



Alliance of Oral Hygiene Practices and Abrasion among Urban and Rural Residents of Central India

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ABSTRACT

Objectives: To attain alliance between the oral hygiene practices with prevalence of tooth abrasion among urban and rural adult population of Central India. To plan dental care services in inaccessible areas and to suggest appropriate remedial measures to prevent this avertable and self-inflicted injury of teeth in this cross-sectional study.

Materials and methods: A sum of 1045 adult residents both from Urban (529) and rural (516) parts of Bhopal district (Central India) was selected on a random basis. The multistage sampling technique was adopted to ascertain the sample size. In urban area the study population consisted of 240 males, 289 females and 201 males and 315 females in rural area respectively. All residents above 18 years of age from the Bhopal district were included in cross-sectional study. Assessment form comprises of questionnaire and general information on oral hygiene practices, dietary habits and medical history. Abrasion was assessed using diagnostic criteria recommended by Smith and Knight (modified). Chi-square test was used to test associations between categorical variables at 5% level of significance. Regression analysis attempted to define for risk factors causing abrasion. Literature on the prevalence of abrasion is very sparse, so attempt is made to correlate the etiological factors and recommend to prevent tooth wear.

Results: Investigation of this cross-sectional study was aggregate of 1045 residences. Result shows high prevalence of abrasion 70.2%. Higher prevalence concomitant with diffident habits related to oral hygiene maintenance was recorded more among rural (76.9%) when compared to urban dwellers (63.7%). Presence of abrasion verifies statistical significance in relation to age, rural-urban difference and variations in habit of oral hygiene care. Stated in the present study, avertable and self-inflicted is tooth-abrasion, recurrently resulted by the reprehensible brushing method and common use of indigenous material for the maintenance of oral hygiene.

Conclusion: Shows significant liaisons with the presence of abrasions in relation to Urban and rural dwelling, age, material used and mode of brushing and duration of brushing. Indigenous and course material causes high amount of enamel wear and with the advancement in age abrasion tend to increase. Prevalence of abrasion does not show any gender predilection.

Cultural believes, lifestyle and transition reflects in deviating presence of abrasion in populations.

Keywords: Abrasion, Oral hygiene, Dental care, Brushing habits.

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INTRODUCTION

The term abrasion is used to indicate the wear that occurs on a tooth from the friction of a foreign body. Abrasion is the mechanical wearing of tooth substance by abnormal mechanical process.¹⁻³ The surface that is affected varies with the causative factors. The result is direct or indirect pulp involvement. Tooth brush abrasion is seen at the cervical third of the tooth. It is observed that cervical lesions are often situated on the vestibular surfaces rarely on proximal surfaces.⁴⁻⁸

Man, throughout his evolutionary innovation, has been subjected constantly to environment. Some changes were beneficial and other detrimental to well-being. Historically, the most widespread rationale for tooth loss and dental hard tissue has been dental caries. Striking changes both the pattern and distribution of oral diseases causes tooth wear, it has been estimated that 25% of tooth destruction does not originate from caries process.^{1,4,9-13} Most common problems associated are non-carious destruction of teeth. Tooth wear or tooth surface loss refers to the pathological loss by a process other than dental caries. It is an irreversible destructive process, which results in functional loss of dental hard tissue. The preventable and self-inflicted injury is abrasion. Tooth brushing is the common cause. The degree

of wear depends on angle of brushing and abrasive effect of material used.¹⁴⁻¹⁸

Abrasion of hard dental tissue is an escalating predicament, reflects changing lifestyle and social pressure. Numerous studies reported that abrasion is a multifactorial process. Widespread causes documented as positive agents for abrasion are aggressive tooth brushing and use of abrasive dentifrices and other abrasive agents, such as coal, sand, brick, etc. Most common cause is use of abrasive dentifrices coupled with injudicious use of horizontal tooth brushing pattern.^{1,2,4,5,8,14,15,18}

Literature on prevalence of abrasion of teeth is scarce and the public health significance is largely unknown. No much information is yet available on incidence and reported prevalence varies widely among Indian population. An extensive lesion may also undermine the tooth, threatening the structural integrity and the defect is esthetically unacceptable. Abrasion of teeth is to a certain limit self-inflicted, which can be prevented to a great extent with proper education and motivation.¹⁹⁻²² The present study attempts to provide a basis of estimating abrasion of teeth in a population and its etiological factors. This may contribute for development of national or regional oral health program and for planning appropriate health education strategies to suggest possible remedial measures.

