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Original Research Article.

A Study on Occlusal Disharmony on Masticatory Muscle Pain

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ABSTRACT

Background: Over the years functional disturbances of the masticatory system have been recognized by a variety of terms.

Objective: In this study our main goal is to evaluate the Effect of Occlusal Disharmony on Masticatory Muscle Pain.

Methods: This observational study was conducted at Department of Prosthodontics, Faculty of Dentistry, Bangabandhu Sheikh Mujib Medical University, Shahbagh, Dhaka, Bangladesh from January 2005 to December 2006 among 100 patients. During the study Total patients had been divided into three groups (Group I, Group II & Group III). In group I only the patients associated with Masticatory muscle pain (MMP) were included. In group II the patients with Masticatory muscle pain (MMP) with temporomandibular joint dysfunction (TMD) were included and in group III patients were selected who were suffering from pain only associated with temporomandibular joint dysfunction (TMD).

Results: In the experiment female percentage (68%) was higher than male and among the group I patients, 60.0% had right side and 40.0% had left side local muscle soreness. Among group II patients local muscle soreness was 37.3% in right and 3.0% in left side. Among group III patients local muscle soreness was none in right side and 7.1% in left side.

Conclusion: After much analysis we can conclude that occlusal disharmonies were positively associated with Masticatory Muscle Pain but not significant. Future studies is needed for better outcome.

Keyword: Masticatory System, Occlusal Disharmonies, Temporomandibular Joint Dysfunction.

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INTRODUCTION

The term occlusion is defined in the dictionary as the act of closure or being closed. Unfortunately, in dentistry the term often connotates a static, morphologic tooth contact relationship. However, the term should have in its definition the concept of a multifactorial functional relationship between the teeth and other components of the masticatory system as well as with other areas of the head and neck that directly or indirectly relate function, parafunction, or dysfunction of the masticatory system.[1]

The alignment and occlusion of the dentition are extremely important in masticatory function. The basic activities of chewing swallowing and speaking depend greatly not only on the position of teeth in the dental arches but also on the relationship of the opposing teeth when they are brought in to occlusion. Tooth positions are determined not by chance, but by numerous controlling factors, such as arch width and tooth size. Surrounding soft tissue force also interfere the tooth position.[2]

One study reported that the masticatory system is a functional unit composed of the teeth; their supporting structures, the jaws; the temporomandibular joints; the muscles involved directly or indirectly in mastication (including the muscles of lips and tongue): and the vascular and the nervous systems supplying these tissues. The masticatory muscles are activated by both central and peripheral nervous system inputs and provide the work (both positive and negative) involved in mastication and both parafunctional activities carried out by the masticatory system. Other muscles of the head and neck are also necessary for parafunctions such as swallowing, respiration and speech (parafunction may also refer to clenching and bruxism).[1]

The TMJ is one of the most complex joints in the human body and is the area in which the mandible articulates with the cranium. It provides for hinging movement in one plane and therefore can be considered a ginglymoid joint. At same time it also provides for

gliding movements, which classifies it as an arthrodial joint. For the dentist attempting to manage a TMD patient, it is critical to appreciate the major causes that may be associated with the condition because proper identification of the correct factor is essential for selecting proper and effective therapy. A review of the scientific literature reveals the five major factors associated with TMD: (1) Occlusal condition, (2) Trauma, (3) Emotional Stress (4) Deep pain input and (5) Parafuntional activity (Jeffrey P. Okeson 2003, p. 162).

In fact, the importance of any of these factors varies greatly from patient to patient. Occlusion is most important, as it is the unique center of dentistry.[3-5]

