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Temporomandibular Joint Disorder with Electromyographic Evaluation in Different Age Groups.

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Abstract:

There are many subgroups of orofacial pain disorders. Temporomandibular disorders (TMD) are one of them, with identifiable signs like jaw opening and closing noises with small range of motion, or mandibular divergence during yawning as well as symptoms like tiredness in the muscle or jaw joint.Surface electromyography (SEMG) is a invasive and diagnostic tool that ensures effective evaluation of muscle activity of the external masticatory muscles called masseter and temporal muscles.Objective of this study is to examine the muscular electrical activity recording of patients with temporomandibular joint disorder is same for youngsters (below 30 years) and mid-age/old age (above 30 years).The number of statistically important pathological features in the stomatognathicsystemchanged with age in groups with TMJ disorders.

Introduction

Temporomandibular disorder (TMD) mainly involve set of musculoskeletal disorders which may affect the masticatory system (1). This disorder is highly prevalent in general population but females and young population are affected more [2,3]. The problem of TMJ disorder have been mounting swiftly nowadays among all ages of the human population. Early detection of this disorder can greatly assist in the maintenance of the subject's mental and physical health

One of the disorder of masticatory muscle and temporomandibular joint is called TMJ disorder. Some of the precipitant factors for this disorder are malocclusion,Bruxism,Trauma of face or jaw, emotional stress and the symptoms of this disorder are muscle aches of neck, Shoulder pain,Headache,ringing in the ear, Jaw locking and clicking with limited opening of the mouth[1,5].TMD is more prevalent adults .Possible causes for the prevalence of adults is may be because of stress in day to day life and in female[6] one of the contributing factor could be premenstrual syndrome. Early diagnosis of this disorder is a challenge aspect for the doctor because of complex signs and symptoms.TMD is diagnosed by Dentist after performing a clinical history followed by radiographic evaluation.

Electromyography (EMG) is the basic muscle recording method which let us know the

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fundamental electrical properties of skeletal muscle using superficial or needle electrodes[4]. Electromyography is complementary tool for assessing the muscle function and can contribute in the diagnosis of this order. For the diagnosis of temporomandibular disorders, a non-invasive surface electromyography (EMG) isused .External muscles of mastication are taken into consideration for the testing of muscle function with surface electromyography[7,8] .Temporalis and Masseter muscles are tested in two formats. When the subject is at rest and when the subject is clenching hard with intercuspal position.

Materials and Methods

The current research was performed with 50 subjects in total with age group of 18-60 years. The study is divide in to two groups. First group is from 18-30 years and second group is from 30-60 years. Those with a history of dysfunction syndrome and orthodontic treatment, lip incompetence, tenderness of any chewing muscle and prior tooth restoration [4] were omitted during the selection of the subjects. For each subject, a complete dental history is made and Optopentamograph (OPG) are taken to identify the parameters of TMJ. Anterior masseter belly and anterior temporalis belly of both sides were studied (which are classified here as masseter and temporalis, respectively, for convenience). For all the subjects, bipolar surface electrodes were used.

The EMG recording of these muscles was done in both groups at most comfortable position of jaw i.e., at rest position and during maximum clenching at maximum intercuspal position[2,9]. Before recording, volunteers were seated comfortably on a normal chair[5].before recording. Since jaw muscles react to changes in head position, the head was held vertical and no movement was allowed. They were taught how to hold the mandible in the most relaxed centric connection position of the jaws, close it in the most intercuspal position possible, and clench maximally for a set amount of time. Cotton roll was used to help with clenching. The volunteers were given 30 seconds to 1 minute to crush the cotton roll. In the other side, the same protocol was followed.Surface EMG signals were collected using bipolar disposable surface electrodesfrom a four channel EMG machine during rest and during maximal voluntary clenching.[6].The simultaneous recording thus obtained from masseter muscles on both sides during rest and MVC[1,9]. Similarly temporalis muscles on both sides obtained during rest and MVC (Maximum Voluntary Clenching) for both the age groups. The results were studied and analysed statistically[10]

OBJECTIVES OF THE STUDY

Objective of this study is to inspect the muscular electrical activity using the non invasive surface electromyographic recording of patients with temporomandibular joint disorder (TMJ Disorder) is same for youngsters (below 30 years) and mid-age/old age (above 30 years).and to check if there is a significant difference in temporalis and massater muscles of masticatory system.

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HYPOTHESIS OF THE STUDY

H0: There is no noteworthychange in Age-Group and electrical activity recording of masseter and temporalis muscles in patients.

H1: There is a noteworthychange in Age-Group and electrical activity recording masseter and temporalis muscles in patients.