MATERIALS AND METHODS

A survey was conducted in Bhopal District of Central India to assess the abrasive lesions of teeth. Assessment form comprises of questionnaire and general information on oral hygiene practices, dietary habits and medical history. Examination of abrasion recorded with the help of tooth wear index Smith and Knight (modified).²³

All statistical analyses were performed using SPSS 19. For the association Chi-square test is applied. p-value less than 0.05 was considered statistically significant.

The investigator conducted the survey single-handedly and prior to the start of the survey training and calibration was carried out. After training and retraining final concordance to determine the diagnostic variability agreement for assessment was 96%.

The study population consider of random selection of 1045 subjects from the Urban and rural areas of Bhopal. The study population was categorized into the assortment of age groups starting from 18 to 59 years and above. The sampling universe was the entire district of Bhopal. Multistage sampling design was adopted. As per information from Bhopal city corporation and ensured randomness and representativeness total 529 available subjects were examined. As per information from zilla parishad office

village Khajuri was selected. By systematic random sampling 516 subjects were examined door-to-door. Among urban 240 males and 289 females and rural 201 males and 315 females were examined respectively.

For organizing the survey rural house hold cooperation was sought from village head, local volunteers and social workers and consequently for urban from voluntary organizations and local volunteers. Detail schedule was prepared for data collection. The survey took place for a period of approximately 3 months from October to December 2008.

All possible measures of sterilization were kept in the mind. Cold sterilization is the most accepted method for survey purposes. Surgisrub was used before examining each individual. Subjects were examined seated in a chair with a high backrest with examiner standing behind. Natural light was used at all locations.

RESULTS

A total of 1045 subjects were examined in age groups of 18 to 59 and above years of both sexes out of which 529 urban and 516 rural residents respectively. In the urban 240 males and 289 females and in rural 201 males and 315 females were examined correspondingly.

The data collected was analyzed and the results showed the following:

The mean subject age was 38.28 years (SD = 15.76 years) intended for males and 38.08 years (SD = 16.81 years) for females. Collective mean age of study population was 38.72 years (SD = 16.41 years).

The overall prevalence of abrasion was 70.2% (Table 1). The abrasive lesions although multifactorial increased with age. In the present study abrasive lesions are in ascending order with age and the difference between youngest age group and all other age groups are statistically significant. Abrasive lesion of teeth does not show any sex predilection (Table 2).

On judging the prevalence of abrasion among urban and rural residents of Bhopal district alteration is originated to be 63.7% urban and 76.9% rural respectively, (Table 2) difference of which was statistically significant. On comparison of urban and rural data 36.1% of the urban subjects using abrasive materials while 65.8% subjects from rural population were found to be using finger and other abrasive materials as an oral cleansing aid. The difference was higher and inferred statistical significance.

The results of the regression model are summarized (Table 3).

The number of lesions recorded varied as a consequence of the brushing habit used. Lesions predominated in the

horizontal mode of brushing and were least frequent in the individuals with circular technique. This holds true both among people who brush their teeth with indigenous material and those using finger predominantly in place of brush both in urban and rural areas of Bhopal district.

It is evident all that in all age groups lesions are more frequent among those who use horizontal brushing and abrasive materials to clean their teeth. The difference is statistically significant for those who use toothpaste and soft bristle toothbrush.

Abrasive lesions do not show any difference statistically with increasing frequency of cleaning. Duration of brushing shows a statistical relation in the formation of abrasion. More is the duration of scrubbing on the tooth surface greater is the prevalence of abrasion.

DISCUSSION

The etiology of cervical abrasion is multifactorial and interrelated. It has been clear that tooth brushing plays an important fragment.^{24,25} The present results confirm on the population level an association between improper tooth

brushing, coarse materials used to clean teeth and abrasion.^{26,27} The alteration among rural and urban populations is evidence of cognizance level, familiarity cultural believes and lifestyle variation.

