ORIGINAL ARTICLE

DETERMINATION OF CARIES RISK STATUS ON THE BASIS OF CARIES ACTIVITY

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ABSTRACT

The objective of this descriptive cross-sectional study was to determine the caries risk status on the basis of caries activity. This study included clinical examination of 200 male & female students using a predesigned proforma over a period of 3 months. Caries risk status was then determined by results of clinical examination on basis of caries activity, recorded on proformas. Of total 200 students (patients), 111 were females and 89 were males. Caries risk status according to caries lesion activity in 3 years was categorized into 3 groups, i.e. low caries risk, moderate caries risk and high caries risk, their statistics were found to be 33 (16.5%), 149 (74.5%) and 18 (9.0%) respectively. In low caries risk group males were 16 (48.5%) & females were 17 (51.5%). In moderate caries group, males were 64 (43%) while females were 85 (57%) and in high caries risk group, both males & females were found to be equal, i.e. 9 (50%). 6 patients of high caries status (33.3%) were present in 21 years age group. 28 (18.8%) moderate risk patients were present in 22 years age group and 7 (21.2%) low caries risk patients were present in 19 years age group. Determination of caries risk status based on past caries lesion activity is a novel method. This study shows most of the patients fall into moderate caries risk status in which female percentage was higher. This study will help in better understanding of caries progression with regards to age & gender based on caries activity and moreover treatment required to treat each caries risk group tailored to special needs of each patient.

Key Words: *Dental caries; Risk assessment; Risk factors; Disease progression; Conservative treatment*

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INTRODUCTION

Dental caries is a bacterial disease of hard tooth structure causing demineralization of inorganic content while dissolution of organic matrix.[1] Dental caries has hazardous effects on oral health.[2] It also presents grave challenges to clinicians who have been researching continuously to devise various methods to treat dental caries.[3]

There are multiple risk factors which might predispose to dental caries like poor socio-economic status, lack of awareness & education, compromised health, caries activity, poor oral hygiene status, diminished use of fluoride products, excessive consumption of sugar diet and cola drinks and lack of visits to dentists etc. All these factors might lead to dental caries & cavitation.[4] Carious lesion require early intervention to treat otherwise it might lead to pulpal pathology and later on, extraction of the tooth.[5] GV black in 1906, coined a concept to classify caries which was based on extension for prevention in which excessive tooth tissue was removed and filled to treat the carious tooth. This concept was named, surgical model of caries management in which emphasis was concentrated only on removal of diseased part of tooth in an unforgiving way and restoring it. Surgical model did not receive that fame because it was lacking on many grounds.[6]

The need of time was to develop a system which could address more than just drill and fill concept. Keeping in view the idea, medical model of caries management was emerged which hoarded extensive horizons of caries management and not just drill and fill concept.[7] Medical model is based on patient centered caries management (PCCM) and caries assessment & management by risk assessment (CAMBRA) which simply means that with treating carious teeth, patient's oral & general health is also considered according to

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the status of patient being at caries risk. Furthermore the initial caries can be remineralized & healed if therapeutic modalities are to be employed timely.[8] With the advent of minimum intervention dentistry (MID) & adhesive dentistry, the medical model got revamped and thereafter both the concepts run contiguously. Medical model of caries management became the gold standard of caries management till date.[9] Medical model focuses mainly on prevention of disease & improving OHrQoL by evaluating individual caries risk status and then treating them according to their own special needs.[10] Caries risk status can be crafted upon various parameters, one of them is to evaluate caries activity by assessing number of carious lesions present in last 3 years and then to manage them accordingly whether titled as high, moderate or low carious risk.[11]

The objective of this study was to determine caries risk status on basis of caries activity by assessing number of past carious lesions over a period of last 3 years in individuals. This will help in attaining information about their awareness level, knowledge of their oral hygiene and to get an overall idea of caries risk status in a better & targeted way so as to make them aware of their condition, educating them on how they can prevent caries, improve their oral & general health. With individualized caries risk status, clinicians can manage caries according to risk status in a conservative way possible. Furthermore there is a lack of this kind of study in our local population so a need was there to fill this space.

