



A case control study to evaluate the relationship between Temporomandibular disorders and psychological status using psychological assessment tool.

Author Contribution

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Abstract:-

Background:- Temporomandibular disorder (TMD) have multifactorial etiology amongst which stress is the most common predisposing factor. The aim of the present study was to evaluate the role of psychological stress in patients with Temporomandibular disorders. **Materials and Methods:-** The 100 subjects included in the study were divided into two groups i.e Group A and Group B. Group A comprised of 50 subjects with signs and symptoms of temporomandibular disorders and group B -50 normal healthy individual. The psychological status of the patient was evaluated using Presumptive Stressful life event scale. **Results:-** Statistical significant co-relation was observed on comparing the Presumptive Stressful Life Event Scale (PSLES) score in the both the groups. The statistical tests used for the analysis of the result were Chi-square Test, Z-test and Pearson's Correlation Coefficient. **Conclusion:-** There is positive co-relation between psychological stress and TMDs.

Key words:- Presumptive Stressful life event scale, Psychological stress, Temporomandibular joint, Temporomandibular disorders, Internal Disc Derangement, Myofacial Pain Dysfunction Syndrome.

INTRODUCTION

Temporomandibular disorder (TMD) comprises a series of dysfunction in the temporomandibular joint and /or functional alteration of the masticatory system which represent a significant problem in the area of dental medicine and public health.[1] The classical symptoms of TMD are orofacial pain, muscle tenderness, joint noises, and restricted jaw function.[2] TMD etiology is clearly multifactorial and not based on a few isolated factors.[3] The importance of psychological processes has grown as studies continue to be unable to consistently substantiate a purely physical etiology of this disorder.[4] Psychiatric factors, e.g emotional stress, anxiety, and depression, may cause general functional disorders and TMD. Increase of emotional stress level intensifies the head and neck muscle tension and lowers the patient's physiological tolerance to noxious stimuli.[3] The aim of this study is to evaluate the role of psychological stress in etiology of Temporomandibular disorders by using psychological instrument (Presumptive Stressful Life Event Scale) and correlate it with various signs and symptoms of TMD patients.

MATERIALS AND METHODS

After obtaining permission from Institutional Ethics Committee this study was conducted in the department of Oral Medicine and Radiology, patients were briefed regarding the study and prior written consent from patient was taken. 100 subjects were included in the study from the patients attending the outpatient Department of Oral Medicine and Radiology. The subjects were divided into two groups i.e Group A and Group B.

Group A - This group comprised of 50 subjects with signs and symptoms of temporomandibular disorders. The criteria for the diagnosis of TMD were from the findings of case history and clinical examination which includes signs and symptoms of TMJ pain and tenderness, on palpation of both sides in the pre auricular area and also via external auditory meatus, masticatory muscle tenderness, clicking/crepitus, reduced mouth opening and deviation/deflection.

Group B - This group comprised of age and sex matched 50 normal healthy individual. The study subjects were made to sit comfortably on a dental chair. All the subjects were screened by taking the history of pain and other signs and symptoms of TMD and conducting thorough clinical examination including the digital palpation at TMJ and functional manipulation of muscles of mastication the method described by JP Okeson.[5]

Inclusion criteria:

1. Patients with signs and symptoms of Temporomandibular disorders as study group.
2. Normal healthy subjects without signs and symptoms of TMD as control group.

Exclusion criteria

1. Patients having history of trauma involving Temporomandibular joint.
2. Patients with ankylosis.
3. Patients with tumor involving structural components of Temporomandibular joint.
4. Patients who had underwent orthodontic treatment.
5. Elderly patients having Temporomandibular disorder due to loss of teeth and not wearing complete denture.