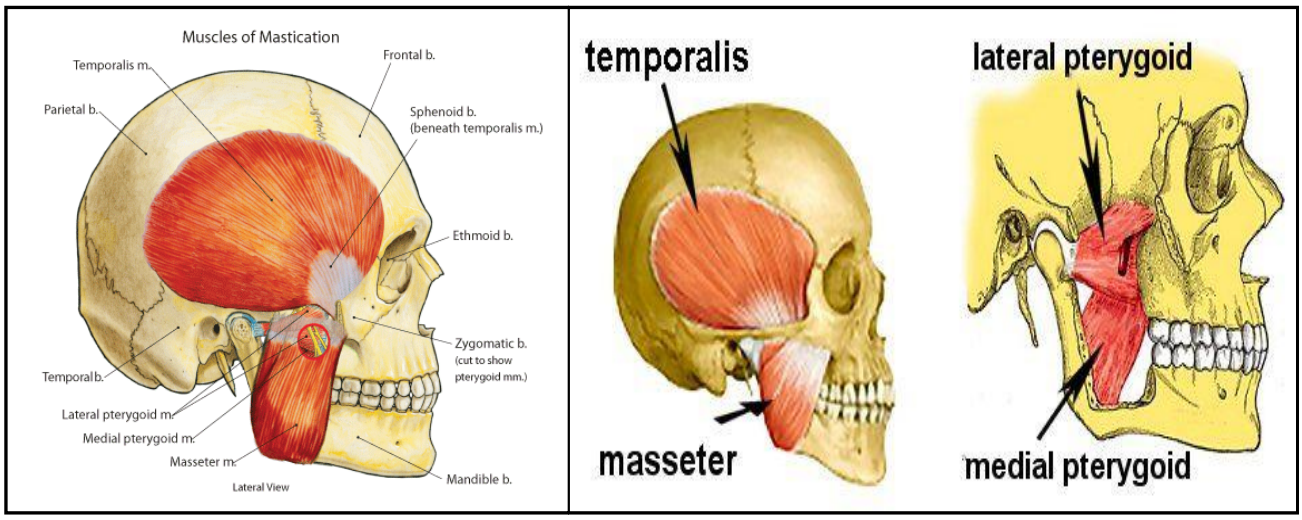

Figure 1a and 1b: Masticatory Muscle Pain.

One contributing factor to TMD that has been strongly debated for many years in the occlusal condition. Early in the development of this field, occlusion was considered to be the most important contributing factor in TMD & MPS. However, more recently many researchers argued that occlusal factors play little-to-no role in TMD (Jeffrey P. Okeson 2003, p. 162). Another important factor that help to stabilize tooth alignment is occlusal contact, which prevents the extrusion or supererupt ion of teeth, thus maintaining arch stability. Every time the mandible is closed, the unique occlusal-contact pattern reemphasizes and maintains tooth position. If a portion of the occlusal surface of a tooth is lost or altered, the dynamics of the periodontal supportive structures will allow shifting of the tooth. Unopposed teeth are likely to supererupt until occlusal contact is established. Therefore when a tooth is lost, not only is the distal tooth likely to move mesially, but the unopposed tooth is also likely to erupt, seeking an occlusal contact. Therefore it becomes apparent that the proximal and occlusal contacts are important in maintaining tooth alignment and arch integrity.[6] In this study our main objective is to evaluatethe Effect of Occlusal Disharmony on Masticatory Muscle Pain.

OBJECTIVE

General Objective

- To assess the effect of occlusal disharmony on masticatory muscle pain.

Specific Objective

- To detect duration of Fixed Partial Denture (years)
- To identify patients in groups by myofacial pain

METHODOLOGY

Study Type

- The study was a observational study.

Place and Period of Study

The study was conducted at the Department of Prosthodontics, Faculty of Dentistry, Bangabandhu Sheikh Mujib Medical University, Shahbagh, Dhaka, Bangladesh from January 2005 to December 2006.

Study Population

- Study population was selected on the basis of inclusion and exclusion criteria.

Sample Size and Sampling Technique

- The sample size has been determined to measure a given proportion with a given degree of accuracy at a given level of statistical significance by using the following formula

To determine the sample size, the formula is used;

$$n = \frac{z^2 pq}{d^2}$$

Where, n = the desired sample size which would help to measure the different indicators

Z = the standard normal deviate, usually set at 1.96 at 5% level which corresponds to 95% confidence level;

The assumed target proportion is p to have a particular characteristics and q = 1-p, Here p=0.08

$$\frac{|\hat{p} - P|}{\hat{p}}$$

Suppose, is the relative error of estimate, p is to be tolerated with P, as proportion in the population and. d is the degree of accuracy level considered as 5%. The degree of accuracy d, which assume, is 0.05

Putting the values in the above equation the sample size n is estimated as

$$\frac{3.84 \times 0.08 \times 0.92}{0.05^2} = 113.09$$

n =113 (targeted sample size)

During the study period 100 samples were available which were included in this study. Sample was selected purposively.

