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Correlation between mouth opening & lateral deviation in chronic gutkhachewers in adult population in latur region of south-eastern part of India

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ABSTRACT

BACKGROUND: In recent years, a combination of areca nut & tobacco has been introduced in India known as gutkha. Gutka chewing is the most popular form of chewable tobacco used in India with the prevalence rate of as high as 57.6%. Habitual chewers tend to consume more dry weight of areca nut & tobacco, it is probable that they develop more fibrosis of oral mucosa. The hallmark of the disease is submucous fibrosis that affects most parts of the oral cavity, pharynx, & upper third of the oesophagus that lead to dysphagia & trismus, which is progressive. It is associated with juxta epithelial inflammation followed by fibroelastic change of the lamina propria with epithelial atrophy, which leads to stiffness of oral mucosa to cause trismus & an inability to eat.

Material & Methodology: 120 subjects were participated in this study. They were given consent form & their maximum mouth opening & lateral deviation was assess by Vernier Caliper. Functional Impairment was checked by asking question to subject of mandibular function impairment questionnaire.

Conclusion: The study concluded that there is positive correlation between mouth opening & lateral deviation

Keywords: mouth opening, lateral deviation of mouth, gutkha chewers, submucous fibrosis, Mandibular function impairment questionnaire.

1.INTRODUCTION

In recent years, a combination of areca nut & tobacco has been introduced in India known as gutkha [1]

Gutkha has made inroads in traditional society & people with lower socioeconomic status as an alternative source of smoking. Gutkha was introduced less than 3 decades back, but today there are thousands of manufactures ranging from to very large, with a combined annual turnover in the order of several hundred million American dollars. [2]

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This product contains nicotine & other known carcinogenic chemicals such as tobacco specific N-nitrosamines, benzopyrene, nitrate, cadmium, lead, arsenic, nickel & chromium. A number of adverse human health outcomes such as periodontitis, oral leukoplasia & submucous fibrosis; gastrointestinal abnormalities; oropharyngeal, oesophageal & pancreatic cancers & cancer of stomach has been linked to short term use of gutkha. [3]

Gutkha use in India most commonly as mouth freshener [4]

Analysis of smokeless tobacco consumption suggested that effects of nicotine & tobacco specific N-nitrosamines, results in: biochemical changes of plasma glucose levels, total cholesterol, triglycerides, & significant decrease HDL cholesterol indicative of atherosclerosis risk. The data demonstrate Smokeless tobacco users are at high cardiovascular risk due to nicotine-induced free radicals & oxidative damage. [5]

chewing tobacco users had 7.3 times higher odds of getting oral cancer when compared to respondents who did not chew tobacco. [6]

An estimated 9 million new cases of cancer are diagnosed every yr. due to tobacco related causes [6]

cancer is a disease with high-incidence & mortality rate. Among all cancer worldwide oral cancer rank 6th [7]

Smokeless tobacco can trouble gum tissue, causing periodontal disease. Sugar is routinely added to update the sort of smokeless tobacco, growing the danger for tooth cavitation. The effect of gutkha on oral submucous fibrosis among users seems to develop very fast & there have been many reports on the evolving epidemic of oral submucous fibrosis.[8]

Habitual chewers tend to consume more dry weight of areca nut & tobacco, it is probable that they develop more fibrosis of oral mucosa. The hallmark of the disease is submucous fibrosis that affects most parts of the oral cavity, pharynx, & upper third of the oesophagus that lead to dysphagia & trismus, which is progressive. It is associated with juxta epithelial inflammation followed by fibroelastic change of the lamina propria with epithelial atrophy, which leads to stiffness of oral mucosa to cause trismus & an inability to eat. [9]

Diagnosis of oral submucous fibrosis (OSMF) is based on clinical criteria such as oral ulceration, paleness of oral mucosa, a burning sensation particularly with spicy food, the hardening of tissues, & presence of fibrous bands in the buccal mucosa.[9]

The practice of gutka chewing is common in communities particularly from South-East Asian countries including Bangladesh, Pakistan, Nepal, and Sri Lanka, and is spreading to North America [10,11]

In India, in the Global Adult Tobacco Survey, 21% of the participants were chewers of tobacco-related products [12]

Gutka chewing is the most popular form of chewable tobacco used in India with the prevalence rate of as high

