RESEARCH ARTICLE

DIGITAL EVALUATION OF FUNCTIONAL OCCLUSION PARAMETERS USING T SCAN IN TEMPOROMANDIBULAR DISORDERS

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ABSTRACT

Background: Temporomandibular disorder (TMD) is a multifactorial disease and occlusal force has main role in determining the teeth health, chewing, muscle and TMJ function. Dysfunctional occlusal contacts can lead to disorders in dento-maxillary system, which may be accompanied by painful symptoms for the patient.

Aim and Objective: To evaluate the digital occlusal parameters using T-Scan device that senses and analyses occlusal contact forces, occlusion time, and the effect of reducing disclusion time on symptoms of temporomandibular joint- muscular disorders.

Materials and Method: Myofascial pain symptomatic patients was recruited as per the diagnostic criteria for temporomandibular disorders (TMD), including the clinical protocol outlined by the International RDC/TMD consortium network (version: January 20, 2014) to assess the efficacy of reduced disclusion time in lateral excursions to resolve the myofascial pain symptoms. As per the inclusion and exclusion criteria, static and dynamic interocclusal record was scanned and analysed using image software. 25 cases were treated in four visits. Recall occlusal parameters were recorded. The questionnaire was used for symptom assessment at every recall visit.

Results: Among the occlusal parameters, TMD patients had prolonged occlusion and disclusion time, variations in right and left quadrant occlusal forces, more incidence of occlusal premature contacts compared to post therapeutic evaluation in same individuals. Changes in the intensity of symptoms from reducing the disclusion time to <0.4 seconds were statistically significant with p value of 0.001from treatment day 1, and onward through the 3 months period of observation.

Conclusion: The results indicate that T scan evaluation and then treating the dentition relieves the musculoskeletal symptoms of myofascial pain, such that this methodology increases clinical therapeutic success.

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INTRODUCTION

Temporomandibular Disorders (TMD) is a collective term which includes a group of clinical conditions affecting the stomatognathic system, in particular the muscles of mastication and the Temporomandibular joints (TMJ), which is characterized by a group of commonly reported symptoms: fairly localized pain, limited or asymmetric mandibular movements and TMJ noises (crepitations or clickings) (Okeson, 1997; Alberto Baldini *et al.,* 2014). Because of the different methods used to assess TMD symptoms, which are often subjective, literature reports that the world-wide prevalence of TMD varies between 7% and 84% of the population (Luther, 2007).

Mostly it seems to afflict 10% of the population over 18 years of age, where chronic pain is experienced in the Temporomandibular region (LeResche, 1997). In fact, because of the variability of the symptoms of this cluster disorder, that potentially confirm a diagnosis of TMD, it has been quite problematic to isolate a primary etiology that predisposes the patients to suffer symptoms, leading researchers to advocate that TMD is of multifactorial etiology. Possible causes for TMD are Bruxism, mandibular muscle activity, facial growth, and also other systemic, postural, metabolic, structural, traumatic, psychological, social and behavioral influences, which have been identified as possible predisposing, initiating, and maintaining factors for TMD (Greenberg *et al.,* 2012; Baldini *et al.,* 2013; De Boever and Carlsson, 1994). For many years Dental Medicine had considered an unfavorable dental occlusion as a principal cause of the occurrence of TMD, because TMD appeared to be more frequently observed

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in patients with compromised or excessive vertical dimensions (De Boever *et al.,* 2000). However, later studies suggested TMD had a multifactorial origin such that dental occlusion was considered to be only one factor that may affect the adaptive capacity of the Stomatognathic system, which could lead to the development of TMD (McNamara, 1997). The introduction of the Research Diagnostic Criteria for TMD (RDC/TMD) Axis – I provided standardized criteria for the diagnosis and classification of the different forms of TMD's, categorizing them in three groups: Group I muscle disorders, Group II disc displacements and Group III other common joint disorders. The RDC facilitated creating statistically better intra- and interexaminer reliability when clinicians were observing and reporting patient signs and symptoms and provided a common model for any examiner (Manfredini *et al.,* 2006; Baldini *et al.,* 2012).

