ASSESSMENT OF PANORAMIC RADIOMORPHOMETRIC INDICES IN TOBACCO (SMOKE AND SMOKELESS) AND NON TOBACCO USERS.

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INTRODUCTION:

Tobacco consumption has become very common for a given population, mainly due to stress, work pressure, family issues, an individual tends to consume tobacco for short term relief when it in turn leads to severe manifestation on a later stage. It can be in the form of smoke or smokeless. Around 80-90% of the individuals develop Premalignant lesions after consuming tobacco. Radiographs help in further understanding and diagnosis of the lesion when the stage is progressive or malignant. Different radiographic modalities are employed such as OPG, CBCT, Panoramic X-rays.

X-rays findings vary from non tobacco and tobacco users overall. In India according to the Global Adult Tobacco Survey (GATS) conducted by CDC (Centers for Disease Control and Prevention) and WHO (World Health Organisation) in 2016–17, 28.6% adults (42.4% males and 14.2% females) are tobacco users. Tobacco products contain over 7,000 potentially toxic constituents, which can cause various morbid diseases like certain types of cancer, cardiovascular disease, respiratory ailments, and bone diseases like osteoporosis.

MATERIALS AND METHODS:

Patients that were included in this study were from the outpatient department of Oral Medicine and Radiology Saveetha Dental college and hospitals. This cross sectional study was conducted on 40 subjects aged above 25 years who consented voluntarily to be part of the study. Included patients were categorized as study group (tobacco users), comprising 10 smokers [1] 10 Smokeless Tobacco users [2] and 10 individuals with a combination of smoking and smokeless tobacco habits; control group comprised of 10 healthy age and sex-matched individuals with

no habit of tobacco use. Panoramic radiographs of the included patients who visited the Department of Oral Medicine and Radiology, Saveetha Dental college and hospitals for complaints related to odontogenic causes were taken.

Radiomorphometric indices were determined using the measuring tool of the in built computer software program:

a. Mandibular cortical index (MCI) was determined by the visual appearance of the lower border of the mandible below the mental foramen on both sides of the panoramic radiographs and categorised into one of three groups according to the classification by Klemetti et al.,1994 which is: C1, the endosteal margin of the cortex is even and sharp on both sides; C2, the endosteal margin shows semilunar defects (lacunar resorption) and/or seems to form endosteal cortical residues on one or both sides; C3, the cortical layer forms heavy endosteal cortical residues and is porous.
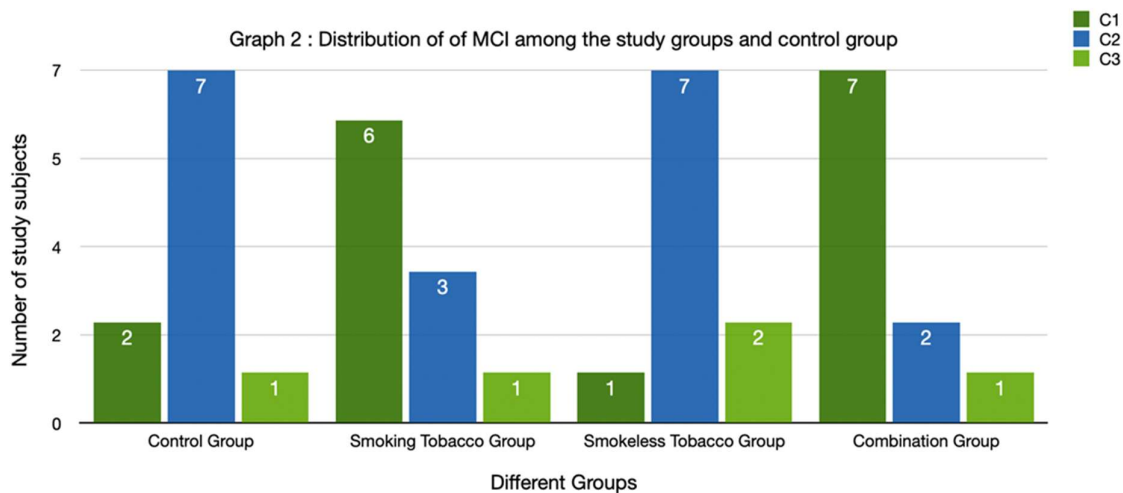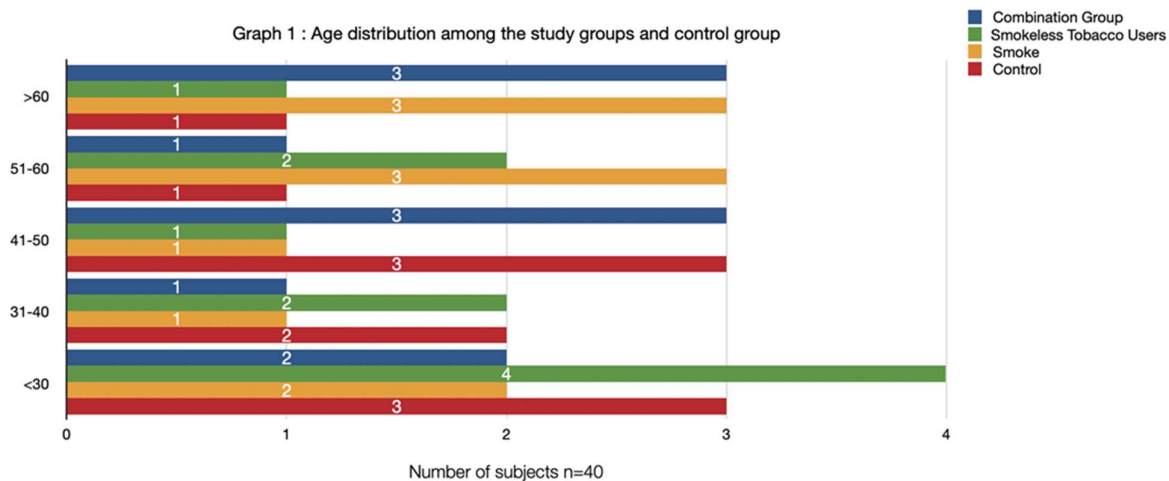
b. Mental index (MI) was determined by tracing a line perpendicular to a tangent drawn to the lower border of the mandible through the centre of the mental foramen. The cortical width was measured at this point (Ledgerton et al.1999)

