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ORIGINAL ARTICLE

Correlation between length of usage and temporomandibular disorder presence in complete denture patient

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ABSTRACT

The aim of this study was to see if there was a correlation between the length of usage and the presence of TMD in patients wearing CD at Dental Hospital of North Sumatra University. This study is analytic observational with a cross-sectional design and a sample size of 50 subjects. The samples were separated based on the length of use, which was 12, 18 and 24 months. The FAI was used in interviews, while the DI was used in clinical tests. Subjects were interviewed using the TMD Etiology Index questionnaire to determine the level risk. The findings revealed that the prevalence of TMD risk based on duration of use showed at 12 month group with low risk, followed by 18 months and 24 months who experienced high risk. The results also revealed that the prevalence of TMD status based on duration of use at 12 months without TMD, followed by 18 months and 24 months. The Chi-Square test yielded a value of $p = 0.0001$ ($p<0.05$) based on the results of statistical tests evaluating the correlation between duration of usage and TMD status, indicating that there is a correlation between duration of use and TMD status and the highest results were found at 24 months of use of 85.7%. (IJP 2025;7(1):94-97)

Introduction

Temporomandibular disorder (TMD), is a disorder that not only involves the temporomandibular joint but also involves the masticatory muscles and related structures.[1] The etiology of temporomandibular disorder is multifactorial and is still difficult to determine precisely. The Etiology Index Questionnaire for TMD is an index that is easy, simple, and accurate in determining the etiology of temporomandibular disorder.[2] A complete denture (CD) is not good enough if there is poor stability and retention or a loss of vertical dimension. Loss of vertical dimension can occur due to poor fabrication or use of the denture. This can compromise the stomatognathic system as loss of vertical dimension can be exacerbated by long-term use of an inadequate denture. Prolonged wear of a complete denture can cause wear on the denture.[3] Excessive pressure over a long period of time on the temporomandibular joint can result in adaptive and degenerative changes in the joint.[4] Several studies state that excessive masticatory loads will cause occlusal imbalances thereby increasing the possibility of temporomandibular disorder. Dentists must combine various examinations to be able to determine the diagnosis and provide appropriate treatment for the temporomandibular disorder. Based on these problems, this study aims to determine the risk and status of temporomandibular disorder in patients wearing complete dentures in terms of the duration of use.

Material and Methods

This observational analytical study conducted at the Dental and Oral Hospital of North Sumatera University employed a cross-sectional design with a sample population of 50 individuals selected through purposive sampling. Participants were divided based on the duration of complete denture use (12, 18, and 24 months). The study, approved by the Research Ethics Committee of Universitas Sumatera Utara, utilized the Fonseca Anamnestic Index and Etiology Index Questionnaire for TMD for data collection through interviews and clinical examinations.

The Fonseca Anamnestic Index comprised 10 questions with three response options, categorizing individuals into absence of TMD, mild TMD, moderate TMD, and severe TMD. The Etiology Index Questionnaire assessed gender, bad habits, emotional stress, and freeway space. Each component had specific codes and scores, determining the overall index score. A high index score (≥7) indicated a high risk of developing temporomandibular disorders (TMD), while a low score (<7) suggested a low risk. Data analysis employed the Chi-Square test with a significance level of $p<0.05$ to examine the correlation between the duration of complete denture use and TMD status in patients.

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Table 1. Subjects' risks with Etiology Index Questionnaire for TMD based on duration of use.

Duration of Use	TMD Risk					
	Low		High		Total	
	n	%	n	%	n	%
12 month	15	100	0	0	15	100,0
18 month	10	47,6	11	52,4	21	100,0
24 month	0	0	14	100	14	100,0

Table 2. Distribution of subjects' answers regarding bad habits and emotional stress of the Etiology Index Questionnaire for TMD.

