Original Article

OCCUPATIONAL COMPLICATIONS RELATED CRANIOFACIAL HABITS AND ITS EFFECTS ON ORAL HEALTH AMONG CONSTRUCTION LABOURS IN CHENNAI – A CROSS SECTIONAL STUDY

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Abstract

Aim and Objective: To assess the occupational hazard of construction workers due to craniofacial habits. The primary objective is to evaluate the prevalence of TMJ (Temporomandibular joint) disorders and non carious dental lesions such as dental attrition and abfraction. The secondary objective is to assess the association between weight lifting and TMJ disorders, non carious dental lesions. The initial study hypothesis was that construction workers with heavy weight lifting would suffer from the above-mentioned conditions more often.

Methods: A cross sectional study was done among construction workers in and around Chennai with questionnaires and a clinical examination for assessing TMJ disorders and non carious lesion.

Results: The TMJ clicking sign was noted high between the age group of 31 to 40 years (n=58) while 17 to 30 years have (n=58), 41 to 50 years have (n=40), 51 to 60 years have (n=32) and above 60 years have (n=8).Based on the number of years of working as construction labours, those who are working for more than 5 years had high TMJ signs. Construction labours whose work were associated with weight lifting had increased TMJ signs (n=171), increased grade I dental wear (n=140), increased grade II dental wear (n=112) while those who are not associated with weight lifting had lesser TMJ clicking sign (n=16) lesser grade I dental wear (n=49), increased grade II dental wear (n=16).

Conclusion: It can be concluded that weight lifting by itself may not be a risk factor for TMJ disorders, but with associated factors such as number of years of weight lifting work, increased age might act as a a potential risk factor for irreversible hard tooth tissue damage(dental attrition and dental abfraction) and contribute to TMJ disorders.

Keywords: Weight lifting, TMJ disorders, Dental attrition, Dental afraction.

Introduction

Industrialization forms an important role in the development of the country's economy. Domestic and foreign investment were prone to flow into various infrastructure projects especially with the construction activity[1].In India, in 2022, the number of construction workers sharply increased to around 21.4 million. Recent surveys by the International Labour Organization (ILO) report that about 2.78 million workers lose their lives each year globally due to accidents at work or occupational diseases, and 374 million workers are victims of non-fatal accidents at the workplace[2].Hence it is important to ensure the safety, health and welfare measures of the building and other construction workers according to the Regulation of Employment and working Conditions Act, 1996[3]. The initial foremost step to develop a policy in protecting the construction workers from various health hazards is to conduct a survey fir need assessment. The initial survey could help the policy makers to prioritize the health hazard problems and proceed further.

It is known fact that all types of construction workers in building process such as painting, landscaping, electrical supply, telecommunications, plastering and paving are exposed to different health hazards due to different types of exposure during their work. It might arise from dust, noise, chemicals, lifting heavy weights, handling various manual and vibrating tools, exposing to too much sunlight, inhaling toxic compounds, ergonomics issues etc.,[4].

Most of the work in construction sites is associated with the manual lifting and carrying of heavy weight during which the workers are maintained at various kinds of postures that might result in harmful results in their musculoskeletal system. The pathogenesis behind this fact is that, lifting heavy weight incorporates heavy stress on the masticatory muscles that causes hard clenching of teeth which forces the mandible upward and backward causing the cartilaginous disc within the joint to be pushed forward. Excessive forward gliding results in laxity and overstretching of the surrounding capsule, ligaments, and the temporalis tendon leading to disk displacement/derangement to occur in one or both TMJ over time[5]. This can resemble the masticatory activity termed bruxism, a repetitive jaw-muscle activity characterized by clenching or grinding the teeth and/or by bracing or thrusting the mandible along with the appearance of symptoms and sign such as pain, existence of dental attrition and abfractions, prevalence of articular TMJ disc displacement with reduction that presents with clicking sign, presence of relative limitations in mandibular range of open movements[6].

There has been plenty of information from various previous studies which reports different types of health hazards associated with construction work. Also there exists a lot of previous studies addressing the association between weight lifting and musculoskeletal disorders among body builders etc., But to our knowledge no reports are available till date that assessed the occupational hazard on dentition and the craniofacial region of construction workers engaged in weight lifting. The aim of the present study was to evaluate the potential occupational hazard in the dentition and craniofacial region among the construction workers with weight lifting activities. The primary objective is to assess the clicking in TMJ (temporomandibular joint disc displacement with reduction), dental attrition and cervical abfraction. The secondary objective is to assess the association between weight lifting and clicking in TMJ. The null hypothesis is that there exists no association between weight lifting and TMJ clicking, dental attrition and dental abfraction.

Methodology

It is a cross sectional analytical studyconducted in various construction sites in and around Chennai among the migrant and immigrant construction workers. The data collection was held between December 2021 to March 2022 by the primary author of the study. The sample size calculation was done by G power analysis with reference of the previous study by Shakthi et al. The attained sample size required for the study is 400. The inclusion criteria were construction workers who are willing to participate after an informed consent and age group above 18 years. The exclusion criteria were those who were suffering from a severe periodontal disease (as evidenced by a direct inspection of the mouth); suffering from general neurological disturbances (sensory or reflex changes, weakness, etc.); afflicted with uncontrolled hormonal disease (diabetes, thyroid, or parathyroid disease, etc.); suffering with the presence of neoplasm, or known psychiatric problems (as reported in their medical history).