6. Patients having medically diagnosed polyarthritis.
7. Patients younger than 18 years.
8. Patients on antidepressant or anxiolytic drug therapy for any disease
9. Pregnant women

Method for estimation of psychological assessment of stress: The measuring instruments of psychological stress to assess the stress were applied to all patients. Presumptive Stressful Life Events Scale (PSLES) by Gurmeet Singh, Dalbir Kaur, Harsharan Kaur,[6] which allowed to know the degree of stress, was subjected to 100 patients. PSLES is a modified scale of Holmes and Raphes Social Readjustment Rating Scale (SRRS)” mainly for the Indian population. The Scale consists of 51 oriented item to search the changes or recent experiences in past 12 months. The questionnaire was applied to all patients in his/her native language. Every item or event of the scale has their mean score of highest 95 to the lowest 20. Total score was calculated by adding all individual item scores that the patient had experienced. Scoring criteria as per the original author recommendation was applied in the study.

Statistical formulas

Statistical analysis of the evaluation of the psychological stress in etiology of TMD was carried out to find the significant difference between those values. The statistical tests used for the analysis of the result were:

1. Chi-square Test
2. Z-test
3. Pearson’s Correlation Coefficient

All the variables from the study were analysed for the mean values, standard deviation, standard error, range and “P” value to find the significant difference between those values. In all the above tests, “P” value < 0.05 was taken to be statistically significant; “P”value> 0.05 was taken to be statistically non significant

RESULTS AND OBSERVATIONS-

50 patients with age ranging from 18-55 years who visited dental OPD in the department of OMR with clinical signs and symptoms of Temporomandibular disorders.

Mean age of group A (study group) patients was 32.16 ± 8.80 (Table no.1) which had 13(26%) males with mean age of 32.76 ± 7.98 and 37 (74%) females with mean age of 32.21 ± 8.95 (Table no.2). The differences was statistically non significant. Amongst group A (Study group) patients 7(14%) patients had parafunctional habit and 43 (86%) without parafunctional habit. While in group B (Control group), 2(4%) subjects have parafunctional habit and 48(96%) without parafunctional habit. (Table no.3). The difference was statistically non significant. ($P > 0.05$). Out of 50 patients, pain temporomandibular joint was present in total 23(46%) patients, in which 7(30.43%) were males and 16(69.57%) females and 19 (82.61%) patients had unilateral pain in TMJ and 4 (17.39%) have bilateral pain in TMJ. Restricted mouth opening was present in total 25(50%) patients in which 5(20%) are male and 20(80%) are female. Tenderness in muscles of mastication is present in total 10 (20%) patients, in which only 1(10%) was male and 9(90%) were females, 7(70%) patients had unilateral muscle tenderness and 3(30%) patients had bilateral