The subject population is a representative of urban and rural areas of Bhopal district. Overall prevalence of abrasion is 70.2%. In this study abrasion constitutes 76.9% amid rural and 63.7% urban. These patterns were different from Nigerian experience (Oginni and Olusile in 2002)²⁸ where prevalence is 15.8%. Probable linking between oral hygiene practices, knowledge to securely maintain oral hygiene and presence of abrasion at lower level. It is different from that observed in European countries (Smith and Robb 1996) combination of abrasive erosive lesion is pragmatic could be related with contemporary lifestyle habits and diet, such as high consumption of acidic drinks.²⁹

The overall occurrence of abrasion in the present study is in favor with the Croatian study where tooth wear is 60 to 70% and the prevalence and severity appeared to increase with age.³⁰ This finding is also supported by two other studies among adult population in Turkey and the

Table 1: Demographic profile of residents of Bhopal district (urban, rural) according to age and gender

Age	Male			Female		
	Urban n%	Rural n%	Total n [%]	Urban n%	Rural n%	Total n [%]
18-28	38 [15.8]	53 26.3	91 20.6	59 [20.4]	87 27.6	151 [19.7]
29-38	49 [20.4]	34 16.9	83 18.8	67 [23.2]	62 20.0	133 [20.7]
39-48	69 [28.8]	54 26.9	123 27.9	65 [22.5]	53 16.3	118 [23.6]
49-58	63 [26.2]	45 22.3	108 24.5	59 [20.4]	61 19.5	117 [20.9]
>59	21 [8.8]	15 7.6	36 8.2	39 [13.5]	52 16.6	101 [15.1]
Total	240 [100.0]	201 [100.0]	441 100.0	289 [100.0]	315 [100.0]	604 [100.0]

Table 2: Distribution of the residents of Bhopal district (urban and rural) according to age and prevalence of abrasion

Age	Urban n%		Abrasions		Rural n%		Abrasions	
18-28	97	35.1	34	10.1	140	27.1	76	54.2
29-38	116	48.3	56	16.6	96	18.6	65	67.7
39-48	134	67.9	91	27.1	107	20.7	95	88.7
49-58	122	82.8	101	29.9	106	20.5	96	90.6
>59	60	91.6	55	16.3	67	12.9	65	97.1
Total	529	63.7	337	100.0	516	100.0	397	76.9

$$\chi^2 = 10.799, df = 1, p < 0.05$$

Table 3: Regression analysis of etiological factors responsible for abrasion

Factors	B	Standard error	Wald Chi-square	df	Sig.	Exp (b)
Age	2.269	0.285	63.578	1	0.000	9.670
Rural/urban	-0.636	1.042	0.373	1	0.041	0.529
Material used	-2.093	0.490	18.240	1	0.000	0.123
Frequency of brushing	17.703	3225.976	0.000	1	0.996	4.877e7
Type of toothbrush	5.092	0.986	26.679	1	0.000	162.672
Duration of brushing	3.291	0.467	49.596	1	0.000	26.870
Gender	-35.718	3225.977	0.000	1	0.991	0.000
Toothbrush/finger	2.503	0.801	9.773	1	0.002	12.221
Constant	5.059	2.962	2.918	1	0.088	157.447

Southeast of England.^{29,31} Prevalence observed in the study by Smith and Robb in the European population accounts 25 to 60%²⁹ which a broader perspective with the age there is advancement of abrasion present and the study shows analogous finding.²⁹ Another study reported 10 to 35% of enamel cervical wear among adolescents in South London by Bartlett et al³² present study is not in agreement with this study as the adolescents were the target group. Sagnes and Gjermo¹⁹⁷⁶ reported similarly high levels of enamel wear in cervical lesion.¹⁷ On contrary 35.8% abrasion the study of tooth wear patterns and their associated etiologies in adults in Kelantan, Malaysia.³³ Bergstorm and Lavstedt reported the prevalence of abrasion 31%.³⁴

The present study reveals comparatively high prevalence could be attributed to widespread ignorance due to low level of education and low per capita income. Use of cheap and low grade materials for oral hygiene maintenance by the residents. Other elucidation could be due to cultural believes and slow transition due to less urbanization in the developing country like India.