Study Procedure

- Patients attended with pain in the temporomandibular region and muscle of mastication with the history of missing teeth or occlusal disharmony (premature contact, reduced vertical height due to attrition or faulty restoration) in the Department of Prosthodontics for the treatment within the study period were initially randomized for this study. Each patient was evaluated by a through medical and dental history as well as clinical and radiographic examination as per history sheet (Appendix-I) enclosed herewith. The total experiment procedures, advantages and disadvantages of the experiment prior to investigation were explained to the patients. According to the opinion from the patient he/she was finally selected for the experimental study. A verbal consent was taken from each patient before performing the study.

Grouping of the Subjects

- In this study total number of patients was 100; total patients had been divided into three groups (Group I, Group II & Group III). In group I only the patients associated with Masticatory muscle pain (MMP) were included. In group II the patients with Masticatory muscle pain (MMP) with temporomandibular joint dysfunction (TMD) were included and in group III patients were selected who were suffering from pain only associated with temporomandibular joint dysfunction (TMD). Data were collected on the basis of the clinical and radiological record and associated changes on some specific parameters (mentioned in methodology). Collected data in terms of different parameters were shown in tabular form and statistical analysis was done to observe the statistical significance.

Inclusion Criteria

- Patients with missing teeth in the premolar, molar region and anterior teeth.
- With premature contact.
- Faulty restoration
- Reduced vertical height due to attrition.

Exclusion Criteria

- Patients with ankylosis of the TMJ.
- Patients with the history of trauma.
- More than 65 years of age.
- Full mouth edentulous.

Clinical and Radiological Evaluation

- Patients were examined clinically and radiographically (transcranial lateral oblique view and/or tomograph of TMJ and/or orthopantomgraph). A master cast and radiograph were preserved. Condyle position was identified by the radiological evaluation and occlusal derangement was find out from the clinical record as well as from the master cast.

Clinical Evaluation

- In evaluating a patient for TMDs, the dental structure was carefully examined. The tooth wear, occlusal contact pattern was examined in all possible positions and movements of the mandible: the centric relation (CR) position, the intercuspal position (ICP), Protrusive movement, and right and left laterotrusive movements. The patient was made relaxed to locate CR. The patient was recline comfortably in the dental chair. A soft, gentle, reassuring and understanding manner and encouragement was given to patient to achieve success. It was done by laying the patients back and the chin pointed upward. By standing behind of the patients, bracing of the patient's head between the forearm on one side and the rib cage on the other. Four finger of the each hand were placed on the lower border of the mandible especially on the bone not on the soft tissues. Then both thumb were placed over the symphysis of the chin. At this position, the mandible was guided by upward force placed on its lower border angle with the fingers, at the same time the thumb press downward and backward on the chin. The overall force on the mandible was directed to seat the condyles in their most superior anterior position, braced against the posterior slopes of the eminences. Firm and gentle force was applied to guide the mandible that helped not to elicit any protective reflexes. In this superoanterior position the condyle disc complexes will be in proper relation to accept forces. In such relation guiding the mandible to CR will create no pain. Any pain that will indicate intracapsular disorder existed. That will indicate a functionally displaced or dislocated disc. During the guiding mandible, any inflammatory disorders of the TMJ will elicit discomfort. If these conditions existed, no accurate reproducible CR position will be achieved. The loss of arch integrity (through missing teeth or carious loss of tooth structure) was noted. Any drifting, tipping or supererruption of teeth was also included. The vertical dimension of the occlusion was recorded. A loss of vertical dimension was evaluated by loss of significant number of posterior teeth and anterior teeth became functional stop for mandibbular closure. Increase vertical dimension due to presence of any high restoration was also recorded.

Radiographical Evaluation

- From the panoramic radiograph the screening of the condyles were done and recorded. By transcranial lateral oblique view the condyles and articular fossa are well studies and recorded the relation. From lateral view of the TMJs evaluation of joint structures was done. Bony changes and functional relationship of the joint also recorded.

Data Collection and Analysis

- Data were collected according to the pre-designed structural data collection sheet (appendix-1) on the basis of specific prefixed parameters. At first all of the relevant collected data were edited and complied on a master chart. Collected data were analyzed by using statistical package for social science (SPSS) after coding and scoring (version 10). Results were presented in bar diagrams. Chi-square and ANOVA test was done for statistical significance where applicable. P value <0.05 was considered as significant.

RESULTS

In figure-2 shows Age distribution of the patients where it was evident that among the group I patients, highest percentage 60.0% were 31-45 years age group and 20.0% were ≤ 30 & ≥46 age groups. Among the group II patients, highest percentage 47.8% were ≤ 30 age group followed by 28.4% were ≥46 years age group and 23.9% were 31-45 years age group. Whereas among the group III patients, highest percentage 57.1% were ≥46 years age group followed by 28.6% were ≤30 years age group and 14.3% were 31-45 years age group. In the whole study

patients 41% was ≤30 years age group followed by 36.0% were ≥46 years age group and 23.0% were 31-45 years age group.