muscle tenderness, Clicking/Creptus was present in total 32(64%) patients in which 9(28.12%) were males and 23(71.88%) were female, and 25(78.12%) patients had unilateral clicking and 7(21.88%) patients had bilateral clicking. Total 30 (60%) patients had deviation and deflection in which 9(70%) are males and 21(30%) females (Table no.4 and 5) Statistical significant ($p < 0.05$) difference was observed on comparing the Presumptive Stressful Life Event Scale (PSLES) score in the both the groups. In group A (Study group) mean PSLES score was 81.52 ± 35.10 and in group B (Control group) it was 53.24 ± 31.33 . (Table no.6 and Graph no.1) Correlation of TMJ pain VAS score with PSLES score in group A (Study group) mean TMJ pain VAS score was 5.21 ± 2.02 and PSLES score was 91.21 ± 34.31 . Statistical difference is non significant. (Table no.7). Mean of TMJ pain VAS score in male was 4.57 ± 2.43 and in female was 5.87 ± 2.18 . The difference was statistically non significant ($p > 0.05$) (Table no.8) Mean of Tenderness of muscles of mastication VAS score in male was 4.00 ± 0 and in female was 7.44 ± 0.88 . Statistical difference was significant ($p < 0.05$) (Table no.9). Mean VAS score of Tenderness of muscles of mastication in group A (Study group) patients was 7.10 ± 1.37 and PSLES score was 92.30 ± 24.39 , on correlating both of them statistically non significant differences were observed. (Table no.10). Similarly on correlation of parafunctional habits of group A (Study group) with PSLES score ($n=50$) shows, parafunctional habit was present 7(70%) has mean PSLES score of 103.42 ± 39.57 and absent in 3(30%) had mean PSLES score of 77.95 ± 33.47 . Statistically non significant differences were observed (Table no.11). On comparison of PSLES score in group A (Study group) with signs and symptoms of TMD like pain in Temporomandibular joint, restricted mouth opening, tenderness in muscles of mastication, clicking/creptus, deviation/deflection. Out of 50 patients, pain in temporomandibular joint was present 23(46%) patients which had mean PSLES score 91.12 ± 34.31 and absent in 27(54%) had mean PSLES score 73.25 ± 34.22 , restricted mouth opening was present in 25(50%) patients which had mean PSLES score of 86.16 ± 29.23 and absent in 25(50%) has mean PSLES score of 76.88 ± 40.19 , tenderness in muscles of mastication was present in 10 (20%) patients which had mean PSLES score of 92.30 ± 24.39 and absent in 40 (80%) has mean PSLES score of 78.82 ± 37.05 , clicking/creptus is present in 32(64%) patients which had mean PSLES score of 82.46 ± 41.70 and absent in 18(36%) had mean PSLES score of 80.50 ± 27.06 , deviation and deflection is present in 30 (60%) patients which had mean PSLES score of 78.14 ± 36.97 and absent in 20(40%) had mean PSLES score of 85.47 ± 33.14 . The differences was statistically non significant. (Table no.12). On correlation of PSLES score of group A (Study group) with provisional diagnosis ($n=50$) patients with Internal Disc Derangement (IDD) had mean PSLES score of 78.82 ± 37.05 and patients with Myofascial Pain Dysfunction Syndrome (MPDS) had mean PSLES of 92.30 ± 24.39 . The difference was statistically non significant ($P > 0.05$) (Table no.13).

DISCUSSION-

The term TMD has been described as a cluster of disorders characterized by pain in the preauricular area, temporomandibular joint(TMJ) or masticatory muscles; limitation or deviations in mandibular range of motion; and clicking in the TMJ during mandibular function,

unrelated to growth or development disorders, systemic diseases, or macrotrauma.[7] One of the etiological factors of TMD is stress, which has been regarded as predisposing or perpetuating factor. Stress can be defined as an innate response of body to adjust to the everyday demands of life.[8] It has been reported that patients with temporomandibular disorders experienced twice as many undesirable stressful life events in a 6-month period than did controls and that life events contributed to the onset of TMDs in almost 50% of the patients.[9]

Psychological disturbance would thus lead to an increase in body tension, triggering or worsening the painful symptomatology associated to TMD. This would explain the presence of TMD signs and symptoms in individuals constantly exposed to tension, anxiety and stress.[10]

Considering all these point, the present study was carried out for evaluation of the psychological stress in etiology of temporomandibular disorders by using psychological instrument (Presumptive Stressful Life Event Scale) by case control method.

It was found that the majority of patients were in the age group of 21-30 years, which was similar to the observation made by Ozden AN et al. who reported that the prevalence of TMDs was highest in the age range of 20 -49 years [11] and Zulqarnain BL. Khan et al in their study found similar prevalence of 80% between age range of 20-25 years with mean age 21.36 (range: 17 - 33) years, in 705 female TMD patients.[12] While Wilkens Aurelio Buarque e silva et al in their study found prevalence of 33.33% patients of TMD patient in age group of 31-40 years.[13] The statistical differences were not significant for parafunctional habits and TMDS which states that there is no association between parafunctional habit and TMD. This could be due to very small size of patients with parafunctional habit. This result was contradictory to that obtained by Alan G. Glaros et al who found that parafunctional behaviors are good predictors of jaw pain levels in TMD than in control subjects [14] and C.R Pedroni et al reported that among the individuals with some degree of TMD, more than 52% showed clenching or grinding the teeth.[15]. As far as symptoms of TMDs are concerned, Sujata M Byahatti in her review documented that prevalence of joint noise was 35.2%, joint tenderness in 8.4%, muscle tenderness in 12.8% and limitation of jaw motion in 22.4% in TMD patients. The finding of prevalence of symptom of muscle tenderness was similar to that found in the present study.[16] while Angeles Moyaho-Bernal et al in their study observed that prevalence of muscular pain 48.1% and 19.1% joint pain. 63.4% showed signs of alteration in the mouth opening pattern, 39.1% presented joint sounds on opening or closing the mouth and 20.4% on mandibular excursions. The finding of prevalence of symptom of joint pain and joint sounds or clicking/crepitus was similar to that found in the present study.[17]