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as 57.6% [13]

"Gutkha syndrome or Areca Nut Chewer's Syndrome", which is highly prevalent in Indian subcontinent, it is a combination of several well-known disabilities that are directly related to chewing of areca nut with or without smokeless tobacco consumption. This is usually seen in those chewing these products for several years. The fundamental cause of this syndrome is varying degree of fibrosis in the sub-mucosal layers & in the muscles of mastication leading to varying degree of trismus. [14]

It was seen that conduction velocity was decrease in gutkha chewers, showing the involvement of sensory nerve in gutkha chewers. [15]

The hyalinisation of the buccal mucosa forming white bands on the inner surface of cheeks & decrease in mouth opening is 1st symptom followed by burning sensation while taking food & also difficulty in swallowing. Free radicals released during the metabolism of tobacco & areca nut may involve in the initiation & propagation of mucosal fibrosis.[16]

This is a highly potent, insidious and chronic pre-cancerous condition that affects various portions of the oral cavity as well as the pharynx. It is a collagen related disorder associated with betel quid chewing and characterized by progressive hyalinization of the submucosa. It causes progressive fibrosis of submucosal tissues and juxta-epithelial inflammatory reactions.[16]

This disabling disease also leads to fibro-elastic changes in the lamina propria along with epithelial atrophy, which results in stiffness of the oral mucosa. It may become impossible to open to the mouth due to the extreme stiffness of the jaw. It manifests as blanching and stiffness of the oral mucosa, progressive trismus due to rigid lips, cheeks and pharynx, burning sensation in the mouth, reduced mobility of the soft palate and tongue.[17]

In study on Clinical Evaluation of gutkha chewing & pattern of bone loss in periodontitis concluded that Maximum bone loss was observed with molars and incisors. Alveolar bone loss was more frequently found in mandibular arch as compared to maxillary arch.[18]

The masticatory forces generated during chewing areca may be transmitted to the TMJ and subsequently may give rise to TMJ dysfunction syndrome. In early lesions, there is loss of the usual smooth surface. In later stages, there is total loss of the entire amorphous layer, and the superficial collagen masses consist only of small diameter fibrils. Disorganization of the articular surface occurs in case of more sever and prolonged disorder.
The pathological change in muscles is indefinite. There will be raised intramuscular pressure attributing to oedema, increased blood flow, degranulating mast cells seen in histological examination of painful muscles. [19]

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The connection between tobacco utilization and its malicious consequences for oral health is outstanding. The utilization of gutkha (smokeless tobacco) has found to relate with mouth mobility and reduce functional impairment. [20]

Indian tobacco feature has seen an exponential move in the gutkha bargain during the time in all the socioeconomic level. This is a result of the convenience of usage, easy availability, and insignificant expense of gutkha packets. The expansive promoting of gutkha has incited no matter how you look at its reliance among youthful age group, especially in low-income-related status people.[20]

2.MATERIAL & METHODOLOG:

2.1 Study type & design – cross sectional study

2.2Sample size – 120

2.3Sample method – convenient sampling

2.4Study setting – Pan Stall, gutkha shop.

2.5Study duration – 3 months

Ethical committee approval was obtained from the institute ethical committee. Total 120 subjects were screened, only 1 subject was excluded as he was acute gutkha chewer. Procedure was explained to the subjects. The subjects were given written informed consent form in language understood by them. Their name, age, years of gutkha chewing was asked. Vernier Caliper was sanitized by ethyl oxide and wiped with tissue paper. Right lateral deviation was checked with vernier caliper, measurement point was gap between 2 upper incision & 2 lower incisions. Left lateral deviation was checked with vernier caliper, measurement point was gap between 2 upper incision & 2 lower incisions. Mandibular Function Impairment Questionnaire was used to ask to check any functional impairment of mouth. All 17 questions were asked to the subjects, and the total score was calculated.

