

DISTRIBUTION OF DENTAL CARIES AND ITS RELATIONSHIP TO RISK FACTORS

¹SAIMAAZAM, BDS, FCPS

²MSALEEM KHURRAM BDS, MCPS

³MOHTADA HASSAN, BDS, MDSC

⁴FATIMA IQBAL, BDS

⁴SANA IQBAL, BDS

ABSTRACT

The aim of this study was to assess the distribution of caries in the oral cavity and its relationship to risk factors. A total of 115 patients including both males and females were randomly selected for the study. Information about risk factors was collected by face to face interviews. Oral examination was performed to evaluate distribution of caries. Descriptive statistics were used to analyze data. Mean DMFT index of the studied population was calculated to be 5.04. The value was higher in females than males. Prevalence of caries was high in the mandible as compared to maxilla. Most frequently involved teeth were first and second molars and occlusal surface was the commonly affected surface. There was a significant relationship between caries and risk factors. Distribution of dental caries in the oral cavity follows a specific pattern. Risk factors influence the caries susceptibility of the individuals.

Key words: Dental caries, Risk factors, Socioeconomic Status

INTRODUCTION

Dental caries is an infectious microbiologic disease of the teeth that results in localized dissolution and destruction of the calcified tissues.¹ It is the most prevalent dental disease in the world. It not only causes damage to the teeth but is also responsible for several morbid conditions of the oral cavity and other systems of the body. The prevalence of caries has long been a subject of many epidemiological studies. The prevalence of dental caries has been reported from 44%-60%.^{2,3} The reported risk factors that affect its occurrence include; age, sex, socioeconomic status, race, geographical location, food habits and oral hygiene practices.² Apart from these variables, studies have shown that caries susceptibility also varies within the oral cavity. It differs not only between the maxilla and mandible but also in individual teeth and their surfaces.^{2,4}

Dental caries continues to be a serious health problem in Pakistan. Although several studies have been conducted about the status and prevalence of caries but so far no research has been carried out regarding the distribution of caries in the oral cavities of Pakistani population where preventive services are often lacking. The objective of this study was to assess the distribution of caries in the oral cavity and its relationship to risk factors so as to institute preventive strategies to counteract the potential increase in the prevalence of caries.

METHODOLOGY

This was a cross sectional descriptive study conducted at the Department of Operative Dentistry, Islamabad Dental Hospital. A sample size of 115 was calculated using WHO software for sample size calculation at 95% confidence level, anticipated population proportion of 60% and 9% relative precision. Subjects

² Professor and Head, Department of Prosthodontics

³ Associate Professor and Head, Department of Dental Materials

⁴ Resident, Department of Operative Dentistry Armed Forces Institute of Dentistry Rawalpindi-Pakistan

Correspondence: ¹Dr Saima Azam, Asst Professor & Head Department of Operative Dentistry, Islamabad Dental Hospital, Islamabad Medical & Dental College, Main Murree Road, Bhara Kahu, Islamabad-Pakistan. Telephone: 051-2232045 Ext 21, Email: saima.azam@iideas.edu.pk

including both males and females were randomly selected for the study. Physically and mentally compromised patients and those taking medications and conditions known to reduce salivary flow were excluded from the study. A detailed history followed by an oral examination was conducted on each patient by a single examiner to avoid ambiguous results.

In the history, information was collected about socio-demographic characteristics, oral hygiene practices and carbohydrate intake by face to face interviews. Next after informed consent, oral cavity was examined for the presence of caries. The teeth were cleaned, dried and well illuminated. Careful visual and tactile inspection was performed using a plane mouth mirror and sickle explorer. All the teeth were examined in a systematic orderly fashion using FDI tooth numbering system. The status of the dentition was scored according to DMFT index. A tooth was assigned Decayed status when there was discoloration and changes in translucency with or without air drying or cavitation with or without pulpal involvement. Temporary restorations were also included in the decayed component. A tooth that had a sound permanent restoration, was crowned or had endodontic treatment with a permanent restoration was categorized as Filled. Teeth that were extracted because of caries or were severely broken down were included in the Missing category. Status of oral hygiene was ascertained by evaluating the health of the gingiva and calculus deposits. Data was entered into SPSS and analyzed using descriptive statistics.