In 1987 Maness *et al.,* (1987) reported the development of the first computerized system designed for occlusal analysis (T-Scan I, Tekscan, Inc. Boston, MA, USA). The T-Scan VIII system allows for the recording the Occlusion Time (OT) which is a dynamic parameter defined as the elapsed time from initial tooth contact until maximum intercuspation is reached in centric occlusion (Kerstein and Grundset, 2001), Disclusion time (DT) is the elapsed time in seconds measured from the beginning of a jaw movement made in one direction, when all teeth are relieved in complete contact, through until only canines or incisors are in contact. Disclusion Time can be measured in 3 different jaw movements; the Right excursion, the Left excursion, and the Protrusive excursion. With lengthy disclusion time present in an occlusal scheme, excessive muscle contraction occurs over time and leads to the buildup of toxic muscle contraction by- products (namely lactic acid) within the muscle fibers (Robert Kerstein, 2015). In a given day, a patient's level of toxins will exceed the muscle's ability to metabolize these toxic substances. This would then initiate an ischemic state followed by the clinical appearance of MPDS symptoms. Continued daily, weekly, monthly, and yearly, lengthy occlusal compressions of the posterior teeth & their periodontal ligament, as a result of lengthy disclusion time, would perpetuate the high levels of muscle contractions and establish an ongoing state of chronic ischemia and muscle dysfunction. Thus a study was conducted to evaluate & compare digital occlusal parameters in before and after dental treatment of temporomandibular disorder (myogenous) patients using T scan   and objective is to correlate the chewing pattern and occlusal force in TMD patients, to evaluate the occlusal parameters and comparison in both genders and to evaluate and compare the occlusal force, occlusion and disclusion time, and symptomatic relief of pain in before and after treatment in TMD patients.

MATERIALS AND METHODS

Twenty five Myofascial pain symptomatic patients, who met the below inclusion criteria were recruited based on the diagnostic criteria for temporomandibular disorders (TMDs), outlined by the International RDC/TMD consortium network (version: January 20, 2014) (Dworkin and LeResche, 1992; Satheesh and Haralur, 2013). Patients with symptoms of headache, spastic muscles, dentinal hypersensitivity were checked for digital occlusal parameters using T scan and recorderd both before and after dental treatment procedures.

Inclusion Criteria

- Age- between 20-40 years
- Patients diagnosed with signs and symptoms of TMD- RDC- (MYALGIC SYMPTOMS)
- sex matched individuals (both male & female)

Exclusion Criteria

- Patients with history of trauma, congenital abnormalities to temporomandibular joint
- Undergoing orthodontic treatment, absence of orthognathic surgery.
- patients with any medical illness, rheumatoid arthritis, patients under steroid therapy

Equipment and procedure

The T-Scan VIII is a sophisticated computerized occlusal analysis system, that illustrates both static and dynamic occlusion. It can be used to analyze tooth contact patterns that occur within every mandibular movement (centric relation, centric occlusion, lateral excursions and protrusion), which can all be recorded in various mandibular postures, and body postures, as well. The T-Scan VIII device (Tek-Scan Inc., Boston, MA, USA) is approved as a ''medical index center – scanning sensor system. It has multiple levels of recording sensitivity that can be adjusted at will, to match the recording level within the recording sensor, to the occlusal force exerted by the patient. The hardware comprised of a recording handle (which holds the recording sensor) that is connected to the computer through a USB port. Held securely within the recording handle is a ''sensor support'', which keeps the 100 micron thick recording sensor properly extended flat within the mouth, during all intraoral recording procedures as shown in Figure 1 a & b (Koos *et al.,* 2010; Hirano *et al.,* 2002) When a force is exerted on the sensor, occurs a voltage drop on its conduction paths that is immediately recorded by the software upon each tooth contact, and is then displayed for clinical analysis. The T-Scan VIII computerized occlusal analysis system was used to record the subjects, Occlusion Time during 8 mandibular opening–closing movements. The patient should sit upright in the dental chair with their head on the headrest and mandibular occlusal plane parallel to the horizontal Frankfurt plane. The Occlusion time   (OT) and Disclusion Times (DT), Occlusal forces in both right and left quadrant were recorded by placing the sensor between the dental arches, and asking the patient to perform 8 mandibular opening–closing movements without clenching, in and out of complete intercuspation (Kerstein and Grundset, 2001) with a velocity of about 1 movement per second. Before and after treatment parameters of a patient is shown in Figure 2 & 3. Thus, an average value of the occlusal parameters was obtained for each individuals in before and after dental treatment procedures were summarized.

