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Impact of Education and Occupational status on Temporomandibular Joint Disorders among dental patients - A retrospective study

Type of study: Retrospective study
Running Title: Impact of Education and Occupation on Temporomandibular Disorders

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Abstract:
Temporomandibular joint disorders (TMD) are degenerative musculoskeletal conditions associated with morphological and functional deformities. The etiology of TMD is considered multifactorial in nature and has been related to trauma, malocclusion, parafunctional habits, socioeconomic status and dietary habits. Poor socioeconomic status which includes low literacy level and unemployment may lead to stress among those individuals which might lead to development of TMD in those individuals. The aim of the study was to evaluate the impact of education and occupational status of dental patients on temporomandibular joint disorders. In this retrospective study, a total of 49 patients who had temporomandibular disorders were included. Demographic details like age, gender and types of TMD was noted. Factors like education and occupation of the patients were assessed through case sheets and confirmed through phone calls, thus socioeconomic status was obtained. Excel tabulation and SPSS version 23 was used for statistical analysis. The statistical test used for the demographics was frequency distribution. Chi-square t test was used to test the association between education and occupation with types of TMD and results obtained. The age group most affected with TMD was 31-40 year (42.86%). The gender most affected with TMD was males (51.02%). Disc- condyle disorders (61.22%) was the predominant type of TMD present in the study population. Overall, 30% of those in higher secondary education and 32% of those pursuing engineering were mostly affected with TMD. However this association between education and TMD was statistically not significant ($p>0.05$). Overall, housewives (30%) and students (20%) were mostly affected with TMD. However this association between occupation and TMD was statistically not significant ($p>0.05$). Within the limits of the study, temporomandibular disorders were predominantly seen in the age group of 31-40 years with male predilection. Disc- condyle disorders was the predominant type of TMD. From our study it can be concluded that education and occupational status of dental patients are not associated with temporomandibular disorders.

Keywords: Degenerative disorder, Dental patients, Education, Occupation,, Temporomandibular disorders

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I. INTRODUCTION

Temporomandibular disorders are degenerative musculoskeletal conditions associated with morphological and functional deformities (Carlsson, 1999). The temporomandibular articulation is composed of bilateral, diarthrodial, temporomandibular joints (TMJs) (Mercuri, Olson and Laskin, 1979). Each joint is formed by a mandibular condyle and its corresponding temporal cavity (glenoid fossa and articular eminence) (Tanaka, Detamore and Mercuri, 2008). The TMJ and its associated structures play an essential rule in providing mandibular motion and distributing stresses produced by everyday tasks such as chewing, swallowing and speaking (Magnusson, Egermark and Carlsson, 2002).The American academy of paediatric Dentistry (AAPD) has recognised that disorders of the temporomandibular joint (TMJ), masticatory muscles and associated structures occasionally occur within infants,children and adolescents (Navi, Motamedi and Talesh, 2013).

Temporomandibular disorders (TMD) is a collective term for a group of musculoskeletal and neuromuscular conditions that include several clinical signs and symptoms such as pain, headache, TMJ sounds, TMJ locking and ear pain (Dimitroulis, 1998). In addition to this pain on mastication,with restricted mandibular movements associated with joint sounds is observed. TMD include abnormalities of the intra- articular distal position and/or structure as well as dysfunction of the associated musculature (American Academy of Craniomandibular Disorders, 1990). About 60-70% of the general population has at least one sign of Temporomandibular joint dysfunction (TMD), but only one out of 4 individuals is aware of these symptoms and reports them to a specialist (List *et al.*, 1999).