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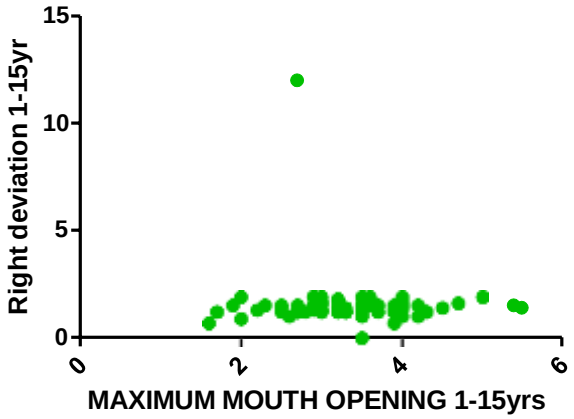
3.RESULT

Table 3.1

• Correlation between Mouth opening and Right deviation 1-15yr	
Number of XY Pairs	77
Pearson r	-0.059
95% confidence interval	-0.28 to 0.17
P value (two-tailed)	0.6077
P value summary	ns
Is the correlation significant? (alpha=0.05)	No
R squared	0.0035



As per correlation analysis about 77 patients recognised to be having addiction of chewing found to be having no significant relationship with mouth opening (P 0.6077) with Pearson r value -0.059 as given in Table and Fig.

Table 3.2

Correlation between Mouth opening and Left Deviation 1-15yr	
Number of XY Pairs	77
Pearson r	0.23
95% confidence interval	0.0083 to 0.43
P value (two-tailed)	0.0424
P value summary	*
Is the correlation significant? (alpha=0.05)	Yes
R squared	0.054

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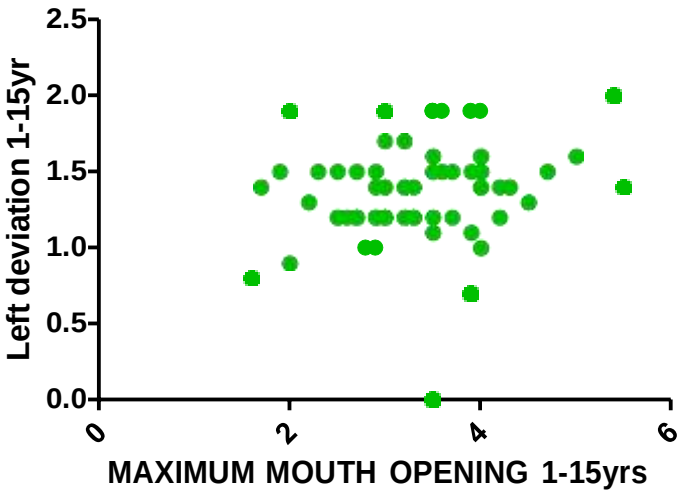

Table 3.3

Correlation between Mouth opening and QMFI Score 1-15yr	
Number of XY Pairs	77
Pearson r	-0.33
95% confidence interval	-0.52 to -0.12
P value (two-tailed)	0.0033
P value summary	**
Is the correlation significant? (alpha=0.05)	Yes
R squared	0.11

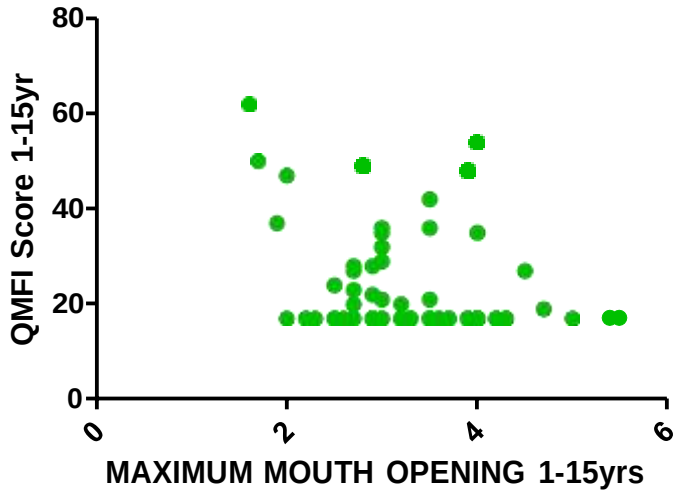

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Table 3.4

Correlation between Mouth opening and Right deviation 15-30yr	
Number of XY Pairs	37
Pearson r	0.37
95% confidence interval	0.057 to 0.62
P value (two-tailed)	0.0225
P value summary	*
Is the correlation significant? (alpha=0.05)	Yes
R squared	0.14