RESULTS

Out of the total 115 patients, 63 were males (54%) and 52 were females (45%). Age of the patients ranged between 13-80 with a mean age 33 years and SD 14. The DMFT index of the studied population is presented in Table 1. Sex wise comparison revealed that females had a higher DMFT index than males (Table 2).

Intra Oral distribution of caries

When comparing the maxillary and mandibular arch, the frequency of caries was more in the mandible than in the maxilla. The most commonly affected teeth in the maxilla were first molars followed by second molars, first premolars, third molars and second premolars, incisors and canines. In the mandible, they follow almost a similar pattern of first and second molars and then third molars, second premolars and first premolars, canines and then incisors (Table 3).

Overall in the oral cavity, the most commonly involved teeth were mandibular first molars and second molars and least affected teeth were mandibular incisors.

When evaluating the distribution of caries according to tooth surface, it was found that the occlusal surface was the most affected followed by mesial, distal, buccal and lingual surface.

Relationship of caries to extra oral factors

Majority of the patients in the study belonged to low socioeconomic status (Fig 1) and a very low percentage had good oral hygiene (Fig 2). Frequency of sugar snacking in between meals and with meals is presented in Fig 3.

There was a significant relationship between caries and social status. The DMFT score was greater in patients with poor oral hygiene and those accustomed to carbohydrate consumption with meals (Table 4).

TABLE 1: MEAN DMFT INDEX

	N	Mini- mum	Maxi- mum	Mean	SD
DMFT Index	115	1	14	5.04	3.2

TABLE 2: RELATION BETWEEN DMFT & SEX

		Sex		Total
		Female	Male	
DMFT Index	1	9	10	19
	2	6	6	12
	3	5	8	13
	4	1	11	12
	5	5	10	15
	6	3	3	6
	7	5	4	9
	8	8	3	11
	9	7	1	8
	10	3	2	5
	12	0	1	1
	13	0	2	2
	14	0	2	2
Total		52	63	115
Mean		5.2	4.8	

TABLE 3: DISTRIBUTION OF CARIES IN MAXILLA & MANDIBLE

	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Maxilla	7.8	13.9	15.7	6.1	7.8	3.5	2.6	3.5	2.6	3.5	2.6	9.6	7	26.1	12.2	7.8
Mandible	14.8	24.3	29.6	9.6	11.3	4.3	1	1.7	1.7	3.5	2.6	5.2	7	37.4	27	16.5

TABLE 4: RELATION BETWEEN DMFT INDEX, SES, ORAL HYGIENE AND CARBOHYDRATE CONSUMPTION

	Socioeconomic Status			Oral Hygiene			Carbohydrate Consumption	
	Upper	Middle	Lower	Good	Fair	Poor	Yes	No
DMFT Index	3.7	5.6	5	2.7	4.1	6.2	4.7	5.3