RESULTS AND DISCUSSIONS

Data has been collected from total 50 respondents and are categorized into 2 equal parts of control (healthy) and experimental (patients)

Table No.1

Ranks

Group		age_group	N	Mean Rank	Sum of Ranks
experimental	Left Temporalis Rest	18-30	11	35.55	391.00
		31-60	39	22.67	884.00
		Total	50		

Table No.2

Test Statistics[a]

Group		Left Temporalis Rest
experimental	Mann-Whitney U	104.000
	Wilcoxon W	884.000
	Z	-2.588
	Asymp. Sig. (2-tailed)	.010

a. Grouping Variable: age_group

Kolmogorov-Smirnov P-value was less than .050 indicating data not normally distributed. The researcher tried correcting the data problem through square root transformation, log transformation and reciprocal transformation but fails to solve the problem of converting the data into normal distribution and thus applied non-parametric Mann-Whitney U test.

As per table no.1 and table no. 2 it can be clearly seen that there is a significant difference in **left temporalis rest muscles electrical activity recording of patients**and age groupas p value is less than the level of significance .05.

It is further seen than mean rank of 18-30 years is 35.55 whereas mean rank of 31-60 years is 22.67

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Table No.3

Ranks

Group		age_group	N	Mean Rank	Sum of Ranks
experimental	Right Temporalis Rest	18-30	11	33.36	367.00
		31-60	39	23.28	908.00
		Total	50		

Table No.4

Test Statistics[a]

Group		Right Temporalis Rest
experimental	Mann-Whitney U	128.000
	Wilcoxon W	908.000
	Z	-2.027
	Asymp. Sig. (2-tailed)	.043

a. Grouping Variable: age_group

Kolmogorov-Smirnov P-value was less than .050 indicating data not normally distributed. The researcher tried correcting the data problem through square root transformation, log transformation and reciprocal transformation but fails to solve the problem of converting the data into normal distribution and thus applied non-parametric Mann-Whitney U test.

As per table no.3 and table no. 4 it can be clearly seen that there is a significant difference in **Right temporalis rest muscles electrical activity recording of patients**and age group as p value is less than the level of significance .05.

It is further seen than mean rank of 18-30 years is 33.36 whereas mean rank of 31-60 years is 23.28

Table No.5

Test Statistics[a]

Group		Left Temporalis MVC
experimental	Mann-Whitney U	71.500
	Wilcoxon W	851.500
	Z	-3.363
	Asymp. Sig. (2-tailed)	.001

a. Grouping Variable: age_group

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Ranks

Group		age_group	N	Mean Rank	Sum of Ranks
experimental	Left Temporalis MVC	18-30	11	38.50	423.50
		31-60	39	21.83	851.50
		Total	50		

Table No.6

Kolmogorov-Smirnov P-value was less than .050 indicating data not normally distributed. The researcher tried correcting the data problem through square root transformation, log transformation and reciprocal transformation but fails to solve the problem of converting the data into normal distribution and thus applied non-parametric Mann-Whitney U test.

As per table no.5 and table no. 6 it can be clearly seen that there is a significant difference in Left **temporalis MVC muscles electrical activity recording of patients**and age groupas p value is less than the level of significance .05.
It is further seen than mean rank of 18-30 years is 38.50 whereas mean rank of 31-60 years is 21.83

Table No.7

Ranks

Group		age_group	N	Mean Rank	Sum of Ranks
experimental	Right Temporalis MVC	18-30	11	41.09	452.00
		31-60	39	21.10	823.00
		Total	50		

Table No.8

Test Statistics[a]

Group		Right Temporalis MVC
experimental	Mann-Whitney U	43.000
	Wilcoxon W	823.000
	Z	-4.029
	Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: age_group

Kolmogorov-Smirnov P-value was less than .050 indicating data not normally distributed. The researcher tried correcting the data problem through square root transformation, log transformation and reciprocal transformation but fails to solve the problem of converting

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the data into normal distribution and thus applied non-parametric Mann-Whitney U test.
As per table no.7 and table no. 8 it can be clearly seen that there is a significant difference in **Right temporalis MVC muscles electrical activity recording of patients**and age groupas p value is less than the level of significance .05.
It is further seen than mean rank of 18-30 years is 41.09 whereas mean rank of 31-60 years is 21.10

Table No.9

Ranks

Group		age_group	N	Mean Rank	Sum of Ranks
experimental	Left Massater Rest	18-30	11	32.18	354.00
		31-60	39	23.62	921.00
		Total	50		

Table No.10

Test Statistics[a]

Group		Left Massater Rest
experimental	Mann-Whitney U	141.000
	Wilcoxon W	921.000
	Z	-1.722
	Asymp. Sig. (2-tailed)	.085

a. Grouping Variable: age_group

Kolmogorov-Smirnov P-value was less than .050 indicating data not normally distributed. The researcher tried correcting the data problem through square root transformation, log transformation and reciprocal transformation but fails to solve the problem of converting the data into normal distribution and thus applied non-parametric Mann-Whitney U test.
As per table no.9 and table no. 10 it can be clearly seen that there is no significant difference in **left masseter rest muscles electrical activity recording of patients**and age groupas p value is .085.