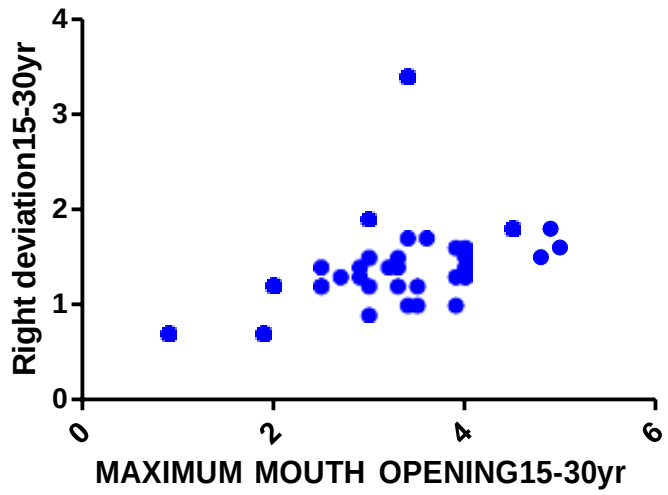

Table 3.5

Correlation between Mouth opening and Left Deviation 15-30yr	
Number of XY Pairs	37
Pearson r	0.73
95% confidence interval	0.54 to 0.85
P value (two-tailed)	< 0.0001
P value summary	***
Is the correlation significant? (alpha=0.05)	Yes
R squared	0.54

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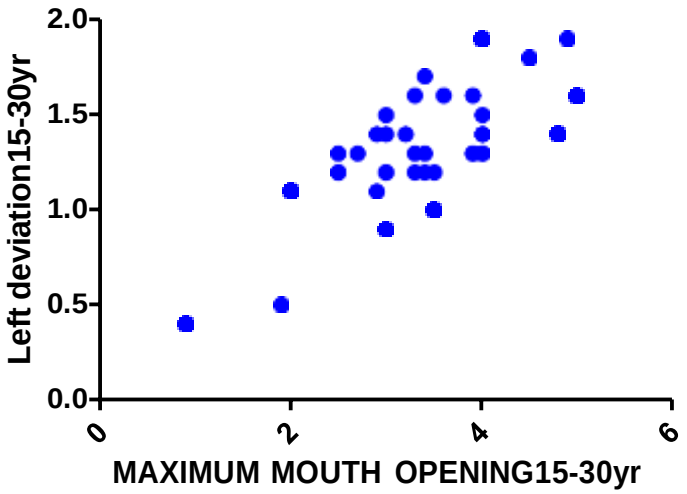

Table 3.6

Correlation between Mouth opening and QMFI Score 15-30yr	
Number of XY Pairs	37
Pearson r	-0.18
95% confidence interval	-0.48 to 0.15
P value (two-tailed)	0.2894
P value summary	ns
Is the correlation significant? (alpha=0.05)	No
R squared	0.032

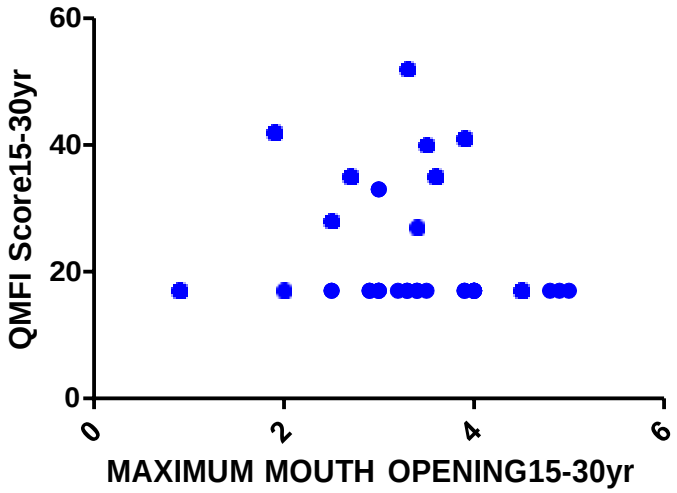

Table 3.7

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Correlation between Mouth opening and Right deviation31-45yr	
Number of XY Pairs	5
Pearson r	0.21
95% confidence interval	-0.83 to 0.92
P value (two-tailed)	0.7348
P value summary	Ns
Is the correlation significant? (alpha=0.05)	No
R squared	0.044