The mean PSLES score of stress in TMD (Group A) was 81.52 ± 35.10 whereas mean PSLES score in control group (Group B) was 53.24 ± 44.73 . These statistical significant differences showed that patients with TMD are associated with high level of stress. This inference was in conjunction with that of Elliot N. Gale who investigated relationship between psychological factors and temporomandibular joint dysfunction patients in female patients who had facial pain amongst these majority of them had temporomandibular joint dysfunction using Taylor Manifest Anxiety Scale (TMAS) [18] and Leonardo R Bonjardim et al who performed

psychological assessment using Hospital Anxiety Depression Scale (HADS) in TMD patients and their results showed statistical significant association with anxiety but not with depression,[19] Alderis A. Pesqueria et al who measured anxiety by means of self evaluative questionnaire and Spielberger's Trait-State Inventory to evaluate students state and trait anxiety and found a positive correlation between TMD and anxiety,[20] Maisa Reis Diniz et al who found that prevalence of TMD is more common in the individuals with higher level of stress and anxiety using Beck Anxiety Inventory (BAI)[3] and Hyung-Jun Yoon et al who suggested a relationship between stress levels and treatment types for patient with TMD using psychological well being index short form (PWI-SF) [21]. On co-relating gender and psychological stress amongst sample size of 50, 13 males had mean PSLES score of 91.53 ± 32.88 and while 37 females had mean PSLES score of 78.00 ± 35.60 Statistical difference were non significant. The findings of present study differed from that of Hyun-Jun Yoon who reported that women are more likely to experience greater emotional stress and concomitant psychiatric disorders; thus suggesting the need to consider gender and emotional stress in clinical assessment of TMD patients.[21]

On correlating mean TMJ pain VAS score which was 5.21 ± 2.02 with PSLES score which was 91.2 ± 34.31 , statistical differences were non significant. The results of present study differed to that obtained by Dr. Basheer Reman et al who evaluated the influence of stress and anxiety on severity of pain in the Temporomandibular joint dysfunction patients and showed that added morbidity of stress and anxiety with TMJ pain is strongly associated with severe pain.[22]

On correlating mean tenderness of muscles of mastication VAS score with PSLES score, the statistical differences were non significant, which implies that tenderness of muscles of mastication VAS score is not related to TMD. The results are contrary to that of G.M. Vedoni et al who assessed the impact of anxiety and stress levels in pressure pain threshold (PPT) of masticatory muscle and levels of pain and levels of pain in female dental students with myofascial pain. To measure level of stress, anxiety and pain, the Beck Anxiety Inventory, Lipp Stress Symptoms Inventory and Visual Analogue Scale was used, it was found that the external stressors have potential impact on masticatory muscle tenderness, regardless of the presence of myofascial pain.[23]

It was found that there was no correlation of parafunctional habit in TMD patients with psychological stress. The results obtained in the present study were contrary to that obtained by A. Emodi-Perlman et al who reported that stressful life events are related with increase in performance of multiple oral parafunctions in children.[24] Adriana do Vale et al who found that behavioral problems and potential emotional problems can be risk factors to bruxism in children[25] and R. Akhter et al who reported that parafunctional habit have shown to increase in stress level.[9] The hypothesis to justify this result of present study can be that parafunctional habits can be considered as an adaptive response to stress.