There are various factors associated with the occurrence of TMD which includes dietary habits, parafunctional habits, and stress, socioeconomic status (education and occupation) etc. The etiology and pathogenesis of this condition is poorly understood, therefore treatment of Temporomandibular joint diseases is sometimes difficult (Karan, 2010). Poor socioeconomic status like low literacy level and unemployment may lead to stress among those individuals which might lead to development of TMD in those individuals (Inglehart *et al.*, 2016). But this was not statistically significant in the majority of the studies conducted (Martins *et al.*, 2008). While 25% of the population may experience symptoms of TMD (Solberg, Woo and Houston, 1979), only a small percentage of afflicted individuals seek treatment. Recent studies have shown that rural schools, low parental education levels, poverty, living outside the home, poor general and oral health showed positive correlation with TMD (Guo *et al.*, 2014).

Several other factors other than occlusal, hormonal, trauma, parafunctions to be involved in the occurrence of TMD like socioeconomic status which has very little literature relating to it (Guo *et al.*, 2014). Thus understanding the etiology of Temporomandibular joint disorders is extremely important in identifying and avoiding potential pathological factors.

Previously our team had conducted numerous clinical trials (Jesudasan, Abdul Wahab and Muthu Sekhar, 2015) (Patil *et al.*, 2017) (Kumar and Rahman, 2017) (Rao and Kumar, 2018) (Christabel *et al.*, 2016) (Abhinav *et al.*, 2019) (Jain *et al.*, 2019) (Santhosh Kumar Mp, 2017) (Kumar and Snena, 2016) (Rahman and Mp, 2017) (Sweta, Abhinav and Ramesh, 2019) (Patturaja and Pradeep, 2016), in vitro studies (Marimuthu *et al.*, 2018) and systematic reviews (Packiri, Gurunathan and Selvarasu, 2017) (S. K. Mp, 2017) regarding TMD over the past 5 years. Now we are focussing on epidemiological surveys on TMD. The idea for this survey stemmed from the current interest in the community.

So this study aims to evaluate the impact of education and occupational status of dental patients on

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temporomandibular joint disorders, which would help in patient motivation, early intervention and better prognosis.

II. MATERIALS AND METHODS

Study design and Study setting:
This retrospective cross-sectional study was conducted in Saveetha dental college and hospital, Saveetha University, Chennai, to evaluate the association between education, and occupational status with temporomandibular joint disorders among dental patients reporting from June 2019 to March 2020. The study was initiated after approval from the institutional review board and it was covered by the following ethical approval number; SDC/SIHEC/2020/DIASDATA/0619-0320.

III. STUDY POPULATION AND SAMPLING

Inclusion criteria for the study were adult dental patients with TMD. Exclusion criteria included history of trauma to the TMJ, immunocompromised patients, history of orthodontic treatment, having dental prostheses, dental anomalies, systemic diseases with cognitive problems and speech problems, missing or incomplete data. After assessment in the university patient data registry, consecutive case records of 49 patients who were diagnosed with TMD and were eligible for the study were included in the study. Cross verification of data for errors was done with the help of an external examiner.

IV. DATA COLLECTION AND TABULATION

Data regarding patients having TMD were retrieved after analyzing 86000 case sheets. The following parameters were evaluated based on the dental records; age, gender and types of TMD. Chief complaints, medical and dental history and treatment report of the patients were examined for the data collection. Occupation and education details of the patients were also recorded from patients case sheets and confirmed with phone calls to the patients. Patients diagnosed with TMD were further classified into disc-condyle disorder, degenerative disorder and myofascial pain and dysfunction syndrome (MPDS). Data was entered in excel and was imported to SPSS. The variables were defined.

V. STATISTICAL ANALYSIS

The collected data was validated, tabulated and analysed with Statistical Package for Social Sciences for Windows, version 23.0 (SPSS Inc., Chicago, IL, USA) and results were obtained. Descriptive analysis was used to describe age, gender and types of TMD among the study population. Categorical variables were expressed in frequency and percentage; and continuous variables in mean and standard deviation. Chi-square test was used to test associations between categorical variables (age, gender and types of TMD). P value < 0.05 was considered statistically significant.