Symptom assessment questionnaire

At each visit, subjects were asked to answer a symptom questionnaire that used an ordinal number scale to describe the current status of their condition [Table 1]. The ordinal scale ranged from 0 to 5 to describe symptom severity (0 ‑ no symptoms, 1 ‑ very little, 2 ‑ mild, 3 ‑ moderate, 4 ‑ severe, and 5 ‑ very severe). The common musculoskeletal symptoms that were graded were morning jaw pain, jaw fatigue, facial tension, difficulty in eating or chewing, clenching difficulty, temporal headaches, and neck pain.
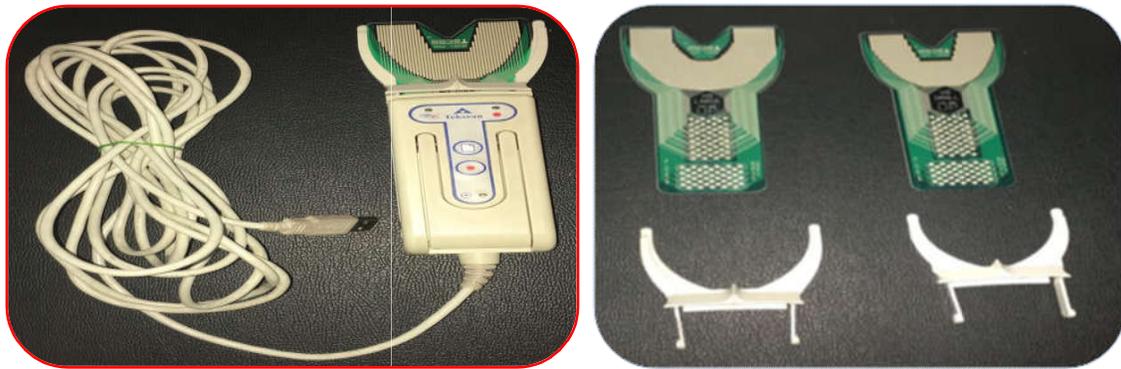
**Fig. 1a&1b. USB cable sensor holder and sensors, Support Handle assembly**
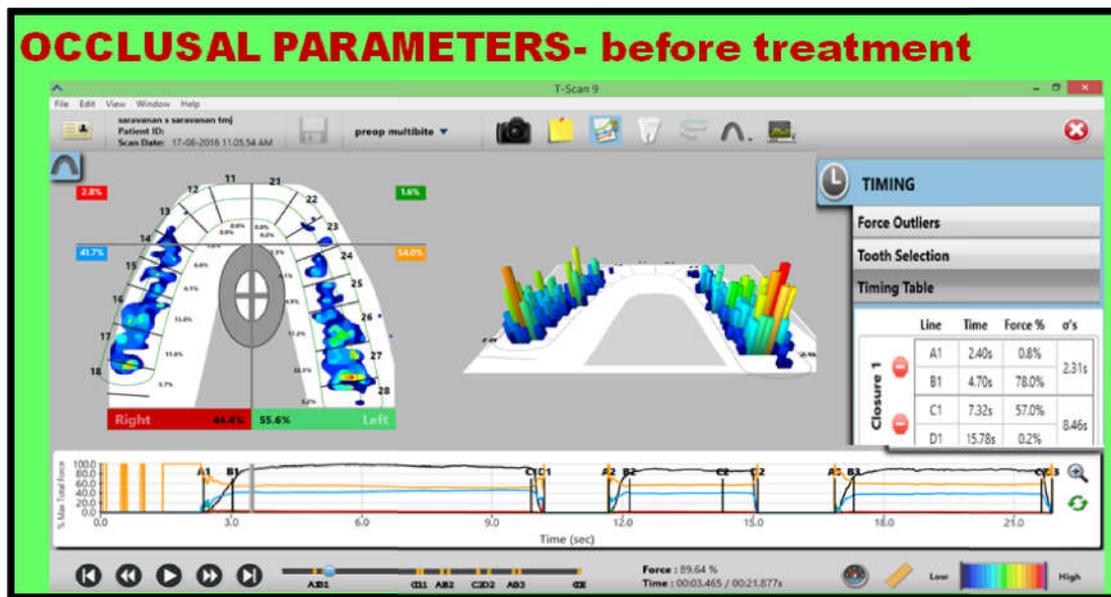
Fig. 2. Occlusal contact force in right and left quadrants, premature contacts in 27,28 region, and occlusion time of 2.31 seconds and disclusion time of 8.46 secs
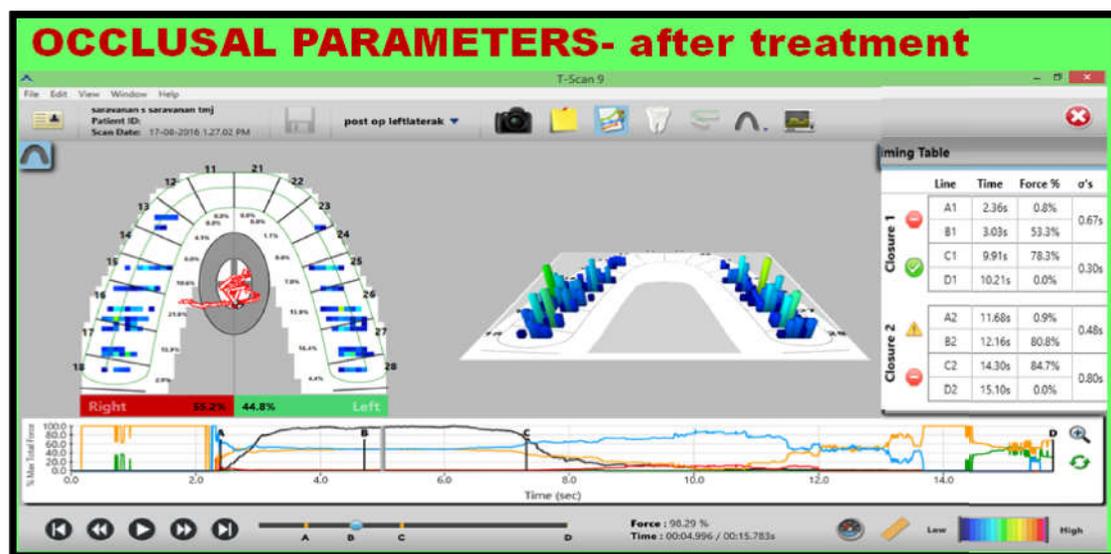