In the present study on correlating PSLES score in group A (Study group) with signs and symptoms of TMD like pain in Temporomandibular joint, restricted mouth opening, tenderness in muscles of mastication, clicking or crepitus, deviation and/ or deflection, there was no

correlation between signs and symptoms of TMD and psychological stress. Unlike Maisa Reis Diniz et al who found prevalence of joint sounds in TMD in students was 80% which increased to 90% as examination approached (stress period)[3]. R. Akhter et al also reported that the prevalence of TMD sound tended to increase with increase in stress level.[9]

The results of present study states that there is no correlation between psychological stress and the type of Temporomandibular disorder. This observation was contrary to that made by D.Manfredini et al who found that myofascial pain patients showed the highest prevalence of both mood and anxiety psychopathology when compared with TMD- free, disc displacement and joint disorders subjects.[26]

Although a positive correlation of psychological stress in etiology temporomandibular disorders was found in the present study, it carries limitation of the small sample size, other psychosocial and behavior domains such as anxiety, depression and fatigue were not considered for evaluation, and lastly whether psychological factors cause TMD or reflect the impact of the TMD on an individual as a “cause and effect” relation was not assessed.

In future, studies on large sample size for evaluation of all the etiological factors of TMD, including the psychological stress with methods likes serum cortisol, both before and after the treatment of TMD can be more helpful in understanding the role of psychological stress in etiology of TMD.

Thus it can be concluded from present study that psychological stress is an important etiological factor of Temporomandibular disorders. An estimation of PSLES score seems a promising parameter in the investigation of TMD. Hence psychological counselling should be included in the management for all TMD patients which will increase their ability to cope with stress together with conventional treatment modality.

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TABLES AND GRAPHS

Table 1: Age wise distribution of patients (n=100)

Age Group(yrs)	Group A	Group B	Total	χ^2 -value	p-value
Upto 20	6(12%)	8(16%)	14(14%)	7.19	0.12 NS,p>0.05
21-30	20(40%)	21(42%)	41(41%)		
31-40	16(32%)	20(40%)	36(36%)		
41-50	8(16%)	1(2%)	9(9%)		
>50	1(2%)	0(0%)	1(1%)		
Total	50(100%)	50(100%)	100(100%)		
Mean Age	32.16	29.12	30.64		
SD	8.80	7.00	7.90		
Range	18-55	19-43	18-55		

Table 2: Age wise and Gender wise distribution of subjects in group A and group B

	Mean	SD	Range	t-value	p-value
Group A (n=50)					
Male (n=13)	32.76	7.98	20-49	0.17	0.86 NS,p>0.05
Female (n=37)	32.21	8.95	18-55		
Group B (n=50)					
Male (n=15)	30.46	6.99	20-43	0.88	0.37 NS,p>0.05
Female (n=35)	28.54	7.03	19-40		

Table 3: Distribution of patients in both the groups according to parafunctional habit (n=100)

	Group A	Group B	χ^2 -value	p-value
Present	7(14%)	2(4%)	3.05	0.08 NS,p>0.05
Absent	43(86%)	48(96%)		
Total	50(100%)	50(100%)		

Table 4: Distribution of patients in group A according to signs and symptoms of TMD (n=50)

Symptoms	Pain in TMJ	Restricted mouth opening	Muscle Tenderness	Clicking/ Crepitus	Deviation/ Deflection
Present	23(46%)	25 (50%)	10 (20%)	32 (64%)	30 (60%)
Absent	27(54%)	25 (50%)	40 (80%)	28 (46%)	20 (40%)
Total	50(100%)	50 (100%)	50(100%)	50(100%)	50(100%)

Graph 1: Distribution of patients in group A according to signs and symptoms of TMD (n=50)