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TableNo.11

Ranks

Group		age_group	N	Mean Rank	Sum of Ranks
experimental	Right Massater Rest	18-30	11	25.45	280.00
		31-60	39	25.51	995.00
		Total	50		

Table No.12

Test Statistics[a]

Group		Right Massater Rest
experimental	Mann-Whitney U	214.000
	Wilcoxon W	280.000
	Z	-.012
	Asymp. Sig. (2-tailed)	.991

a. Grouping Variable: age_group

Kolmogorov-Smirnov P-value was less than .050 indicating data not normally distributed. The researcher tried correcting the data problem through square root transformation, log transformation and reciprocal transformation but fails to solve the problem of converting the data into normal distribution and thus applied non-parametric Mann-Whitney U test.
As per table no.11 and table no. 12 it can be clearly seen that there is no significant difference in **Right masseter rest muscles electrical activity recording of patients**and age groupas p value is .991

Table No.13

Ranks

Group		age_group	N	Mean Rank	Sum of Ranks
experimental	Left Massater MVC	18-30	11	24.95	274.50
		31-60	39	25.65	1000.50
		Total	50		

Table No.14

Test Statistics[a]

Group		Left Massater MVC
experimental	Mann-Whitney U	208.500
	Wilcoxon W	274.500
	Z	-.141
	Asymp. Sig. (2-tailed)	.888

a. Grouping Variable: age_group

Kolmogorov-Smirnov P-value was less than .050 indicating data not normally distributed.

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The researcher tried correcting the data problem through square root transformation, log transformation and reciprocal transformation but fails to solve the problem of converting the data into normal distribution and thus applied non-parametric Mann-Whitney U test.
As per table no.13 and table no. 14 it can be clearly seen that there is no significant difference in **left masseter MVC muscles electrical activity recording of patients**and age groupas p value is .888

Table No.15

Ranks

Group		age_group	N	Mean Rank	Sum of Ranks
experimental	Right Massater MVC	18-30	11	30.14	331.50
		31-60	39	24.19	943.50
		Total	50		

Table No.16

Test Statistics[a]

Group		Right Massater MVC
experimental	Mann-Whitney U	163.500
	Wilcoxon W	943.500
	Z	-1.195
	Asymp. Sig. (2-tailed)	.232

a. Grouping Variable: age_group

Kolmogorov-Smirnov P-value was less than .050 indicating data not normally distributed. The researcher tried correcting the data problem through square root transformation, log transformation and reciprocal transformation but fails to solve the problem of converting the data into normal distribution and thus applied non-parametric Mann-Whitney U test.
As per table no.3 and table no. 4 it can be clearly seen that there is no significant difference in **Right masseter MVC muscles electrical activity recording of patients**and age groupas p value is .232

Hypothesis	P (value)	Results
1. electrical activity recording of left temporalis rest muscles in patients of age group 18-30 and age group 31-60 are same.	.010	REJECTED
2. electrical activity recording of Right temporalis rest muscles in patients of age group 18-30 and age group 31-60 are same	.043	REJECTED

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3. electrical activity recording of left temporalis MVC muscles in patients of age group 18-30 and age group 31-60 are same	.001	REJECTED
4. electrical activity recording of Right temporalis MVC muscles in patients of age group 18-30 and age group 31-60 are same	.000	REJECTED
5. electrical activity recording of left massater rest muscles in patients of age group 18-30 and age group 31-60 are same	.085	ACCEPTED
6. electrical activity recording of Right masseter rest muscles in patients of age group 18-30 and age group 31-60 are same	.991	ACCEPTED
7. electrical activity recording of left masseter MVC muscles in patients of age group 18-30 and age group 31-60 are same	.888	ACCEPTED
8. electrical activity recording of Right masseter MVC muscles in patients of age group 18-30 and age group 31-60 are same	.232	ACCEPTED

CONCLUSION

Based on the results above presented, it was concluded that clinical signs and symptoms of TMJ Disorder were present in all the age group from 18 to 60 years. Bruxism and jaw locking were the most prevalent clinical signs and symptoms, respectively. In relation to muscle differences, only temporalis and masseter during rest and maximal voluntary clenching tenderness showed greater frequency among the age group 18-30, but this finding must be inferred carefully. The presence of clinical signs associated with subjective symptoms was also confirmed. It can be clearly seen that there is a significant difference in Masseterand temporalis muscles electrical activity of Surface EMG recording of patients belonging to patients of Age group 18-60 years.

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