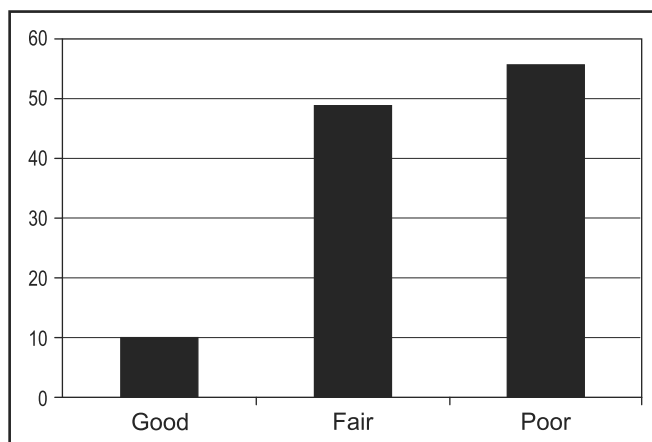


Fig 1: Comparison of Socioeconomic Status

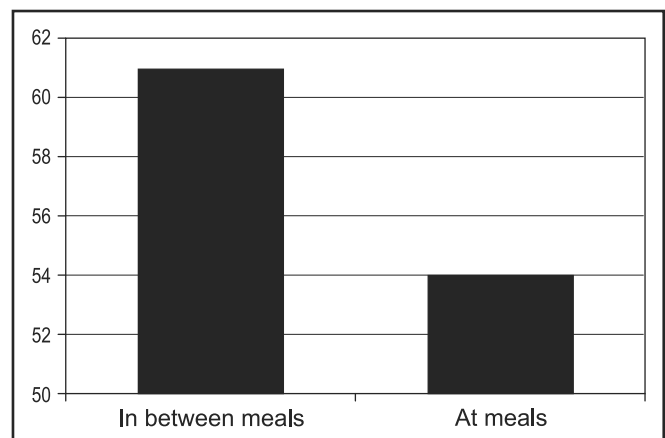


Fig 3: Comparison of Carbohydrate Consumption

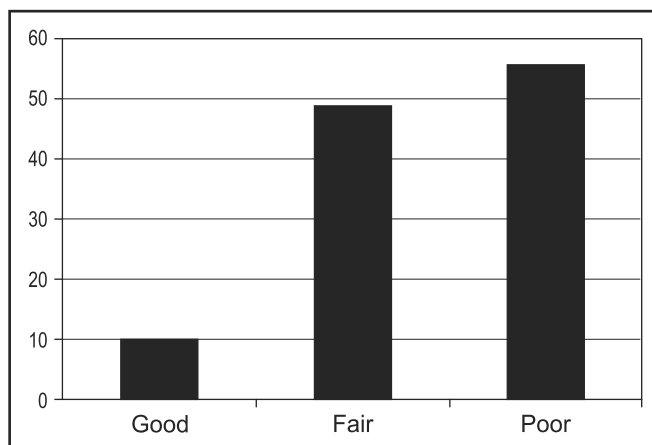


Fig 2: Comparison of Oral Hygiene

DISCUSSION

This study showed predilection of dental caries for sex with females having a higher DMFT index than males which is also reported in other studies.^{5, 6, 7} Differences in caries prevalence between sexes likely reflect behavioral and dietary variation for males and

females. In addition to gender wise distribution, it has also been observed that caries follow a specific intra oral pattern. It shows some relation to the arches. In the present study interarch comparison was also carried out which revealed higher prevalence in the mandibular arch than the maxillary arch. Similar findings were reported by Saravanan et al² and Kutesa et al.⁴ Higher frequency of caries in the mandibular arch may be attributed to greater food and plaque accumulation potential. There is also a hierarchy of caries susceptibility by tooth type and surfaces of the teeth. In the current study the most frequently involved teeth in both the arches were first and second molars and the least affected teeth were incisors. Occlusal surface was predominantly involved with caries followed by approximal, buccal and lingual surfaces. These findings corroborate previous studies.^{4, 7, 8} The increased incidence of caries on the occlusal and approximal surfaces can be correlated to the morphology of these sites which is more retentive of food particles, relatively protected from mechanical cleaning by tongue, cheeks and tooth brushing, and is not

fully exposed to the flushing action of saliva. The increased involvement of occlusal surface also reveals the relative lack of preventive procedures like fissure sealing.

We also investigated the relationship of caries to risk factors. There is fairly strong evidence for an inverse relationship between socioeconomic status and the prevalence of caries^{5,9,10} which is consistent with our findings. People with good socioeconomic status always perform better in most health status measurements while the ones belonging to low socioeconomic background have low family income and generally possess low level of education. Such people prefer to have their teeth extracted instead of opting for restorative treatment due to the high cost of oral health services. Burden of oral disease can be reduced in the population by providing health services accessibility to this group of community which in this study constituted 60% of the population.