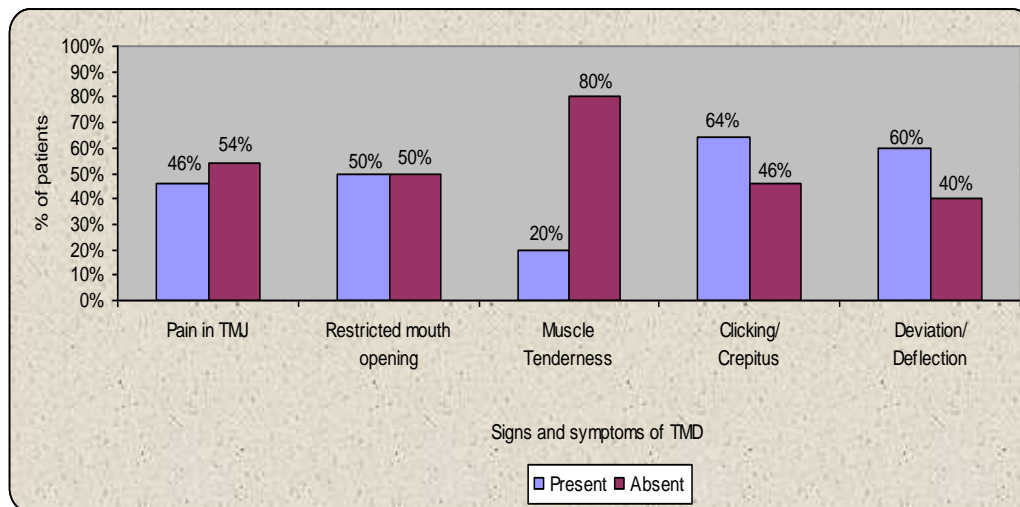


Table 5: Gender wise distribution of patients in Group A signs and symptoms of TMD (n=50)

Gender	Pain in TMJ	Restricted mouth opening	Muscle Tenderness	Clicking/ Crepitus	Deviation/ Deflection
Male	7(30.43%)	5(20%)	1(10%)	9(28.12%)	9(70%)
Female	16(69.57%)	20(80%)	9(90%)	23(71.8%)	21(30%)
Total	23(100%)	25(100%)	10(100%)	32(100%)	30(100%)

Graph 2: Gender wise distribution of patients in Group A signs and symptoms of TMD (n=50)

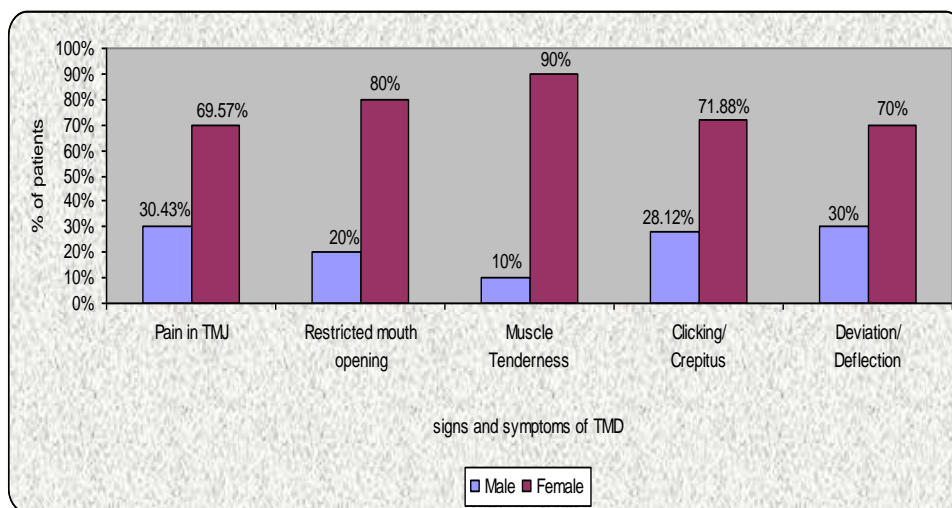


Table 6: Comparison of PSLES score in both the groups

Group	n	Mean	Std. Deviation	Std. Error Mean	z-value	p-value
Group A	50	81.52	35.10	4.96	4.25	0.000 S,p<0.05
Group B	50	53.24	31.33	4.43		