	No		Sometimes		Yes	
	n	%	n	%	n	%
Bad habits						
Do you chew on one side of your jaw?	1	2	27	57	22	75
Do you have a habit of biting your nails?	41	82	10	20	0	0
Do you have a habit of biting hard objects, for example: sewing needles, pencils, etc	50	100	0	0	0	0
Do you like chewing gum?	30	60	20	40	0	0
Do you like propping your chin up?	31	62	19	38	0	0
Do you like sucking on the cheeks?	46	92	4	8	0	0
Do you have a habit of sleeping on one side only?	0	0	25	50	50	100
Do you like to move your lower jaw without making contact with your teeth (jaw play)?	44	88	6	12	0	0
Do you like to bite your upper lip?	33	66	17	34	0	0
Do you like to bite your lower lip?	27	54	21	42	0	0
Do you like sucking the tongue?	49	98	1	2	2	4
Do you like to suck tongue and cheek simultaneously?	50	100	0	0	0	0
Do you have a habit of playing with dental appliances or dentures in your mouth?	39	78	11	22	0	0
When you breathe is your mouth open?	10	20	14	28	26	56
Do you like to snore when you are sleeping?	26	52	14	28	10	20
Are you sleepy during the day?	2	4	14	28	34	68
Do you like to grind your upper and lower teeth loudly during the day?	45	90	4	8	1	2
Do you like to grind your upper and lower teeth loudly at night?	39	78	10	20	1	2
Do you like to move your lower jaw when your teeth contact during the day?	46	92	3	6	1	2
Do you like to move your lower jaw when your teeth contact at night?	40	80	9	18	1	2
Does your bed partner often complain you move your lower jaw causing loud noise while sleeping?	46	92	3	6	1	2
Emotional stress						
Do you feel sad if something unexpected happened?	6	12	37	74	7	14
Do you feel weak or off balance?	6	12	44	88	0	0
Are you feeling excessively worried?	9	18	27	54	14	28
Do you feel a lack of energy or a setback?	32	64	18	36	0	0
Do you blame yourself?	22	44	28	56	0	0
Do you cry easily?	7	14	28	56	15	30
Do you feel lonely?	5	10	10	20	35	70
Do you feel that you are not interested in anything?	27	54	22	44	1	2
Are you feeling hopeless for the future?	46	92	4	8	0	0
Do you feel like you can't control the important things in your life?	36	72	13	26	1	2
Do you feel nervous, confused and stressed?	10	20	39	78	1	2
Do you feel that there is something missing from you?	42	84	8	16	0	0
Do you find that you can't cope with the things that need to be done?	31	62	19	38	0	0
Are you angry if something happened beyond your control?	5	10	8	16	37	74
Do you find it very difficult to deal with something that you can not overcome?	13	26	25	50	12	24
Do you find everything difficult?	21	42	25	50	4	8
Do you feel worthless?	42	84	6	12	2	4
Do you feel guilty?	28	56	7	14	15	30

Table 3. Distribution of total scores of etiology index questionnaire for TMD.

Etiology		n	%
Sex	Male	12	48
	Female	38	52
Stress	Yes	32	64
	No	18	36
Bad habits	Yes	12	24
	No	38	76
Free way space	2-4mm	28	56
	<2mm or >4mm	22	44

Results

The results showed that a total of 25 subjects (50%) had a low risk of TMD, while 25 other subjects (50%) had a high risk of TMD with the highest prevalence on 24 month (100%), followed by 18 month (52,4%) and 12 month none were at high risk of temporomandibular joint disorder, as shown in table 1. On the bad habits component, 22 subjects (44%) often chew on one side of the jaw and 25 subjects (50%) have a habit of sleeping on one side only. On the emotional stress component, 35 subjects (70%) often feeling lonely and 37 subjects (74%) often feel angry if something happens beyond their control table 2. In this study, for gender distribution, there were 38 (76%) women and 12 men (24%). On the freeway space component, 28 subjects (56%) have 2-4mm freeway space and 22 (44%) have <2mm or >4mm freeway space table 3. The results of the study also showed that 33 subjects (66%) had TMD, while 17 other subjects (34%) did not have TMD wherein the highest prevalence were 18 month (42%), followed by 24 month (24%) and 12 month none have TMD table 4. The common signs and symptoms found in the subjects are difficult to open mouth widely (46%), tiredness when they are chewing (8%) and frequent headaches (8%) table 5. Based on the results of statistical tests that were analyzed using the Chi-Square test, a value of p=0.0001 (p<0.05) was obtained, which means that there was correlation between the duration of use and status of TMD table 4.