Poor oral hygiene was related to the increased DMFT score in our study. The literature on the relationship of oral hygiene and caries is controversial because some investigators have concluded that oral hygiene is a risk factor for caries¹¹ while others find no such association.⁵ The inconsistency in these results might be due to different methods that were used to assess oral hygiene in such studies.

The effect of carbohydrates on the prevalence of caries has long been established. In this study we also probed the frequency of carbohydrate consumption as a risk factor for caries and found that consumption of carbohydrates as part of meals had a slightly higher DMFT score than that of taken in between meals which contradict with the findings of others.^{5,12,13} The difference in results may be due to lack of information on the type and composition of the carbohydrates being consumed by the participants in our study. Therefore, further research is needed to explore the effects of composition, sequence and form of carbohydrates on the caries prevalence.

CONCLUSION

There is a specific intraoral pattern of dental caries in terms of arches, tooth type and surfaces. This information is useful in identifying the most vulnerable areas to caries and hence can assist in designing the best cost effective methods to prevent the disease.

Risk factors are strong predictors of caries susceptibility of the individuals. Improvements in oral hygiene, diet and socioeconomic status can upgrade oral health.

The findings of the study reinforce the need to carry out a national survey so that we can properly allocate and utilize our scarce resources.

REFERENCES

- 1 Roberson TM, Lundeen TF. Cariology: The Lesion, Etiology, Prevention and Control. In: Sturdevant's Art and Science of Operative Dentistry. 5th ed United States of America: Mosby 2006; 66.
- 2 Saravanan S, Madivanan I, Subashini B, Felix JW. Prevalence pattern of dental caries in the primary dentition among school children. *Indian J Dent Res* 2005; 16:140-6.
- 3 Namal N, Vehit HE, Can G. Risk factors for dental caries in Turkish preschool children. *J Indian Soc Pedod Prev Dent* 2005; 23:115-8.
- 4 Kutesa A, Mwanika A, Wandera M. Pattern of dental caries in Mulago Dental School clinic, Uganda. *Afr Health Sci* 2005; 5: 65-8.
- 5 Rehman MM, Mahmood N, Rehman B. The relationship of caries with oral hygiene status and extra oral risk factors. *J Ayub Med Coll* 2008; 20:103-7.
- 6 Temple DH. Variability in dental caries prevalence between males and female foragers from the Late/Final Jomon period: Implications for dietary behavior and reproductive ecology. *Am J Hum Biol* 2011; 23: 107-17.
- 7 Khan AA, Jain SK, Shrivastav A. Prevalence of dental caries among the population of Gwalior (India) in relation of different associated factors. *Eur J Dent* 2008; 2: 81-5.
- 8 Togoo RA, Yaseen SM, Zakirullah M et al. Prevalence of first permanent molar caries among 7-10 years old school going boys in Abha City, Saudi Arabia. *J Int Oral Health* 2011; 3: 30-4.
- 9 Reisine ST, Psoter W. Socioeconomic status and selected behavioral determinants as risk factors for dental caries. *J Dent Edu* 2001; 65:1009-16.
- 10 Peres MA, Peres KG, Barros AJ, Victoria CG. The relation between family socioeconomic trajectories from childhood to adolescence and dental caries and associated oral behaviors. *J Epidemiol Community Health* 2007; 61:141-45.
- 11 Ahluwalia M, Brailsford SR, Tarelli E, Gilbert SC et al. Dental caries, oral hygiene and oral clearance in children with craniofacial disorders. *J Dent Res* 2004; 83:175-9.
- 12 Warren JJ, Gasparoni KW, Marshall TA, Drake DR et al. A longitudinal study of dental caries risk among very young low SES children. *Community Dent Oral Epidemiol* 2009; 37: 116-122.
- 13 Jurgensen N, Petersen PE. Oral health and the impact of socio-behavioral factors in a cross sectional survey of 12 year old school children in Laos. *BMC Oral Health* 2009; 9:29.