VI. RESULTS AND DISCUSSION

In our study sample of 49 patients with TMD, the most affected age group by TMD is 31-40 years (42.86%) and the least affected age group is 51-60 years (4.08%). 14.29% of patients in the age group of 11-20 years were affected by TMD, followed by 22.45% in the 21-30 years age group and 16.33% in the 41-50 years age group [Figure 1].

In relation to the gender distribution of the patients with temporomandibular disorders it was found that the males (51.02%) were most affected than females (48.98%) [Figure 2]. Distribution of TMD among the study population revealed that disc-condyle disorder was present predominantly (61.22%), followed by MPDS (34.69%) and with least occurrence of degenerative disorders (4.08%) [Figure 3].

On comparing the association between education and TMD, it was seen that disc-condyle disorders were mostly seen in patients who were in higher secondary education (20.41%) and engineering students (20.41%). In the middle school category, 2.04% of the study population had degenerative disorders and

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2.04% had MPDS. In the High secondary category, 2.04% had degenerative disorders, 20.41% had disc-condyle disorders and 8.16% had MPDS. In the B.com category, 8.16% of the study population had disc-condyle disorders and 6.12% had MPDS. In the engineering category, 20.41% had disc-condyle disorders and 12.24% had MPDS. In the MBA category, 4.06% had disc-condyle disorder and 2.04% had MPDS. In the uneducated category, 8.16% of the study population had disc-condyle disorders and 4.08% had MPDS. Overall, 30% of those in higher secondary education and 32% of those pursuing engineering were mostly affected with TMD. However this association between education and TMD was statistically not significant ($p = 0.394$) [Figure 4 and Table 1].

On comparing the association between occupation and TMD, it was seen that Disc-condyle disorders were predominantly present in students (14.29%) and housewives (22.45%). MPDS was seen mostly in patients working in IT sectors (12.24%). In the accountant category, 2.04% of the study population had disc-condyle disorder. In the beautician category, 2.04% had disc-condyle disorder. In the businessman category, 4.08% of the study population had disc-condyle disorder. In the case of the daily wage worker group 2.04% of the study population had disc-condyle disorder and 2.04% had MPDS. In the driver category, 4.08% had disc-condyle disorder. In the housewives group, it was observed that 4.08% had degenerative disorder, 22.45% had disc-condyle disorder and 8.16% had MPDS. In the IT professional category, 4.08% had disc-condyle disorder and 12.24% had MPDS. In the salesman category, 4.08% had MPDS. In the security category 4.08% had disc-condyle disorder and 2.04% had MPDS. In the servant category, 2.04% had disc-condyle disorder. In the student category, 14.29% of the study population had disc-condyle disorder and 6.12% had MPDS. Overall, housewives (30%) and students (20%) were mostly affected with TMD. However this association between Occupation and TMD was statistically not significant ($p = 0.333$). [Figure 5 and Table 2].

Temporomandibular disorders include alterations of the Temporomandibular Joint (TMJ) and associated structures, including facial and neck muscles (Dimitroulis, 1998). According to our study, it was found that the most commonly affected by TMD was the 31-40 years age group and least affected was the 51-60 years age group. This was in accordance with the study by Anastassaki et al (Anastassaki Köhler, Hugoson and Magnusson, 2012). However this is contradictory to the study by Shet et al (Shet *et al.*, 2013) where they stated that the prevalence of TMD increases as the age increases. This can be attributed to the fact that as the age increases, tooth loss is common, resulting in occlusal disturbances and ultimately resulting in TMD. The contradictory results obtained in our study may be due to the fact, differing sample size and variable population.

In our study, it was found that males are most commonly affected by TMD than females. The results were similar to the study by Akhter et al (Akhter *et al.*, 2004). However, study by Shet et al (Shet *et al.*, 2013) and Hongxing et al (Hongxing *et al.*, 2016) stated that females were more affected than males. They reasoned out the fact that parafunctional habits like nail biting, bruxism were more common in females and usually females take up more stress compared to men. This was attributed as the reason for TMD more prevalent in females when compared to men. The contradictory results obtained in our study may be due to differing sample size and the geographic location.