Fig. 3. Occlusal contact force in right and left quadrants, no premature contacts and occlusion time of 0.67 & 0.48 seconds and disclusion time of 0.30 & 0.80 seconds

Table 1. Symptom assessment questionnaire

	Ordinal scale									
	No symptoms	Mild			Moderate			severe			
Symptoms assessed	0	1	2	3	4	5	6	7	8	9	10
Temporal head ache											
Morning jaw pain											
Jaw fatigue											
Facial tension											
Difference on chewing											
Clenching											
Neck pain											

Table 2. Mean age of the study group

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Age	25	25	37	30.08	2.812
Valid N (List Wise)					

Table 3.

	Lt. Chewing	Rt.chewing
LT. Occlusal force	65.52 ± 7.6	32.413 ± 7.3
RT. Occlusal force	34.48 ± 9.0	67.913± 9.3

Table 4.

Sex					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	12	48.0	48.0	48.0
	Female	13	52.0	52.0	100.0
	Total	25	100.0	100.0	

Table 5.

		Before treatment		After treatment	
	n	Occlusion time	Disclusion time	Occlusion time	Disclusion time
Male	12	1.403	1.509	0.415	0.516
Female	13	1.441	1.6	0.512	0.502

Table 6.

	Mean	N	Std. Deviation	Std. Error Mean	p-value
Occlusal force - rt. - before treatment	51.628	25	24.6850	4.9370	0.568
Occlusal force - rt- after treatment	48.840	25	7.9602	1.5920	
Occlusal force - lt - before treatment	48.568	25	24.7699	4.9540	
Occlusal force - lt- after treatment	51.136	25	7.9649	1.5930	0.601
Occlusion time – before treatment	2.6360	25	2.15109	.43022	0.000
Occlusion time – after treatment	0.4661	25	0.46564	.09313	
Disclusion time - before treatment	3.6244	25	2.89239	0.57848	0.000
Disclusion time – after treatment	0.5250	25	0.44677	.08935	
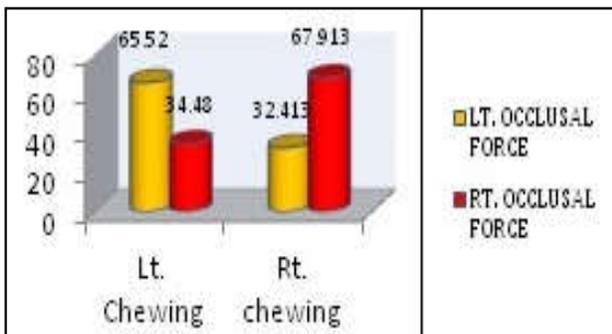
Graph 1. Chewing side & Occlusal force
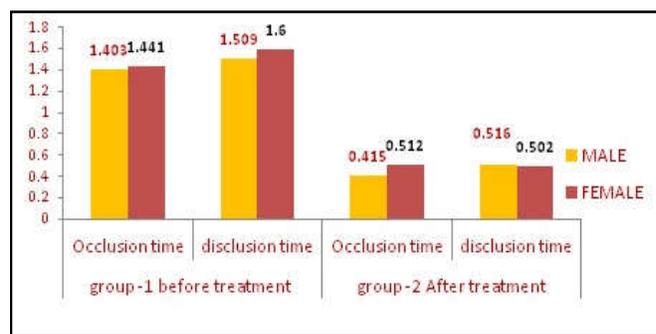
Graph 2. Occlusion and Disclusion time – mean values in comparing male and female patients- Before and after dental treatment

Table 8. Symptom questionnaire statistical data

1. Comparison of median intensity values of 'morning jaw pain' from pre- treatment Day 1 to other time intervals

Jaw pain	Median	Mean rank	Minimum	Maximum	Z	P-value
Day 1	4	14.50	0	7	…	…
Day 8	0	14.50	0	2	-4.604	<0.001
1 month	0	14.50	0	0	-4.604	<0.001
3 months	0	14.50	0	0	-4.604	<0.001

2. Comparison of median intensity values of jaw fatigue' from pre- treatment Day 1 to other time intervals

Jaw fatigue	Median	Mean rank	Minimum	Maximum	Z	P-value
Day 1	4	7.50	0	7	…	…
Day 8	0	7.50	0	3	-3.431	<0.001
1 month	0	7.50	0	0	-3.430	<0.001
3 months	0	7.50	0	0	-3.430	<0.001

3. Comparison of median intensity values of 'facial tension" from Pre- treatment Day 1 to other time intervals

Facial tension	Median	Mean rank	Minimum	Maximum	Z	P-value
Day 1	4	8.50	0	6	…	…
Day 8	0	8.50	0	0	-3.157	<0.001
1 month	0	8.50	0	0	-3.157	<0.001
3 months	0	8.50	0	0	-3.157	<0.001

4. Comparison of median intensity values of "differences in chewing/eating" from pre-treatment Day 1 to other time intervals

'differences in chewing/eating'	Median	Mean rank	Minimum	Maximum	Z	P-value
Day 1	4	6.5	0	6	…	…
Day 8	0	6.5	0	0	-3.209	<0.001
1 month	0	6.5	0	0	-3.209	<0.001
3 months	0	6.5	0	0	-3.209	<0.001

5. Comparison of median intensity values of 'clenching" from pre-treatment Day 1 to other time intervals

Clenching	Median	Mean rank	Minimum	Maximum	Z	P-value
Day 1	4	16.50	0	8	…	…
Day 8	0	16.50	0	4	-5.27	<0.001
1 month	0	16.50	0	0	-5.297	<0.001
3 months	0	16.50	0	0	-5.297	<0.001