In table-1 shows gender distribution of the patients where female (68%) were higher than male. In figure-3 shows removable partial denture where removable partial denture were present in 80.0%, 17.9% and 14.3% in group I, group II and group III respectively. In total 20.0% patients used removable partial denture.

In table-2 shows duration of Fixed Partial Denture (years) where among the group I patients 20.0% used fixed partial denture during last 1-5 years and 40.0% used fixed partial denture for last 6-10 years. Among the group II patients 4.5% used fixed partial denture during last 1-5 years and 3.0% used last 6-10 years. Among the group III patients 14.3% used fixed partial denture during last 1-5 years and none used fixed partial denture for last 6-10 years.

In figure-4 shows duration of attrition where duration of attrition was 0-3 years & 8-10 years in 40.0% and 4-7 years in 20.0% among the group I patients. Among the group II patients, highest percentage of duration of attrition 56.7% was 0-3 years followed by 34.3% was 4-7 years and 9.0% was 8-10 years. Among the group III patients, highest percentage of duration of attrition 71.4% was 0-3 years followed by 14.3% was 4-7 years and 8-10 years.

In table-3 shows distribution of patients in groups by condylar morphology where among the group I patient 20.0% had right side and 40.0% had left side of superior surface flat. Among group II patients superior surface flat was 29.9% and 41.8% in right and left side respectively Among group III patients superior surface flat was 14.3% in right and in left side 14.3%.

In figure-5 shows distribution of patients in groups by local muscle soreness, where it was evident that among the group I patients, 60.0% had right side and 40.0% had left side local muscle soreness. Among group II patients local muscle soreness was 37.3% in right and 3.0% in left side. Among group III patients local muscle soreness was none in right side and 7.1% in left side.

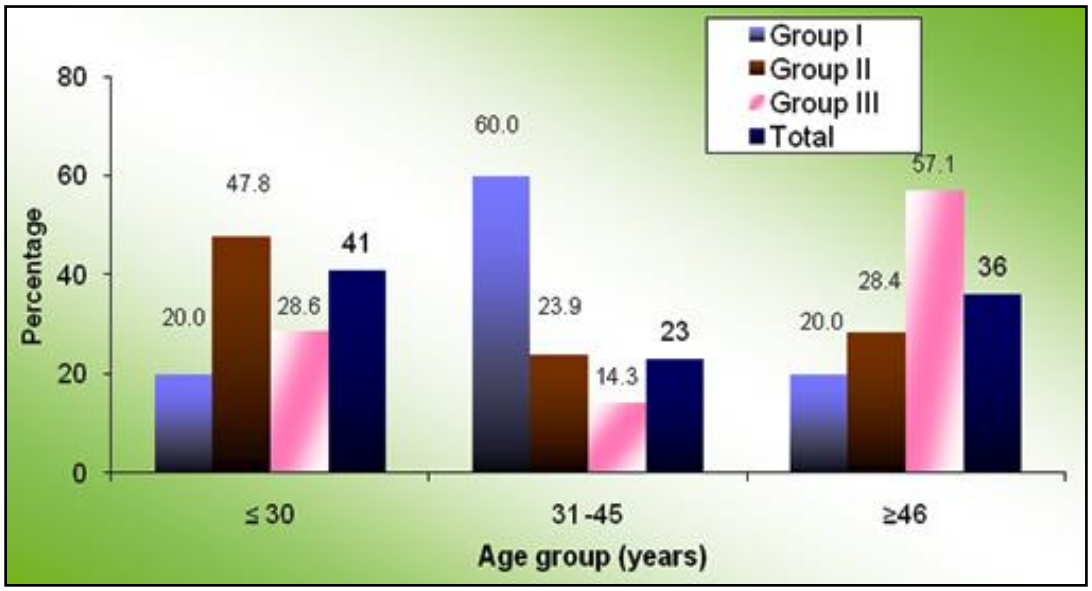

Figure-2: Age distribution of the patients.

