the right or left, but only 2 samples were diagnosed with a displacement of disc without reduction. Also on examination of the deviation jaw opening pattern, there

Table 8. Multidiagnosis Distribution of TMD

TMD Diagnosis	Male	Female	Total
Diagnosed with TMD	10	22	32
One diagnosis of TMD	6	10	16
Two diagnosis of TMD	1	2	3
Three diagnosis of TMD	1	4	5
Four diagnosis of TMD	1	1	2
Five diagnosis of TMD	1	2	3
Not diagnosed with TMD	12	21	33
%	36.36 %	63.63 %	50.76 %

were 26 people detected deviation, but only 19 detected persons had a the disc displacement with reduction. This suggests that the pattern of jaw openings can not be the main symptom for diagnosing the displacement of the disc, especially the disc displacement without reduction.

The examination of joint sounds is an indicator of the disc displacement by reduction. The presence of sound at the time of open and closed the mouth is a definite diagnosis for this disorder. On examination, the revision of RDC-TMD, the sound of a joint is ensured when there are once sounds of three repetitions because sometimes the sound can disappear. When there is only a sound in open or closed the mouth, the diagnosis of disc displacement with/without reduction must be ensured by the presence of joint noise during excursive and protrusive movements.[9]

The examination of pain palpation in the temporal and masseter muscles is to confirm a myofacial disorder along with a history of facial pain.[9] The most commonly felt pain complaint is maseteric muscle pain. Masseter is a muscle that plays an active role in the process of mastication. The increased activity of these muscles, which can be stimulated by stress or the presence of parafunctions (eg, bruxism and clenching) will cause muscle fatigue that stimulates muscle spasms. So as to cause pain syndrome of myofacial dysfunction that will cause muscle injury, occlusal disharmony, internal disturbance derangement, and degenerative changes of condyle.[9]

Palpation examination of the preauricular and intrameatal areas, is performed to confirm the presence of other joint disorders, including those associated with degenerative changes in the jaw joint. Degenerative changes may include athralgia, osteoathritis, and osteoathrosis.[9]

The presence of degenerative joint disorders is confirmed by the presence of crepitation joint sounds. Usually, preauricular pain is associated with referral pain toward the temporal muscle.[17] Osteoathritis usually affects people aged between 55-60 years, but in this study 2 people got osteoathrosis and 2 people had osteoathritis. This is surprising because the sample is under 30 years old. This requires further examination to confirm this disorder.

Examination of pain palpation of the lateral pterygoid muscle resulted in 24 people suffering pain in right area and 25 people suffering in the left, it was experienced by 38% of the samples. The inferior lateral pterygoid plays an active role when lowering the mandible during opening and protrusive movement while the superior lateral pterygoid plays together with the elevator muscle when closing the mandible. The attachment of the two muscles almost towards the medial, they play a role to attract condyle and disc.[16,18] The number of subjects who experience lateral pterygoidal muscle pain indicates a disturbance in the articular joints. The displacement of the disc towards anterior, posterior, lateral, or medial may cause a change of position of the lateral pterygoid muscle or the abnormal emphasis that causes pain at the time of palpation.

Palpation of the temporal tendon produces pain in 22 samples. The temporalis muscle is the mandibular elevator muscle. Excessive functioning of the muscle causes the muscles to work hard all the time. As well as in maseetered muscles, an increased function of the muscles of mastication will cause muscle fatigue that stimulates the muscle tension. The temporal tendon will also undergo the same effect, otherwise the other chewing muscles can cause the pain of reference

to the temporalis muscle.[17] Of the total study sample (n = 65), the percentage of diagnosed and undiagnosed with TMD was similar (32:33 or 49.23%: 50.76%). Previous studies have suggested that people with TMD are about 80%.[19] But the study used different diagnosis classification systems, making it somewhat difficult to compare. In addition, the study sample is a dentistry student who already known about dental hygiene and know the existence of joint disorder, so fair if the percentage in general society is higher.

Judging from the number of male students diagnosed with TMD disorders based on RDC-TMD Axis 1 revision 2010, the percentage was smaller (10 out of 22 students, 31.25%) than female students (22 out of 43 students, 68.75%). These results are in line with Karibe et al.[20] studies which suggest that women have a higher susceptibility to chewing muscle pain than men. According to Huang et al.[21] research, higher levels of depression in women are a risk factor for TMD.