6. Comparison of median intensity values of 'temporal headache" from pre- treatment Day 1 to other time intervals

Temporal headache	Median	Mean rank	Minimum	Maximum	Z	P-value
Day 1	4	21.0	0	6	…	…
Day 8	0	21.0	0	0	-6.010	<0.001
1 month	0	21.0	0	0	-6.006	<0.001
3 months	0	21.0	0	0	-6.006	<0.001

7. Comparison of median intensity values of 'neck pain" from pre-treatment Day 1 to other time intervals

Neck pain	Median	Mean rank	Minimum	Maximum	Z	P-value
Day 1	4	3.00	0	7	…	…
Day 8	0	3.00	0	0	-2.031	0.042
1 month	0	3.00	0	0	-2.031	0.042
3 months	0	3.00	0	0	-2.031	0.042

In each visits, the subjects were not allowed to review their previous answers, to avoid bias in their differing questionnaire response. The 25 treated subjects questionnaire scores were computed by mean with standard deviation. Since the mean and median of different groups of individuals were compared, a nonparametric statistic (the Wilcoxon signed‐ranks test) was used for statistical analysis **(Table 7)**.

RESULTS

- A total number of 25 patients (13 female and 12 male), with mean age 30.08(SD ± 2.812) as shown in Table 2, were included in this study.

- Occlusal force was higher in the preferred chewing side (P < 0.05), maximum in right side compared to left with mean value of 67.913± 9.3 in right side and 65.52 ± 7.6 in left side as shown in **Table-3 & Graph-1**

Demographic data

According to the demographic data as shown in Table- 4 & Table- 5, Graph -2 ;female patients have increased mean value of occlusion time of 1.444 and disclusion time of 1.6 compared to male patients with mean value of Occlusion time of 1.403 and disclusion time of 1.509.

- Analyzing the occlusion time and Disclusion time, the mean value before dental treatment was 2.636 ±2.15 and 3.624 ± 2.892   and after dental treatment was 0.4661± 0.465 and 0.525 ± 0.446 shown in **Graph -3 & Table-6**
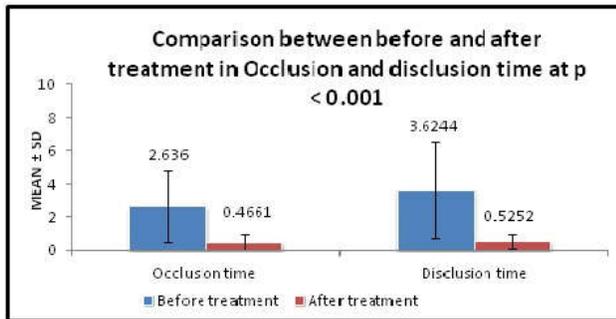
Graph 3. Mean Value of Occlusion and Disclusion time of all Patients- before and after treatment

Using Paired sample T test **(Table-6)**, mean value for occlusal force on the right side before dental treatment (51.528±25.6850) and after dental treatment (48.840±7.960) and the left side (48.568 ±24.76) before dental treatment and (51.136±7.649) after treatment was found. There was no statistically significant value of 0.568 in right side and 0.601 in left side. Mean value of Occlusion time and disclusion time before treatment was 2.636 ±2.15 and 3.624 ± 2.892 and after dental treatment was 0.4661± 0.465 and 0.525 ± 0.446 and statistically highly significant p value of 0.000 in both occlusion time and disclusion time.

Symptom pain questionnaire

An ordinal scale questionnaire was used to assess the severity of various TMD symptoms where the mean values of the scores for the entire group were determined for statistical comparison. The changes in mean intensity and frequency of all myofascial pain symptoms studied and was found **(Table - 8)** to be statistically significant between day 1 and day 7 (P < 0.001), day 1 and 1 month (P < 0.001) & day 1 & 3 months (P < 0.001).

Table 7. Wilcoxon signed rank test for determining the level of significance in occlusion time, disclusion time and occlusal force

Test Statistics		
	Occlusion time - after treatment - Occlusion time - before treatment	disclusion time - after treatment - disclusion time- before treatment
Z	-4.286[a]	-4.372[a]
Asymp. Sig. (2-tailed)	.000	.000
a. Based on positive ranks.		
b. Wilcoxon Signed Ranks Test		

	Occlusal force – rt- after treatment - Occlusal force – rt. - before treatment	Occlusal force – lt- after treatment – occlusal force – t - before treatment
Z	-.471[a]	-.498[b]
Asymp. Sig. (2-tailed)	.638	.619

This test shows highly significant p value for occlusion time, disclusion time and not significant for occlusal force.