[*where in group I = Masticatory muscle pain (MMP);
group II =Masticatory muscle pain (MMP) with temporomandibular joint dysfunction (TMD) and
group III = temporomandibular joint dysfunction (TMD)]

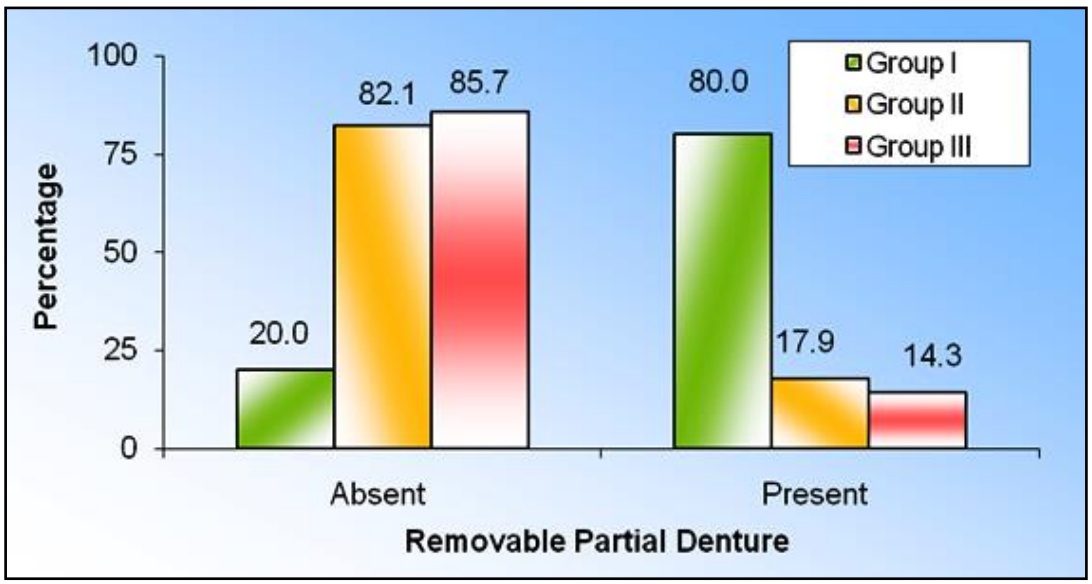

Figure-3: Removable partial denture.

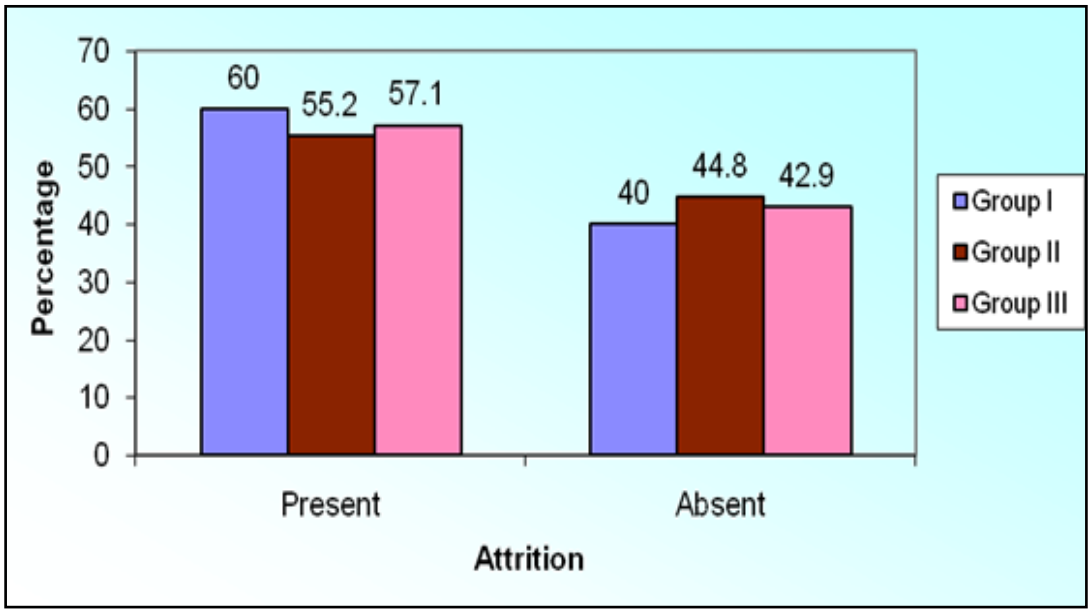

Figure-4: Duration of attrition.