Association between cervical lesion and other etiological factors are implicated in the development of abrasion.^{16,17,30} Higher prevalence in rural may perhaps be distributed to illiteracy, low per capita income and henceforth use of cheap abrasive materials like locally prepared tooth powder, brick powder, sand, rangoli powder, charcoal, etc. to clean the teeth (26.1, rural 45.7%). This could be attributed to prevalent illiteracy and lack of awareness. Cervical wear is a multifactorial process concluded by most of the studies similar findings are reflected in this study too.^{10,20,21,26,29,30}

Cervical abrasion is a common condition distribution of the subjects according to gender does not show any discernible divergence and is statistically insignificant.^{16,17,32,33} Current study also shows abrasion is evenly disseminated between both the genders. Bergstrom J and Lavstedt, Randentz, Barnet and Cutright,^{25,34} also reported no statistical dissimilarity owing to gender pertaining to abrasion of teeth.

Present investigation corresponds to the concept of tooth brushing with separate five independent variables. Owing to abrasion risk factors considered are brushing technique, brushing frequency, bristle stiffness and abrasivity of the material used and the duration of brushing. Of these five the correlation of abrasion was stronger with brushing technique and use of abrasives as dentifrice. As influenced by bristle stiffness, duration of brushing shows positive strength in the similar stream. Frequency of brushing however shows a weaker association. Conversely age of the individuals exhibited the strongest correlation to abrasion. In this connection age may be the expression, with

increase in chronicity of tooth brushing and the use of abrasives for cleaning the teeth increases proportionately so is the abrasive lesion. The present study exhibits similar findings. The individuals with horizontal brushing for a longer and use of abrasives as oral hygiene aid reveals higher level of abrasion. The present study is in concordance with this expectancy as the probability of cervical abrasion and subsequent hypersensitivity increases with increase in age with other available literature.^{31-36,37}

Together, age and brushing frequency expression for accumulated brushing time in the individuals, the importance of accumulated brushing time for the development of abrasive lesions is indicated that only subjects with least abrasion are youngest age group could be less exposure to abrasive cleaning aids and harmful brushing technique.^{34-36,37}

Horizontal brushing strokes invariably causes abrasion, *in vivo* it is proved that faulty tooth brushing has a significant role in causing abrasion and subsequent hypersensitivity.³⁷ In the present result confirms this expectancy and shows horizontal brushing is most hazardous and likely to produce abrasion than any other technique. Circular or vertical tooth brushing strokes are the safest for causing the pathological wear in the form of abrasion.

Most studies pertaining to the abrasion potential of the material used for cleaning teeth agree that the abrasives incorporated do cause damage. The present study reflects the parallel conclusion. Coarser the material higher will be the abrasive lesions. The use of more indigenous material are much harmful and causes more amount of abrasiveness in teeth with severe hypersensitivity as major indicator accumulated affect is visible in later decades of life.^{31,32,34,37}

LIMITATIONS OF THE STUDY

Factors of possible importance to dental abrasion which were omitted in the study are the pressure of the tooth brush applied and indirect etiologies like acidic oral environment and easy enamel dissolution and medication. Some of the biological factors, such as saliva, tooth composition and structure, occlusion and behavioral factors were not considered. Further investigations and continuous follow-up may allow the mapping of the relationship of biological factors with the occurrence of tooth wear.

CONCLUSION

Positive association between abrasive lesion, low levels of wakefulness due to deprived economic status and the cosmic difference or rural and urban lifestyle was existed. Improper tooth brushing and rampant use of abrasives, such as sand

and charcoal to clean their teeth; in the rural area such folk practices are still widespread in high percentage and fewer among urban. Study could be related to rural exodus from urban transition. Lower class in the Urban follow a similar trend as in rural due to economic and educational diffident or they are migrated from the rural area. Prolonged use of abrasives, improper brushing habits and lack of becoming accustomed to superlative habits of hygiene among populations are the add-ons.

Abrasion being a self-inflicted destructive process, the damage and mortality due to this can be preventable by effective health instruction and inspiration. In order to prevent this problem from becoming worse and become a burden, we should try to combat the problem from its early stages; literacy and wakefulness.

CLINICAL SIGNIFICANCE

Abrasion being a self-inflicted destructive process the damage and mortality due to this can be preventable by effective health instruction and inspiration. In order to prevent this problem from becoming worse and become a burden, we should try to combat the problem from its early stages. Literacy and wakefulness are important steps in achieving superior oral health of people. Masses are encouraged to discontinue the habit of using abrasives and to use the tooth paste and brush and become accustomed to a correct method and proper oral hygiene measures. Government should supply these products on subsidized rates. Audiovisual aids like television might promote the accurate aid and acceptable process to maintain oral hygiene.

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