DISCUSSION

Dr. Bernard Jankelson's study of the human dental occlusion were precursors to the neuromuscular occlusion published in 1955 lead to the recognition of the scientific methods to quantify the function of the masticatory system (Jankelson, 195555; Prafulla Thumati, 2016). Gadgets like digital analysis of occlusion using T-scan, electromyography (EMG), joint vibratography (JVA) to measure the function of the masticatory system-dental occlusion, temporomandibular joints (TMJ) and muscles were subsequently invented. These biometric diagnostic tools help in the practice and management of painful conditions related to temporomandibular disorders (TMD) (Jankelson *et al.,* 1975). Orofacial pain was incorporated into the authors practice in 2010 to provide healthcare to patients who have been suffering from varied symptoms, which include headache, migraine, early morning facial stiffness, trauma to musculoskeletal tissues (muscles, ligaments, tendons), low back ache, nutritional deficiencies, nervous tension, or stress (Jankelson *et al.,* 1975; Berger *et al.,* 2007). One of the predominant symptom and at the same time the main cause of the patients reporting for treatment due to TMD is a pain. Pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage. Factors of nonspecific pain within TMD are usually classified as psychosocial, occupational and personal. All these factors encourages an acute pain episode, while mental suffering due to anxiety, adjustment disorder, depressive or irritable mood, fear of somatic illness, and persistent somatizations can incite a chronic form of pain. Chronic tension is associated with an increase in parafunctional activity, which is considered to be one of the main TMD factors. Stress as well as anxiety, depression and personality traits exert an important influence on the increased frequency of parafunctional teeth contact (Rollman *et al.,* 2000; Lakshmi *et al.,* 2016). Kersteine in 2001 was the first person to locate centric relation prematurity with simultaneous recording of sequence of resultant tooth contacts using computerized occlusal analysis system.

According to him this method offers significant improvement in the precision of locating the first tooth contact. Correct understanding of dynamic occlusion is very critical in differentiating between the normal and pathological occlusal parameters. Digital evaluation of the occlusion by T scan will provide additional information like occlusion and disclusion time on functional occlusion. T scan analysis enables the clinician to evaluate the occlusal contacts quantitatively, also record the occlusion during continuous mandibular movement (Pyakurel *et al.,* 2013). The patients in the present study were considered with natural complete dentition and having Angle class I occlusion exhibiting signs and symptoms of TMD. Our study showed equal gender ratio and the study age group of 20 and 40 years with mean age of 30.08 which was in accordance with Edward et al study (Edward *et al.,* 2009). In our study the preferred chewing side was detected by declaring of the patients through questionairre, while in the literature we found that it can be detected by observing the examinees during mastication or using kinesiographic movements by using jaw tracking movement. Palinkas *et al.,* have investigated the influence of gender and age on maximal bite force and masticatory muscles thickness. The hypothesis is the lower force applied in a non preferred chewing side is associated with a "weaker" muscles on that side therefore, with a smaller occlusal contact area And is associated with a reduced occlusal