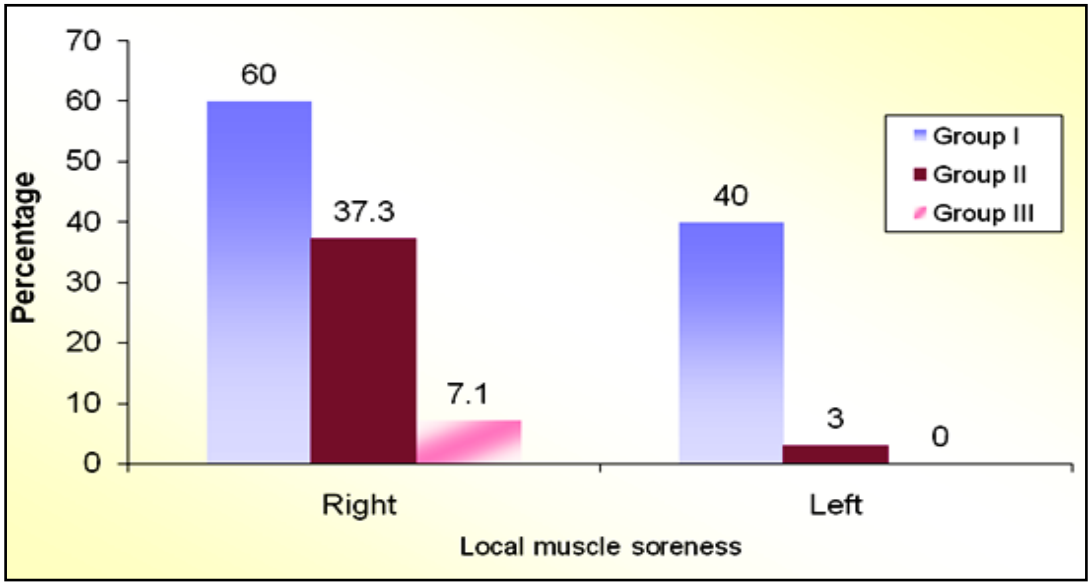

Figure-5: Distribution of patients in groups by local muscle soreness.

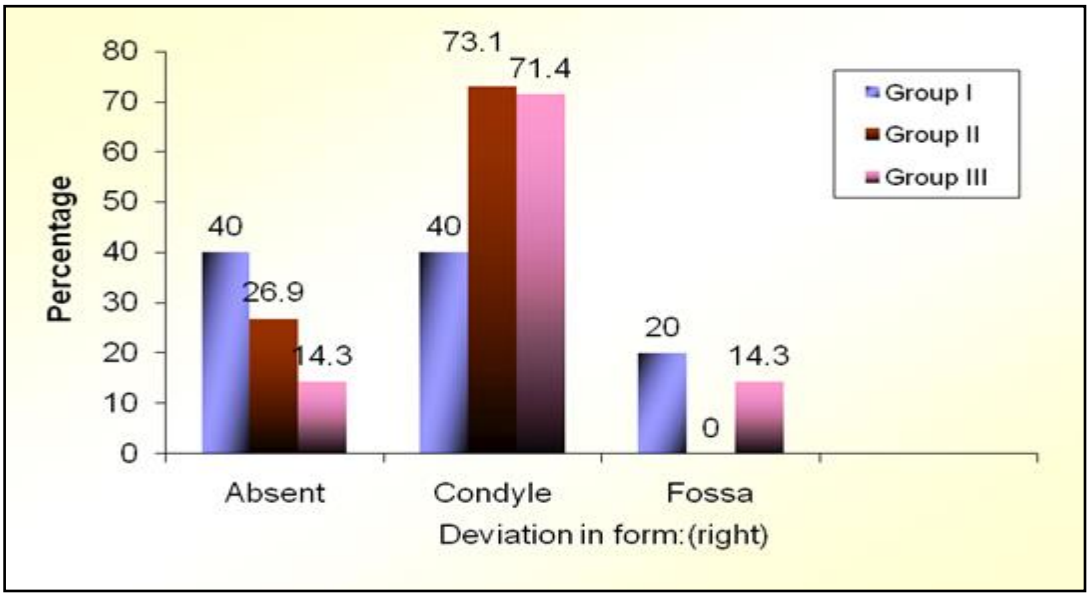

Figure-6: Distribution of patients in groups by deviation in form (right)