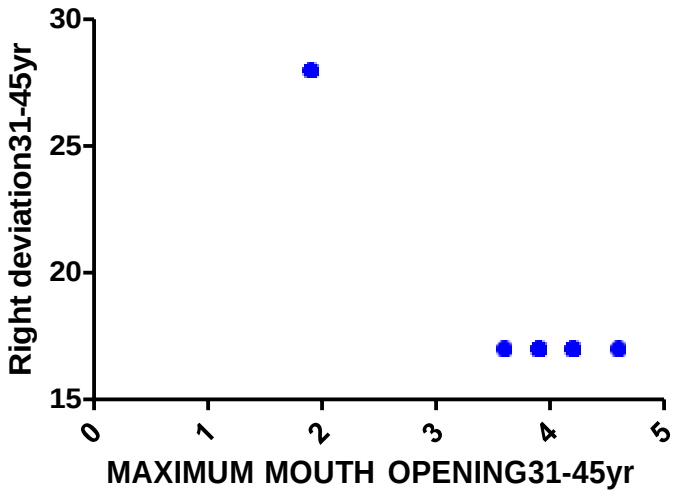

Table 3.8

Correlation between Mouth opening and Left Deviation31-45yr	
Number of XY Pairs	5
Pearson r	0.21
95% confidence interval	-0.83 to 0.92
P value (two-tailed)	0.7364
P value summary	ns
Is the correlation significant? (alpha=0.05)	No
R squared	0.044

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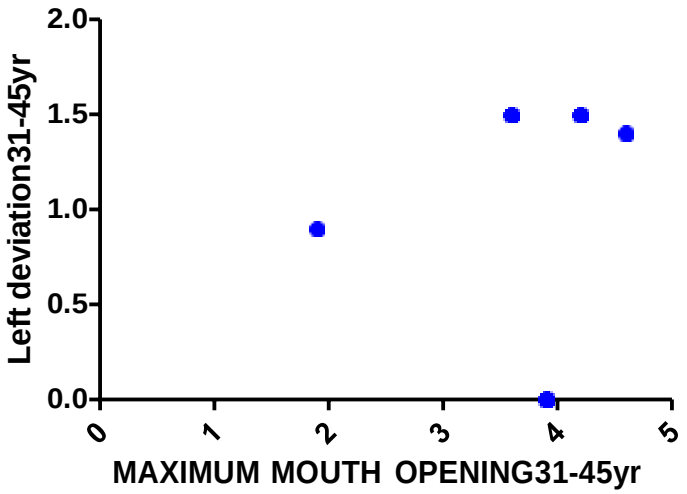

Table 3.9

Correlation between Mouth opening and QMFI Score31-45yr	
Number of XY Pairs	5
Pearson r	-0.93
95% confidence interval	-1.0 to -0.30
P value (two-tailed)	0.0198
P value summary	*
Is the correlation significant? (alpha=0.05)	Yes
R squared	0.87