Graph 3: Comparison of PSLES score in both the groups

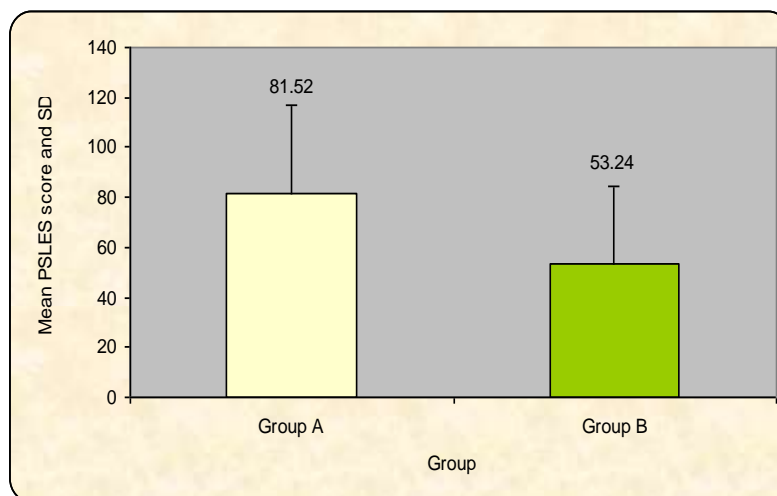


Table 7: Correlation of TMJ pain VAS score with PSLES score (n=23)

	N	Mean	Std. Deviation	r-value	p-value
TMJ pain VAS score	23	5.21	2.02	-	-
PSLES Score	23	91.21	34.31	0.24	0.26 NS,p>0.05

Table 8: Distribution of patients of group A according to TMJ pain VAS score (n=23)

TMJ pain VAS score	Mean	SD
Male	4.57	2.43
Female	5.87	2.18
Z-Value	1.27	
P-Value	0.21,NS,p>0.05	

Table 9: Distribution of patients of group A according to Tenderness of muscle of mastication (VAS score) (n=10)

Tenderness of muscle of mastication	Mean	SD
Male	4.00	0.00
Female	7.44	0.88
Z-Value	3.70	
P-Value	0.006,S,p<0.05	

Table 10: Correlation of tenderness of muscles of mastication with PSLES score (n=10)
Pearson's Correlation Coefficient

	Mean	Std. Deviation	n	Correlation 'r'	p-value
Tenderness of muscles of mastication	7.10	1.37	10	0.32	0.35 NS,p>0.05
PSLES Score	92.30	24.39	10		

Table 11: Correlation of patients of group A according to parafunctional habits with PSLES score (n=50)

Present/ Absent	n	Mean	SD	z-value	p-value
Present	7	103.42	39.57	1.82	0.075
Absent	43	77.95	33.47		NS,p>0.05

Table 12: Comparison of PSLES score in group A with signs and symptoms of TMD

Signs & symptoms of TMD	Duration	n	Mean	Std. Deviation	Std. Error Mean	z-value	p-value
Pain in TMJ	Present	23	91.21	34.31	7.15	1.84	0.071
	Absent	27	73.25	34.22	6.58		NS,p>0.05
Restricted mouth opening	Present	10	86.16	29.23	5.84	0.95	0.35
	Absent	40	76.88	40.19	8.03		NS,p>0.05
Tenderness of muscles of mastication	Present	10	92.30	24.39	7.71	1.08	0.28
	Absent	40	78.82	37.05	5.85		NS,p>0.05
Clicking / Crepitus	Present	32	82.46	41.70	8.17	0.19	0.84
	Absent	18	80.50	27.06	5.52		NS,p>0.05
Deviation/ Deflection	Present	30	78.14	36.97	7.11	0.73	0.46
	Absent	20	85.47	33.14	6.91		NS,p>0.05

Table 13: Correlation of PSLES score of group A with provisional diagnosis (n=50)

Provisional Diagnosis	Mean	SD	z-value	p-value
IDD	78.82	37.05	1.08	0.28
MPDS	92.30	24.39		NS,p>0.05