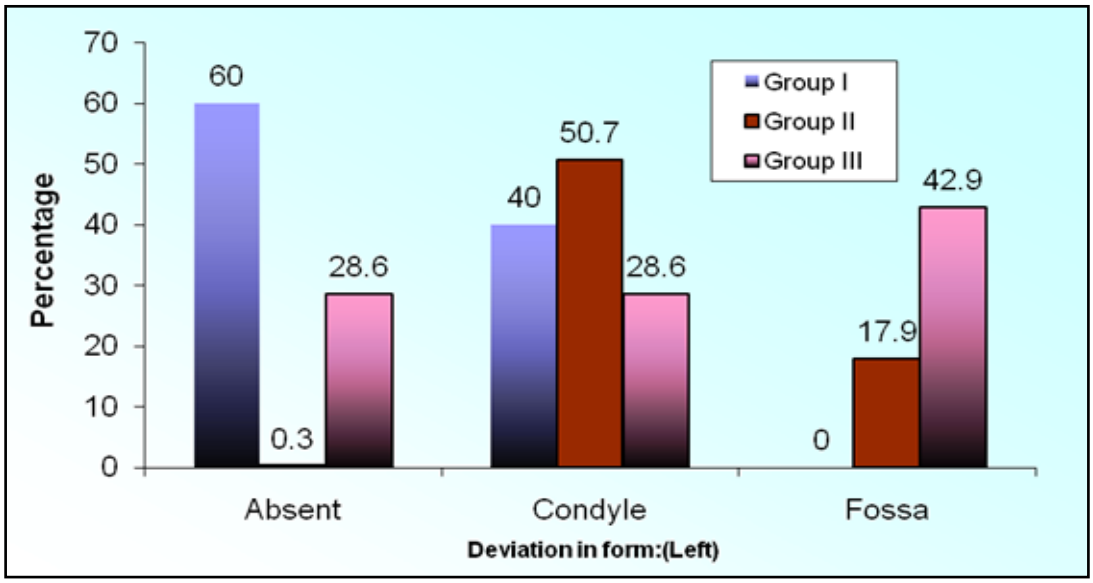

Figure-7: Distribution of patients in groups by deviation in form (left)

Table-1: Gender distribution of the patients

Gender	%
Male	32%
Female	68%

Table 2: Duration of Fixed Partial Denture (years)

Group	% of fixed partial denture, 1-5 years	% of fixed partial denture, 6-10 years
Group I	20%	40%
Group II	4.5%	3%
Group III	14.3%	0%

Table-3: Distribution of patients in groups by condylar morphology

Group	% of superior surface flat, right side	% superior surface flat, left side
Group I	20%	40%
Group II	29%	41.8%
Group III	14.3%	14.3%

Table-4: Distribution of patients in groups by myofacial pain

Group	% of myofascial pain, right side	% myofascial pain, left side
Group I	20%	40%
Group II	22.4%	17.9%
Group III	0%	3.6%

Table-5: Distribution of patients in groups by adhesion

Group	Right, %	Left, %
Group I	40%	40%
Group II	6%	9%
Group III	14.3%	14.3%

In table-4 shows distribution of patients in groups by myofascial pain where in group I patients, 20.0% had myofascial pain in right and 40.0% had myofascial pain in left side. Among group II patients masticatory muscle pain was 22.4% in right and 17.9% in left side. Among group III patients myofascial pain was none in right side and 3.6% in left side. In figure-6 shows distribution of patients in groups by deviation in form (right) where among the group I patients, 40.0% had right side deviation present in the form of the condyle and 20.0% had deviation present in the form fossa. Among the group II patients, 26.9% had right side deviation absent in the form of both condyle and fossa, 73.1% had condyle form deviation and none had deviation in the form of fossa. Among the group III patients, 14.3% had right side deviation absent in the form of both condyle and fossa, 71.4% had condyle form deviation and 14.3% had deviation form of fossa.

In figure-7 shows where among the group I patients, 60.0% had left side deviation absent in the form of the both condyle and fossa. Among the group II patients, 31.3% had left side deviation absent, 50.7% had condyle form deviation and 17.9% had deviation form of fossa on left side. Among the group III patients, 28.6% had left side deviation absent, 28.6% had condyle form deviation and 42.9% had deviation form of fossa in the left side.

In table-5 shows distribution of patients in groups by adhesion where among the group I patients, 40.0% had adhesion in both sides. Among the group II patients, 6.0% had right side adhesion and 9.0% had left side adhesion. Among the group III patients, 14.3% had right side adhesion and 14.3% had left side adhesion present. In total 68.0% had right side masticatory muscle pain and 54.0% had left side masticatory muscle pain. In case of deviation in form of condyle and fossa it was evident that 76.0% had right side deviation and 68.0% had left side deviation present. 10.0% and 12.0% adhesion was present respectively in right and left side.