In our study, no statistically significant association was present between education and TMD. However it was found that the majority of students in their higher education and those pursuing engineering had TMD. This would be attributed to the fact, these groups are more prone to educational stress, which affects them psychologically and may result in TMD. This finding was similar to the study by Jussila et al (Jussila *et al.*, 2018) where no association was found between education and TMD. However contradictory results were present in a study conducted by Hongxing et al who stated that those with low parental education, those in rural schools,

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had positive correlation with TMD (Hongxing, Astrøm and List, 2016).

No statistically significant association was seen between occupation and TMD in our study. However students and housewives showed TMD signs and symptoms predominantly. The reason could be because of educational stress in case of students. The results were similar to study by Martin et al (Martins *et al.*, 2008), where they found that there was no association between occupation and TMD. However our study results were contradictory to the study by Hongxing et al where they found that low parental education, poverty, unemployment, particularly low socioeconomic status had positive correlation with TMD. The reasons could be due to varied geographic location.

The limitations of the study was less sample size, single centered and geographic location. The future scope of the study is to do extensive research with large sample size to evaluate the association between socioeconomic status and TMD. This would help in assessment of TMD, patient motivation, early intervention and better prognosis.

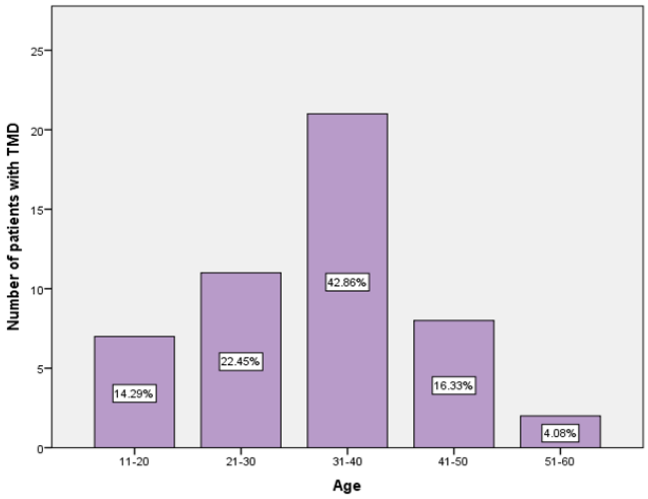

Figure 1: Bar chart shows age wise distribution of the patients with temporomandibular disorders. X axis denotes the age group and Y axis denotes the number of patients with TMD in each age group. The most affected age group by TMD is 31-40 years (42.86%) and the least affected age group is 51-60 years (4.08%).

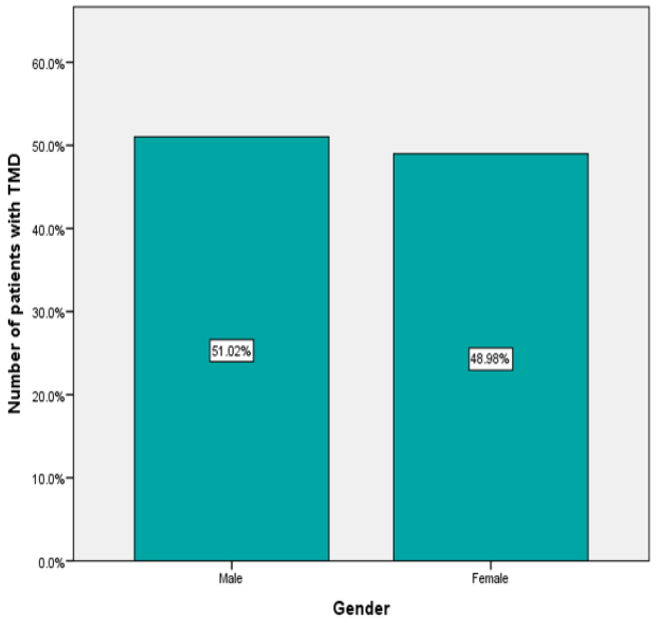

Figure 2: Bar chart shows gender wise distribution of the patients with temporomandibular disorders. X axis denotes the gender (Male and Female) and Y axis denotes the number of patients with TMD in each gender. Out of 49 patients, males (51.02%) are most affected than females (48.98%).