The charted data was analysed using SPSS V.17.0. Descriptive data statistics, cross-tabulations, and Chi-square statistics were computed. One-way ANOVA was used for multiple comparisons of mean values between groups. The level of statistical significance was determined at P value<0.05. Pearson correlation for parametric variables and Spearman correlations for non-parametric variables (MCI) were applied.

RESULTS:

The present study comprises 30 tobacco users and 10 healthy controls (25 males and 15 females). Their ages ranged from 25 to 74 years (mean age 42.93 ±13.85 years)[Graph 1]. All the smokers and combination habit group subjects were men while the Smokeless tobacco users group consisted of 8 females. A number of Smokeless tobacco users (n=6) and combination group (n=5) subjects demonstrated C2 category MCI. An equal number of smokers (n=8) had MCI category C1 and C2. Controls also showed category C2 (n=7) more than C1 and C3. The C3 type of mandibular cortical morphology was more numerous in Smokeless tobacco users (n=4) than other groups [Graph 2].

The frequency of tobacco consumed per day in the study group was divided as 1–5, 6–10, 11–20,and >20 times per day. Mean frequency was 4.25 ± 3.87 per day with maximum frequency noted among the combination habit group (5.53±3.54), followed by Smokeless tobacco users (5.52±3.54) and smokers (4.68±2.36). Duration of tobacco use among the study groups was categorised as 1–5, >5–10, >10–15, >15–20, >20–25, and >25 years with a mean of 11.22 ± 5.47 years. Smokeless tobacco users had the longest duration of habit (10.16±5.20) followed by a combination habit group (5.64±4.73) and smokers (5.56±2.80) [Table 2].

Graph 1 : Age distribution among the study groups and control group

Graph 2 : Distribution of of MCI among the study groups and control group

Parameter	Groups	Mean	Std Deviation	P Value
Age (in years)	Controls	27.55	10.064	0.096
	Smoking	21.31	7.654	
	SLT	24.55	10.935	
	Combination habit group	18.27	11.145	

Frequency (per day)	Controls	0.00	0.000	0.000**
	Smoking	4.68	2.365	
	SLT	5.52	3.546	
	Combination habit group	8.47	5.628	
Duration (in years)	Controls	0.00	0.000	0.000**
	Smoking	5.56	2.803	
	SLT	10.16	5.202	
	Combination habit group	5.64	4.739	
MI (in mm)	Controls	4.03	0.865	0.068
	Smoking	4.46	0.725	
	SLT	3.84	1.060	
	Combination habit group	4.22	0.752	

**Highly significant

TABLE 2: Distribution of age, frequency and duration of habit, MI among the study subjects and controls

DISCUSSION:

Effects of tobacco cumulatively affect the skeletal system, including the mandible sensitive to changes in body bone mass. [3] This is reflected as increased cortical porosity and thinning which can be assessed using Panoramic RI. Generally, most of the scientific literature links cigarette smoking as a risk factor for osteoporosis and its associated risk of fractures. However, some studies have shown that smoking does not affect bone density.[4,5] Possible explanations for these differences include variations in bone sites examined and methods of bone density

measurement, endpoints of interest, age, and menopausal status of subjects; and source of subjects.[6](1)

The typical single dose of nicotine from chewing tobacco is 15 times that of cigarettes. With such high concentrations of nicotine, smokeless tobacco not only decreases bone oxygen consumption and collagen synthesis but also causes increased levels of inflammatory mediators locally that can promote alveolar bone loss.[7](2)

For determination of sensitivity and specificity of MCI, C2 and C3 groups were considered as one group.[8] Sensitivity for the MCI Index was 70.5% which is more as reported by previous studies.[9,8] Gaur et al. reported a 100% sensitivity to MCI.[10] The present study reported comparatively less specificity of 35.6% as compared to the previous studies (range is 75–96%).[10,9,19] Thus, MCI could be a diagnostic tool for assessment of bone loss and changes caused in tobacco users.(3)

The limitations of this study were that the study sample size was small. Wide age range, the menopausal status of female subjects, body weight, physical activity level, nutritional status, dietary, and lifestyle factors might have affected the values obtained. Also, it remains to be further ascertained if these indices carry practical utility in dental clinics of general dental practitioners who may need additional and adequate training to use the panoramic indices effectively on their patients. Our team has extensive knowledge and research experience that has translate into high quality publications(4–13)

CONCLUSION:

Panoramic radiomorphometric indices can be helpful in assessing the bone level present and any changes or alteration caused by tobacco usage (smoke and smokeless) can be evaluated.

CONFLICT OF INTEREST:

The author declares no conflict of interest.

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