DISCUSSION

In this study age range of the patients of all groups were young adult from 20 years to old people up to 65 years old. Here more than 65 years people had been excluded. In Group I patients, most (60.0%) were within the age limit 31-45 years. Few, only

20.0% each found in the age less than 30 years and more than 46 years. In Group II maximum patients were within the age limit below 30 followed by more than 46 but less amount in the age limit 31-45 years. Whereas among the Group III patients, most of the patients were within the age more than 46 followed by less than 30 and 31-45 years. During the study in total 68 female patients were present in the study along with 32 male.

The removable partial denture (RPD) and fixed partial denture (FPD) though can affect in change of occlusion. But within the study group most of the patients were not using the RPD or FPD. Removable partial dentures were present in 80.0%, 17.9% and 14.3% in group I, group II and group III respectively. In total 20.0% patient used removable partial denture but 80% patients did not. Among the group I patients 60.0% used removable partial denture during last 1-5 years and 40.0% used removable partial denture during last 6-10 years. Among the group II patients 13.4% used removable partial denture during last 1-5 years and 3.0% used last 6-10 years. Among the group III patients 14.3% used removable partial denture during last 1-5 years and none used 6-10 years. On the other hand, 60.0% was found fixed partial denture in group I patients, 7.5% in group II patients and 14.3% in group III patients. Among the group I patient 20.0% used FPD for last 1-5 years and 40.0% used FPD for last 6-10 years. Among the group II patients 4.5% used removable partial denture during last 1-5 years and 3.0% used last 6-10 years. Among the group III patients 14.3% used fixed partial denture during last 1-5 years and none was in the group 6-10 years. It was evident that only 12.0% used FPD of total population. So it had a very week relation with MMP and TMD. Attrition was also recorded and evident that among the group I patients 60.0% had attrition present. Among the group II patients 55.2% had attrition present and 44.8% had attrition absent. Among the group III patients 57.1% had attrition present and 42.9% had attrition absent. In total 56.0% had attrition in upper and / lower teeth especially in posterior segment which indicates the association with MMP and TMD.

One study reported that myofascial pain (i.e., trigger point myalgia) is a regional myogenous pain condition characterized by local areas of firm, hypersensitive bands of muscle tissue known as trigger points. This condition is sometimes referred to as myofascial trigger point pain. This condition is sometimes referred to as myofascial trigger point pain. It is a type of muscle disorder that is not widely appreciated or completely understood; yet it commonly occur in patients with myalgic complaints. More than 50% of the patients reporting to a university pain center were diagnosed as having this type of pain.[2]

In the study among the group I patients, 60.0% had right side and 40.0% had left side local muscle soreness. Among group II patients local muscle soreness was 37.3% in right and 3.0% in left side. Among group III patients local muscle soreness was none in right side and 7.1% in left side. where in group I patients, 20.0% had myofascial pain in right and 40.0% had myofascial pain in left side. Among group II patients masticatory muscle pain was 22.4% in right and 17.9% in left side. Among group III patients myofascial pain was none in right side and 3.6% in left side.

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Among the group I patients, 60.0% had left side deviation absent in the form of the both condyle and fossa. 40.0% had condyle form deviation and none had deviation form of fossa on left side. Among the group II patients, 31.3% had left side deviation absent, 50.7% had condyle form deviation and 17.9% had deviation form of fossa on left side. Among the group III patients, 28.6% had left side deviation absent, 28.6% had condyle form deviation and 42.9% had deviation form of fossa in the left side.

Among the group I patients, 40.0% had adhesion in both sides. Among the group II patients, 6.0% had right side adhesion and 9.0% had left side adhesion. Among the group III patients, 14.3% had right side adhesion and 14.3% had left side adhesion present. In total 68.0% had right side masticatory muscle pain and 54.0% had left side masticatory muscle pain. In case of deviation in form of condyle and fossa it was evident that 76.0% had right side deviation and 68.0% had left side deviation present. 10.0% and 12.0% adhesion was present respectively in right and left side.

CONCLUSION

After much examination we can conclude that in the masticatory muscle disorder syndrome, occlusal disharmonies were positively associated with Masticatory Muscle Pain but not significant. The further study is needed for better outcome.

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