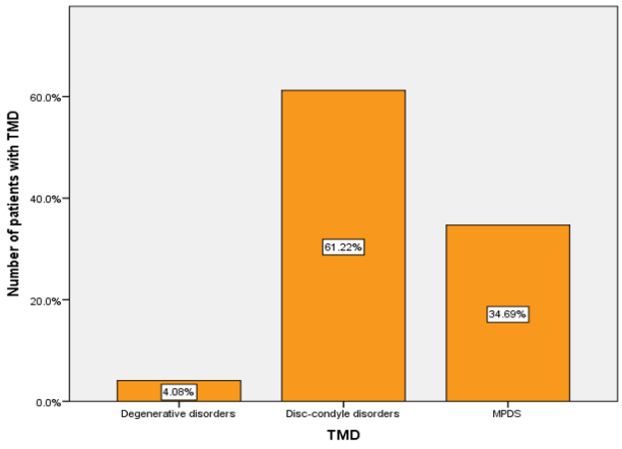

Figure 3: Bar chart shows distribution of types of TMD of the study population. X axis denotes the types of TMD and Y axis denotes the number of patients with TMD in each group. Disc-condyle disorder is the predominant type of TMD (61.22%),

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followed by MPDS (34.69%) and degenerative disorders (4.08%).

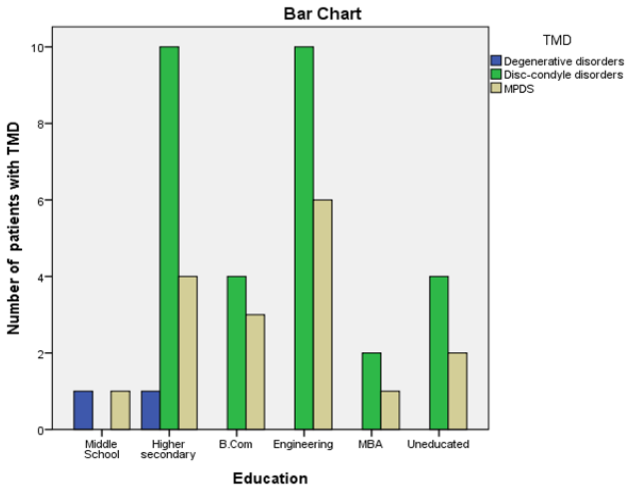

Figure 4: Bar chart showing association between Education and TMD. X axis denotes Education status of the patients and Y axis denotes number of patients with different types of TMD. (Pearson Chi square = 0.725 , p = 0.394 (>0.05), hence statistically not significant). Disc-condyle disorders were mostly seen in patients who were in higher secondary education (20.41%) and engineering students (20.41%). Overall, 30% of those in higher secondary education and 32% of those pursuing engineering were mostly affected with TMD. However this association between education and TMD was statistically not significant

Temporomandibular disorder					Total
		Degenerative disorders	Disc-condyle disorders	MPDS	
Education	Middle school	1	0	1	2
	Higher secondary	1	10	4	15
	B.com	0	4	3	7
	Engineering	0	10	6	16
	MBA	0	2	1	3
	uneducated	0	4	2	6
Total		2	30	17	49

Chi Square Test			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	0.725	10	0.394

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Table 1: Table shows association between education and TMD. (Pearson Chi square = 0.725 , p = 0.394 (>0.05), hence statistically not significant). Disc-condyle disorders were mostly seen in patients who were in higher secondary education (20.41%) and engineering students (20.41%). Overall, 30% of those in higher secondary education and 32% of those pursuing engineering were mostly affected with TMD. However this association between education and TMD was statistically not significant.