Discussion

The results showed that 44% subjects have bad habits of chewing on one side of the jaw. Panjaitan Y (2016) recorded 75% of complete denture wearers like to chew on one side only.4 Ved (2017) recorded that 56 patients (57.7%) out of 97 subjects that like to chew on one side, had temporomandibular disorder.[5] 14% subjects also often feel sad if something unexpected happened and 74% subjects often feel angry if something happens beyond their control. Patil S (2016) recorded 60% patients with temporomandibular disorder experience stress and depression.[6] Habib et al. (2015) also recorded that almost a third of research subjects had a history of emotional stress, and 57.8% of them were classified as experiencing mild to severe degrees of TMD.[6] This research showed that 56% subjects have 2-4mm freeway space and 22% subjects have <2mm or >4mm freeway space. This is consistent with research conducted by Oliveira F et al. (2021) who recorded 35 complete denture patients (70%) had normal vertical dimensions,[8] and another 15 patients (30%) had abnormal vertical dimensions and also supported by research conducted by Galvão (2020), out of 60 subjects with normal vertical dimensions,[9] 32 people (53.3%) did not have temporomandibular disorder. A total of 25 subjects (50%) had a low risk of TMD, while 25 other subjects (50%) had a high risk of TMD with the highest prevalence on 24 month (100%), followed by 18 month (52,4%) and 12 month none were at high risk.

The common signs and symptoms found in the subjects are difficult to open mouth widely (46%),

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Table 4. Chi Square test for correlation between duration of use and the status of TMD.

Duration of Use	TMD Status				Total		p
	Not Present		Present				
	n	%	n	%	n	%	
12 month	15	100	0	0	15	100,0	0,0001
18 month	0	0	21	100	21	100,0	
24 month	2	14,3	12	85,7	14	100,0	

Table 5. Distribution of subjects' answers based on Fonseca Anamnestic Index and Dysfunction Index.

Questions	No		Sometimes		Yes	
	n	%	n	%	n	%
Fonseca Anamnestic Index						
Do you have difficulty opening your mouth wide?	9	18	18	36	23	46
Do you consider yourself a tense (nervous) person?	17	34	32	64	1	2
Do you have difficulty moving your jaw to the sides?	35	70	14	28	1	2
Do you feel fatigue or muscle pain when you chew?	3	6	43	86	4	8
Do you have frequent headaches?	13	26	33	66	4	8
Do you have neck pain or a stiff neck?	48	96	2	4	0	0
Do you have ear aches or pain in that area (TMJ)?	50	100	0	0	0	0
Have you ever noticed any noise in your TMJ while chewing or opening your mouth?	50	100	0	0	0	0
Do you have any habits such as clenching or grinding your teeth?	25	50	24	48	1	2
Do you feel that your teeth do not come together well?	43	86	6	12	1	2

Dysfunction Index		n	%
Symptom Impaired range of movement			
Criteria			
- Normal range of movement	0	28	56
- Slightly impaired mobility	1	19	38
- Severe impaired mobility	5	3	6
Symptom Impaired TMJ function			
Criteria			
- Smooth movement without joint sounds and deviation	0	38	76
- Joint sounds in one or both joints and deviation	1	12	24
- Locking or luxation of joint	5	0	0
Symptom Muscle pain			
Criteria			
- No tenderness to palpation	0	44	82
- Tenderness to palpation in 1-3 sites	1	6	12
- Tenderness to palpation in 4 or more sites	5	0	0
Symptom TMJ pain			
Criteria			
- No tenderness to palpation	0	17	34
- Tenderness to palpation	1	33	66
- Tenderness to the back side of palpation	5	0	0
Symptom Pain on movement of the mandible			
Criteria			
- No pain on movements	0	45	90
- Pain on 1 movement	1	5	10
- Pain on 2 or more movements	5	0	0