One of the authors, a post graduate dental student was trained in the dental and orofacial examination and performed all of the clinical examinations. Prior to the opening of the study, the examining investigator practiced the clinical procedure on 10 male subjects who were not part of the study group. Kappa statistics were performed with

Before the initiation of the data collection and examination, written informed consent were obtained with the response rate of 100%.

Each one of them were provided with the self-report questionnaires that contains

(a) Demographic information – age, type of working activity at the construction site (e.g. weight lifting, other than weight lifting activities), years of working.

(b) A questionnaire referring to the awareness of teeth grinding or clenching[10].

The completion of questionnaire is followed by a clinical examination by the primary author of the study. The clinical examinations were done to assess the

(a) Existence of clicking in TMJ region:

Existence of temporomandibular disc sounds (clicks) was assessed according to the Axis I criteria of the Research Diagnostic Criteria for Temporomandibular Disorders (RDC-TMD) recommendations[7]. The test was performed during jaw movements, while placing an index finger over the subject's TMJs (preauricular area). Diagnosing clicks was carried out during the following mandibular activity:

• Normal mouth opening – while placing an index finger over the subject's temporomandibular joints (TMJ preauricular area), the subject was asked to slowly open his mouth as wide as possible and close until the teeth were in touch in maximum intercuspation. The exercise was repeated three times.

• Mandible lateral movements – while placing the fingers as above, the subject was asked to open slightly and move his mandible as far as possible to each one of the sides (left or right). Each side was repeated three times.

• Mandible protrusion – while placing fingers as above, the subject was asked to open slightly and protrude his mandible as far as possible. The exercise was repeated three times.

(b) Dental attrition:

The presence of Dental attrition was assessed according to a modification of the method by Lobbezoo and Naeije[8] on a tooth-by-tooth basis (molars and premolars), using the following scale: grade 0 = no wear; grade 1 = visible wear within the enamel only; grade 2 = visible wear with dentin exposure and mild to moderate loss of clinical crown height; and grade 3 = significant loss of crown height (≥2⁄3). The most severe worn tooth from each dental group was registered for each subject. In order to prevent bias, any tooth that exhibited severe signs of erosion was excluded.

(c) Cervical abfraction:

The presence of cervical abfraction was examined for the presence of V shaped wedge at the cemento-enamel junction.

The data obtained were analysed using SPSS version 26 (SPSS, Inc., Chicago, IL, USA). Descriptive statistics were provided and presented as appropriate. Continuous and categorical values were presented as mean(s) ± SD(s). Association between TMJ Clicking, Dental Attrition, Dental abfraction, age, years of construction workers were analysed using chi square test and strength of association was analysed using logistic regression.

Result

The TMJ clicking sign was noted high between the age group of 31 to 40 years (n=58) while 17 to 30 years have (n=58), 41 to 50 years have (n=40), 51 to 60 years have (n=32) and above 60 years have (n=8). Dental attrition was found to be for grade I dental wearit was high between the age group of 31 to 40 years (n=82) while 17 to 30 years have (n=74), 41 to 50 years have (n=16), 51 to 60 years have (n=9) and above 60 years have (n=8). For grade II dental wearit was high between the age group of 51 to 60 years (n=56) while 17 to 30 years have (n=0), 41 to 50 years have (n=40), 31 to 40 years have (n=32) and above 60 years have (n=0).

Cervical abfraction was found to be high between the age group of 31 to 40 years (n=58) while 17 to 30 years have (n=8), 41 to 50 years have (n=48), 51 to 60 years have (n=49) and above 60 years have (n=8).

Based on the number of years of working as construction labours, those who are working for more than 5 years had high TMJ signs (n=171) while the less than 5 years had TMJ symptoms (n=16) which is statistically significant P value=0.000. Dental attrition with grade I wear was high among those who are working for more than 5 years (n=156) while the less than 5 years had (n=33), for grade II wear those who are working for more than 5 years had a higher value, (n=128). Cervical abfraction was highly noted among the labours those who are working more than 5 years (n=171) while (n=0) for those who are working less than 5 years.

Construction labours whose work were associated with weight lifting had increased TMJ signs (n=171), increased grade I dental wear (n=140), increased grade II dental wear (n=112) while those who are not associated with weight lifting had lesser TMJ clicking sign (n=16) lesser grade I dental wear (n=49), increased grade II dental wear (n=16). Likewise, cervical abfraction was found to be higher in those who are associated with weight lifting (n=130) and lesser in those who are working less than 5 years.Table 1 shows the descriptive results.