Temporomandibular disorders					Total
		Degenerative disorders	Disc-condyle disorders	MPDS	
Occupation	Accountant	0	1	0	1
	Beautician	0	1	0	1
	Businessman	0	2	0	2
	Daily wage worker	0	1	1	2
	Driver	0	2	0	2
	Housewife	2	11	4	17
	IT Professional	0	2	6	8
	Salesman	0	0	2	2
	Security	0	2	1	3
	Servant	0	1	0	1
	Student	0	7	3	10
Total		2	30	17	49
Chi Square Test					
		Value	df		Asymptotic Significance (2-sided)
Pearson Chi-Square		0.938	20		0.333

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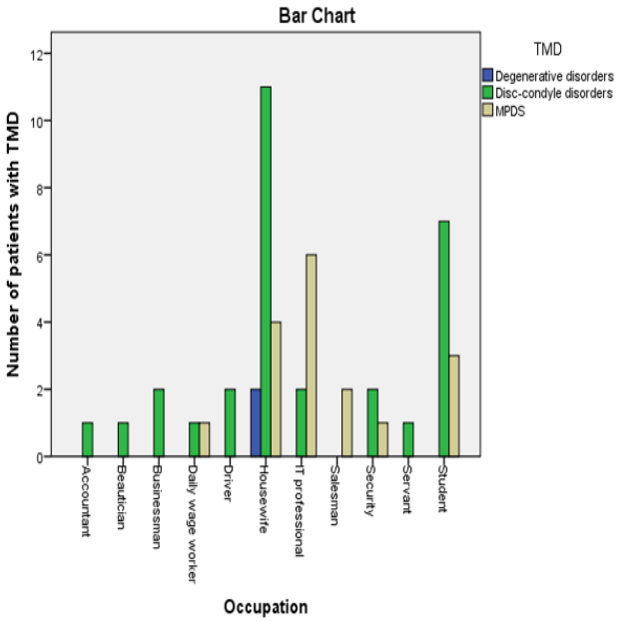

Figure 5: Bar chart showing association between Occupation and TMD. X axis denotes Occupation of the patients and Y axis denotes number of patients with different types of TMD.(Pearson Chi square = 0.938 , p = 0.333 (>0.05), hence statistically not significant). Disc-condyle disorders were predominantly present in students (14.29%) and housewives (22.45%). MPDS was seen mostly in patients working in IT sectors (12.24%). Overall, housewives (30%) and students (20%) were mostly affected with TMD. However this association between Occupation and TMD was statistically not significant

Table 2 : Table shows association between occupation and TMD. (Pearson Chi square = 0.938 , p = 0.333 (>0.05), hence statistically not significant). Disc-condyle disorders were predominantly present in students (14.29%) and housewives (22.45%). MPDS was seen mostly in patients working in IT sectors (12.24%). Overall, housewives (30%) and students (20%) were mostly affected with TMD. However this association between Occupation and TMD was statistically not significant.

VII. CONCLUSION

Within the limits of the study, temporomandibular disorders were predominantly seen in the age group of 31-40 years with male predilection. Disc- condyle disorders was the predominant type of TMD. From our study it can be concluded that education and occupational status of dental patients are not associated with temporomandibular disorders.

VIII. ACKNOWLEDGEMENT

We take pleasure to express our sincere gratitude to the University for granting us permission to utilize the data from patient records for the study.

AUTHOR'S CONTRIBUTION

First author Vaishali.S performed data collection, analysis and interpretation and wrote the manuscript.

Second author Santhosh Kumar contributed to conception, study design, analysis, interpretation and critically revised the manuscript.

Third author Revathi Duraisamy contributed to review the manuscript.

All the authors have discussed the results and contributed to the final manuscript.

IX. CONFLICT OF INTEREST

None

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