preferred chewing side was analysed (Pyakurel *et al.,* 2013). Occlusal force was higher in the preferred chewing side, maximum in right side compared to left with mean value of 67.913± 9.3 and 65.52 ± 7.6 in left side. The present study demonstrated the incidence of premature contacts (occlusal interferences) was higher and disclusion time was significantly longer in patients before treatment. The findings of the study are in correlation with other researchers like Cheng et al and Haralur *et al* in 2012 (Wang *et al.,* 2012; Cheng *et al.,* 2012). Premature contacts can result in condyle displacement, which may potentially cause friction and increased intra-articular pressure on the TMJ. Both situations are injurious to the TMJ and contribute to changes of the structure of TMJ. If the capacity of the subject to modify the condition is exceeded, results in the disorders of the masticatory muscles and TMD Kerstein and Radke, 2012. Analyzing the occlusion and Disclusion time, the mean value before dental treatment was 2.636 ±2.15 and 3.624 ± 2.892 and after dental treatment was 0.4661± 0.465 and 0.525 ± 0.446 and also showed statistically highly significant P value of 0.000 correlated with studies of (Kersteine 2006; Koos *et al.,* 2010; Hirano *et al.,* 2002). The prolonged disclusion time can lead to higher masticatory muscle activity and abnormal distribution of stresses in the disc resulting in TMD symptoms. The compression of the mechanoreceptors of molar and premolar periodontal ligaments by prolonged excursive tooth contact, activate excess muscle contractions in the masticatory muscles. The longer time of the excursive interferences results in periodontal ligaments compression and activating the masticatory muscles to contract. This cycle repeats with every posterior teeth compression during both functional and Para functional mandibular movements and adds excessive muscle contractions. The additive constant and excessive masticatory muscle contractions results in lactic acid accumulation which often leads to the clinical appearance of muscular hyperactivity (Kerstein and Radke, 2012; Kerstein, 2010). Moreover, eight Occlusion and disclusion times were recorded for each subject, and a mean value was calculated in order to approach a representative OT, DT value per subject. The accuracy of the T-Scan system recording has been shown to be not altered by repeated measures, which was correlated by other studies (Koos *et al.,* 2010; Hirano *et al.,* 2002).

Figure 5. Treatment for Occluso force disorders

Occlusal corrections for symptomatic relief of pain in muscular TMD

Conservative and reversible self-management treatment

appliance to protect the teeth, restorations, stabilization appliances- deprogrammer were used as treatment of choice in our study patients as shown in **Figure 5**. The Tscan VIII results showed occlusal parameters and symptomatic muscular pain in the patients with TMD are significantly reduced after dental treatment. The other treatment options include vapocoolant spray and stretching of the muscles involved, injections of local anesthetic directly into the trigger point(s), massage therapy, physical therapy, exercise, elimination of stress, changing sleeping habits, the use of tricyclic antidepressants in low doses , non-steroidal anti-inflammatory drugs, muscle relaxants, counseling, etc. Despite its diverse etiology, occlusal instability has long been considered an important aetiological factor (Greenberg *et al.,* 2012). The results of this study indicate that dental treatment will predictably reduce myofascial pain symptoms because of the physiologic muscle activity lowering effect achieved by dental procedures, which is a distinctly different occlusal adjustment approach to retruding the mandible into centric relation during traditional occlusal equilibration procedures. This study showed the multiple recall visit disclusion time mean values were statistically equivalent to the post treatment mean values of disclusion time. Further the standard deviations from recall visit to visit remained fairly constant throughout the period of observation. The mean differences also remained constant when a comparison between day 1 pretreatment and subsequent visit measurements was made. This suggests that once disclusion time is reduced <0.4 seconds, it is a lasting occlusal change. These findings are very similar to those of another disclusion time reduction study that verified that once the disclusion time was properly reduced, it remained constant, leading to the retention of proper muscle function and low symptom appearances. In this study, the population selected for treatment had their symptoms evaluated by a questionnaire at subsequent recall appointments (day 7, 1 month, 3 months), during which the subjects were not allowed to view their previous symptom responses. The results obtained from the recall date questionnaires showed there were a significant symptom resolution in the study population and was maintained during the 3 months period of observation.

CONCLUSION

A brief screening history regarding pain and activities that make the pain worse can help determine if a patient has a potential TMD problem. A clinical examination that incorporates an assessment of pain and joint sounds on opening and excursive movements is always recommended. TMD due to occlusal disturbances can be diagnosed using biometric T scan system provides sensitivity and specificity, higher reliability in intra-oral conditions and can be repeatedly used again in same patient. This study insists of no arbitrary grinding of the teeth and reduces the subjective interpretation of occlusal analysis data and also provides registration of dynamic occlusal information. T scan is an objective assessment system that enhances patient education, satisfaction, and retention and enables a more confident approach to patient care. This helps in the elimination of the cause of the disease and not just symptom relief. If the etiology is not successfully recognized and treated, the acute physical form of temporomandibular dysfunction may become a chronic pain condition.

Conflicts of interest: None

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