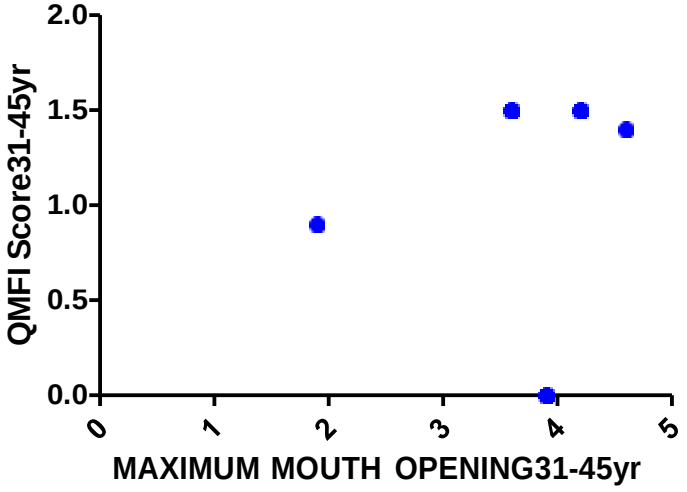

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Table 3.10

Overall mean and stats data of whole population						
	AGE	Years of chewing	MAXIMUM MOUTH OPENING (cm)	Right deviation (cm)	Left Deviation (cm)	QMFI Score
Number of values	119	119	119	119	119	119
Minimum	19	1.0	0.90	0.0	0.0	17
25% Percentile	28	7.0	2.9	1.2	1.2	17
Median	36	12	3.3	1.4	1.4	17
75% Percentile	45	20	4.0	1.5	1.5	25
Maximum	74	44	5.5	12	2.0	62
Mean	37	14	3.4	1.5	1.3	22
Std. Deviation	11	9.3	0.80	1.0	0.33	10
Std. Error	1.0	0.85	0.074	0.096	0.030	0.92
Lower 95% CI of mean	35	12	3.2	1.3	1.3	21
Upper 95% CI of mean	39	16	3.5	1.7	1.4	24
Sum	4435	1678	401	175	160	2643

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4.DISCUSSION

In our study, mean age was seen to be on younger side. This resembles in which significant smokeless tobacco users (60%) started having tobacco before 25 years of age.

Blood nicotine levels appearing due to gutkha biting are drastically higher than that appearing from cigarette smoking. Along these lines, the utilization of tobacco items may intensify periodontal disease. This clarifies the huge high score of versatility and furcation inclusion in gutkha chewers.[27]

In our present study we focused on correlation of gutkha chewing on mouth mobility, and its consequence on functional impairment of mouth.

Study of comparison of masseter muscle changes in tobacco chewers & non-chewers using ultrasonography by Dry Kailasam concluded that there was no statistically significant differences between right & left muscle length changes.[28]

Involvement on just one side of the mouth has been reported when the betel quid is habitually held in one specific site. Finding was showed in study conducted by Dr Delwyn Dyall-Smith on oral submucous fibrosis. [29]

The muscles of mastication (also called the 'elevator muscles') consist of the Temporalis, Masseter, Medial pterygoid and Lateral pterygoid. Each muscle plays an important role in mastication, and when damaged, each can cause limitations in mouth opening. When any muscle is damaged, a pain reflex may be stimulated. This condition, called "muscle guarding" results when muscle fibres engender pain when they are stretched. This pain causes the muscles to contract, resulting in loss or range of motion, mandibular hypomobility will ultimately result in both muscle and joint degeneration.[30]

When a joint is immobilized, degenerative changes occur within the joint. These changes may mimic arthritic changes, and may be accompanied by inflammation and pain. If left untreated, degenerative processes may continue, ultimately becoming permanent. Degenerative changes in the muscle are also highly likely. Disuse atrophy, as seen by reduction in muscle mass and strength, as well as shortening of muscle fibres is observed within days of immobilization.[31]

Habitual unilateral chewing develops subconsciously and serves as an example for lateral preference. Chewing side preference has a detrimental effect on the TMJ of the corresponding side and is also related to lateral facial asymmetry, which suggests that examination and recording of chewing side preference merit consideration in routine dental examination and treatment planning. [32]

Habitual gutka usage is associated with severe oral mucosal disorders, and the consequences may extend beyond the oral cavity.[32]

The relative risk of OSMF increased with duration and frequency of areca nut consumption especially from an early age of onset.[33]

There was an early involvement of the masseter muscle in patients with OSMF compared with that of other muscles like anterior temporalis & orbicularis oris muscle.[33]

Lateral pterygoid provided a very important indirect contribution to some clenching forces. The muscle helped to oppose (balance) the horizontal reaction forces at the bite point and joints, which potentially pushed the condyle backward. A balancing muscle is now defined as one (like lateral pterygoid) whose activity increases the output force by far more than its direct contribution to that force.[34]

Total 120 subject were screen in our study, the subjects were divided into 3 groups.

We found that, in people chewing gutkha from 1-15 years have reduced maximum mouth opening but was non-significant with right deviation. But showing significant correlation with changes in left deviation. QMIF score shows significant changes with moderate score.

People chewing gutkha from 15-30 years had reduced maximum mouth opening showing a significant correlation with right deviation and highly significant with left deviation. QMFI grade show no significant changes People chewing gutkha from 31-45 years had not shown much significant changes in mouth opening as well as left and right deviation. But had grade 2 i.e. moderate qualitative measure in mandibular function impairment questionnaire

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5. CONCLUSION

Conclusion of study is there is significant correlation between mouth opening & lateral deviation, as per data analysis left side deviation is more affected compare to right side deviation

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