In the study found that a student not only diagnosed one disorder but can experience more than one interference joints, both in the left joint and right joint. At most a student suffers from five joint disorders. According to Truelove et al.[5], one person maximum suffers from 5 disorders. The number of diagnoses of joint disorders in a person may indicate an increased severity of TMD. The excessive burden on the mastication muscle causes the tolerance threshold of the mastication system to change so that the myofacial pain occurs. It can cause disturbances in the intraarticular region of the joints (disc displacement with reduction, disc displacement without reduction, disc displacement without reduction with limited or limited opening) that may cause pain in the joint (athralgia) or more severe condyle damage, such as osteoathritis and osteoathrosis.[22]

In this study, it was found that the diagnosis of myofacial pain with limited opening was much greater than without limited opening, different with Manfredini et al.[23] statement which showed that myofacial pain more than myofacial pain with limited opening. On RDC-TMD Axis 1 the standard for limited mouth opening was 40 mm, and that is a standard for the Caucasian race. Rasmi[24] study of the maximum mouth opening of the Indonesian Deuteromalay subrace gave different results from the Caucasian race. The mouth opening range

for the Deuteromalay subrace of Mongoloid race was 45.17-52.77 mm, smaller than the mouth opening range according to Okeson[16] (American), 53-58 mm; Hirsch[24] (Germany), 53.6-56.4 mm; and Dijkstra[26] (Netherlands), 51.0-63.4 mm.[24] From the statistic calculations, there was a moderate abnormal mouth opening between 30.58-42.83 and 55.11-67.36 mm; and severe mouth opening if the value is less than 30.58 mm or more than 67.36 mm. This means that the openings are considered to be limited if they have an oral opening less than 30.58 mm, so the standard calculation of RDC-TMD Axis 1 algorithm of 40 mm for Indonesians needs to be reconsidered.[25]

Although in the 2010 revised RDC-TMD algorithm it is not stated to separate the disorders based on the left and right joints, but in this study separations are based on joint location as in RDC-TMD 1992. This was done so that the disorders is more precisely known to the location, even in the treatment procedure will be done together since both of these joints move together, and the interference of one side will affect the other joint,.

The most common disorders was the disc displacement with reduction, both in the right and left joints, with the same amount in both men and women. From the results of the study, there were 7 people who suffered both joints, while 12 people suffered on one side only, mostly on the left joint. The disc displacement with reduction is characterized by clicking or popping, which is usually not always accompanied by pain unless diagnosed with other disorders. During the study, many students were aware of the disorder, but did not feel the need to seek treatment. When it was explained that the disorder was serious, some students immediately took the treatment.

The second most common disorder suffered by the research sample was myofacial pain with limited opening. Usually the reason for seeking a treatment is the pain.[26] But the high rate of myofacial pain does not make the students seek treatment. The presumption is that the pain has not been so disturbing, or the assumption that the pain is not caused by impaired mastication but for other reasons beyond that. It is much felt by patients who come to treat joint disorders. Patients before treating joint disorders, previously come to the general practitioner, ENT specialist or any neurologist. When the results of these

treatments are not found symptoms associated with the organs suspected, usually advised to check his teeth. At the time it was known the existence of TMD disorders. In addition, many joint disorders are found by chance when the patient is examined the teeth problem. The population of TMD disorders seeking treatment, according to the literature is only 5%.[21,22]

In the study obtained two female students suffering from osteoathrosis, whereas this disorder is a generative disorder that usually affects the old age, while the age range of the study sample was 18-30 years. Osteoathrosis is usually not accompanied by pain in the joint, but ussulually happen a condensed (flattening), lipping, spurring, and erosion of the condyle.[28]

In the combined diagnosis, the most (5 cases) of the disorder was the myofacial with limited opening (Ib Group) accompanied by athralgia (Group IIIa). It is understandable that muscle disorders causes someone to attempt to restrain jaw movement with limited opening manifestations. To ensure disorders occurs in the muscle or in the articular area should be done endfeel test. The presence of chronic pain causes inflammation in the joint area resulting in athralgia. In addition, a combined diagnosis of myofacial pain accompanied by athralgia was present in 3 cases.Based on this research, diagnostic determination of joint disorders based on RDC-TMD Axis 1 can be more directed, although it must be supported by several other examinations, such as radiological examination. However, the adoption of this examination, should be adapted to the conditions of the Indonesian nation, for example in terms of mouth opening.

CONCLUSION

The conclusion of this research was 50% of students of Faculty of Dentistry of Universitas Padjadjaran were diagnosed with temporomandibular joint disorder based on RDC/TMD 2010 Revision Axis I diagnostic criteria, with the most symptom was disc displacement with reduction.

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