tiredness when they are chewing (8%), frequent headaches (8%), and muscle pain (12%). This finding is consistent with Jandial S et al's (2017) that stated the most common signs and symptoms of temporomandibular disorder in patients wearing complete dentures were joint pain and limitations (34.5%), muscle fatigue during mastication (17%), and muscle pain (14.5%). Based on the duration of use there was 33 subjects (66%) had TMD, while other 17 subjects (34%) did not have TMD wherein the highest prevalence were 18 month (42%), followed by 24 month (24%) and 12 month none have TMD.This is in line with study conducted by Khalid et al. (2016), the longer a complete denture is used, the denture will experience wear. As a result of wear on the denture, the patient can experience an imbalance in occlusal force distribution due to abrasion of the posterior teeth and attrition of the anterior teeth. Abrasion of the posterior teeth can occur due to food while attrition of the anterior teeth can occur due to friction or tooth-to-tooth contact. Patients who use a complete denture also often experience discomfort in its use such as pain in the joints and irritation of the mucosa. Joint pain is usually felt when opening and closing the mouth, which is the highest prevalence of TMD in patients wearing a complete denture.[10]

Several factors can also be triggers, contributors, or perpetrators of temporomandibular joint disorders including dysfunctional habits, reduction in vertical dimensions due to tooth loss, old dentures or habits of not wearing a denture during the day, not removing the denture while sleeping, lack of stabilization and retention of the denture and psychological factors. Dysfunctional habits can cause damage to the masticatory structure, teeth, periodontium tissue and temporomandibular joint and are closely related to the occurrence of temporomandibular joint disorders. In this study, the most likely factors that play a role in temporomandibular disorder are bad habits and emotional stress. This study showed that most subjects have bad habits of chewing on one side of the jaw and a habit of sleeping on one side only. Shofi (2014) states that people who have a bad habit of chewing on one side tend to have temporomandibular disorder because the habit of chewing on one side can cause additional pressure on the masticatory muscles and cause muscle spasms, causing pain and joint disorders.[11] Study conducted by Yalçınkaya E. (2019) also states that body and head posture during sleep play an important role in the etiology of temporomandibular disorder because continuous changes in craniocervical posture can cause changes in mandibular position. Emotional stress can also cause temporomandibular disorder. In this study, most of the subjects often felt sad if something unexpected happened and were often angry if something happened out of control.[12] Husada (2019) states that severe stress can cause changes in the body which are basically preparing the body's muscles (including temporomandibular muscles) to face any form of threat or burden that exceeds their normal capabilities. Changes in the muscles are in the form of an increase in muscle activity (hyperactivity).[13]

A state of hyperactivity that lasts for a long time or continuously will trigger muscle fatigue which will be followed by muscle spasms. This muscle spasm will then trigger the occurrence of an imbalance in the distribution of loads or excessive loading on the joints, which will cause disruption and even further damage to the temporomandibular joint or the surrounding area. There are also other factors that can influence the occurrence of temporomandibular disorder. Women tend to experience muscle pain in the neck, arms, shoulders and upper body, while men generally tend to experience more muscle pain in the back and lower body. The role of female sex hormones in pathogenesis of temporomandibular disorder has indicated that excessive exoge-

nous ovarian hormones can put women at risk for temporomandibular disorder. In addition, the vertical dimension also plays an important role in the temporomandibular joint. Loss of vertical dimension will cause the mandible to shift from its actual centric relation and into a continuous centric position. The occurrence of differences in vertical dimensions due to the absence of teeth has an impact on the mechanism of the temporomandibular joint which can result in disruption of the temporomandibular joint. Based on the results, there is correlation between duration of use and status of TMD, this is because the occurrence of temporomandibular joint disorders is multifactorial which includes physical risk factors, occlusal disharmony, psychosocial problems and the presence of systemic diseases. Therefore, the relationship between complete denture wear and temporomandibular joint disorders can occur due to various factors, such as improper denture design or clinical wear can initiate temporomandibular joint disorders after several years of use.

Conclusion

Based on the results of this study, there is a relationship between the length of use and the status of temporomandibular joint disorders in patients wearing complete dentures at Dental Hospital Universitas Sumatera Utara where the results of the study found the highest temporomandibular joint disorders in the length of use of 24 months (85.7%), this is based on occlusal wear that occurs in complete dentures after long use. There are several factors that contribute to the occurrence of temporomandibular joint disorders, namely bad habits, stress and vertical dimensions that can be measured on the Temporomandibular Joint Disorder Etiology Index questionnaire.

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