Table 1: Description of the distribution of TMJ symptoms, Attrition and Cervical abfraction

	TMJ symptoms N=399		**Attrition N=399**			**Cervical abfraction N=399**	
Age	**Yes**	**No**	**No wear**	**Grade 1 wear**	**Grade 2 wear**	**Yes**	**No**
17 to 30 years	49	91	66	74	0	8	132
31 to 40 years	58	72	16	82	32	58	72
41 to 50 years	40	16	0	16	40	48	8
51 to 60 years	32	33	0	9	56	49	16
Above 60 years	8	0	0	8	0	8	0
No. of years of work							
Less than 5 years	16	82	65	33	0	0	98
More than 5 years	171	130	17	156	128	171	130
Type of work							
Associated with weight lifting	171	114	33	140	112	130	155
Not associated with weight lifting	16	98	49	49	16	41	73

Multiple logistic regression was done to find the co relation between the TMJ clicking sign and number of years of work and weight lifting associated work. The positively associated factors with TMJ symptoms were taken as a reference to analyse the strength of association. Thereby, non weight lifting people are around negatively associated with the TMJ symptoms with regression coefficient of B= -2.800. Likewise for less than 5 years of work although not significant they were negatively associated. Table 2 shows the multiple logistic regression showing the strength of association.

Table 2: Co relation between TMJ clicking and Number of years of work, Type of work

				95% Confidence interval	
TMJ symptoms (Yes)	**B**	**Wald**	**Sig.**	**Lower Bound**	**Upper Bound**
Intercept	2.127	63.276	.000*		
Less than 5 years of work	-.636	3.263	.071	.266	1.056
More than 5 years of work	-	-	-	-	-
Not associated with weight lifting	-2.800	56.687	.000*	.029	.126
Associated with weight lifting					

Discussion:

The aim of the present study was to evaluate possible hazards during constructing buildings among the labours in the craniofacial region. However, there are many previous studies addressing the systemic hazards due to construction occupation, no studies have addressed the excessive weight lifting among young and healthy men (around 30 years old) in construction building activities are prone to the possible hazards in their craniofacial region and dentition. This forms the rationale of this study to evaluate whether excessive engagement in weight lifting can affect the orofacial area in a way that it will increase the incidence of TMJ disc displacement with reduction and/or tooth hard tissue damage among this relatively non-susceptible population of young males.

The initial hypothesis was that a connection exists between weight lifting and TMJ disc displacement with reduction. This hypothesis was based on the proposed etiology of internal derangement that frictional “sticking” of the disc is the cause the disorder[9]. In addition, the intra-capsular pressure performed during teeth clenching may cause disc displacement without causing impact to mouth opening due to a possible masticatory muscular (masseter muscles) hypertrophy. However, as actual muscular hypertrophy was not measured in this study, further studies are needed to explore this issue.

The weight lifting people for more than 5 years had more signs of TMJ clicking (n=171) and a higher prevalence of Grade I dental attrition (n=156) and cervical abfraction (n=171). As a potential by product of the overuse of the masticatory muscles among the weight lifters more than 5 years, the results show that this group suffers from relatively severe tooth abfraction lesions, as compared to the weight lifters for less than 5 years. These results were in accordance with the study by Winocure et al, 2001[10]who found that drug users had an increased prevalence of orofacial motor behavior (bruxing and clenching) as well as signs and symptoms of TMD. Also, Dzingute A et al in 2017[11], found that there exists a relation between complaints of patients with TMD and static occlusion parameters.

This study shows that TMJ clicking was more noticed in the age group between 31 years to 40 years (n=58), higher prevalence of grade I dental attrition in the age group between 31 to 40 years (n=82) and higher prevalence of grade II dental attrition in the age group between 51 to 60 years (n=56).This dental attrition might be possibly due to the tendency to clench teeth and jaws during activities such as weight lifting.

TMJ clicking (n=171), grade I dental attrition (n=140) was noted more among the construction labours who were associated with the weight lifting. However, cervical abfraction was noted more among the construction labours who were not associated with the weight lifting (n=155).

Our results were similar when compared with the previous clinical study[12]which found a significant difference in the prevalence of abfractions between people with clenching habit and non-clenching habit. This was also supported by earlier studies[13,14]. In addition, the importance of occlusal overloading is controversial. A review study presented evidence to support the thesis that occlusal loading can contribute to the loss of hard tissue in the cervical region, while an in vitro study found that axially-loaded teeth exhibited significantly less tooth wear. The authors concluded that the application of theoretical forces might not necessarily play a significant role in the progression of cervical tooth wear[15].

The main limitation of this study includes the sample has not included the female participants because of their deficiency in sampling frame. Also, only the basic output parameters have been used to assess the existence of TMJ disorder. Future studies with advanced diagnostic measures such as electromyogram analysis can be done to find the accurate etiology of the TMJ disorders. Further, muscular hypertrophy that will compensate in preventing the development of TMJ disorder for certain threshold which was not considered in the present study.

Conclusion:

Within the limitations of this study, theTMJ clicking sign was found to be strongly associated with increased number of working years especially with the work associated with weight lifting. Also increase in age acts as an additional factor that increases the risk of developing TMJ disorder. Extensive weight lifting people group had major signs ofcervical abfraction and dental attrition significantly that might be due to the increased clenching of teeth.

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Conflicts of interest:

There are no conflicts of interest.

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