MATERIALS AND METHODS

This was a cross sectional study conducted in Peshawar Dental College, Peshawar, Pakistan and total duration of study was 3 months from January 2017 to March 2017. A prior permission from department of Operative Dentistry & ethical review committee of Peshawar Dental College had been obtained. An informed consent was also taken from students.

200 Students were randomly selected for this study. Inclusion criteria for this study included both male & female students from age 19 to 25 and medically fit students. Exclusion criteria included spontaneous pain in teeth, congenital or developmental disorders of teeth and patients receiving chemotherapy or radiotherapy. History & other demographics were taken from each student. They were then clinically examined for caries activity individually by assessing number of carious lesions present from last 1 to 3 years. Students having 3 or more carious lesions in last 3 years were termed as high caries risk status patients. Those having 1 or 2 lesions in last 3 years were classified under moderate caries risk status while those having no carious lesion in last 3 years were grouped into low caries risk status. The data collected was strictly used for research purpose and was kept confidential. Caries risk status was determined for each student by their clinical examination on basis of caries activity and then recorded on pre designed proformas.

The collected data were analyzed using SPSS version 25.0. Quantitative variable i.e., age will be calculated as Mean $\pm$ SD. While Qualitative variables i.e., gender and caries risk status (caries activity) were calculated as frequency and percentages. Post stratification of genders & age were carried out for caries risk status (caries activity) using cross tabulation (correlation) between these variables. All the data was presented in the form of tables and charts.

RESULTS

The number of students (patients) included in this study was 200. Out of these, 111 patients were females, comprising 55.5% while 89 were males representing 45.5% of the sample. Female to male ratio was 1.247:1. The range of age included in the study was from 19 – 25 year. Mean age was 22.06 ± 1.852 SD.

Caries risk status according to caries lesion activity in last 3 years was categorized into 3 groups, i.e. low caries risk, moderate caries risk and high caries risk, their stats being 33 (16.5%), 149 (74.5%), 18 (9.0%) respectively. Caries risk status is shown in **Table 1.** Post stratification for genders & age were carried out for Caries risk status (caries activity) using cross tabulation between these variables which showed their correlation.

In low caries risk group, males were 16 (48.5%) and females were 17 (51.5%). In moderate group, males were 64 (43%) while females were 85 (57%). In high risk status group, both males and females were found to be equal in number i.e. 9 (50%). This is tabulated in Table 2.

TABLE 1: CARIES ACTIVITY ON BASIS OF NUMBER OF CARIOUS LESIONS IN 3 YEARS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low caries risk	33	16.5	16.5	16.5
	Moderate caries risk	149	74.5	74.5	91.0
	High risk caries	18	9.0	9.0	100.0
	Total	200	100.0	100.0	

TABLE 2: GENDER * CARIES ACTIVITY ON BASIS OF NUMBER OF CARIOUS LESIONS IN 3 YEARS CROSSTABULATION

			caries activity on basis of number of carious lesions in 3 years			Total
			Low Caries Risk	Moderate Caries Risk	High Risk Caries	
Gender	Male	Count	16	64	9	89
		% within caries activity on basis of number of carious lesions in 3 years	48.5%	43.0%	50.0%	44.5%
	Female	Count	17	85	9	111
		% within caries activity on basis of number of carious lesions in 3 years	51.5%	57.0%	50.0%	55.5%
Total		Count	33	149	18	200
		% within caries activity on basis of number of carious lesions in 3 years	100.0%	100.0%	100.0%	100.0%

TABLE 3: AGE * CARIES ACTIVITY ON BASIS OF NUMBER OF CARIOUS LESIONS IN 3 YEARS CROSSTABULATION

			caries activity on basis of number of carious lesions in 3 years			Total
			Low Caries Risk	Moderate Caries Risk	High Risk Caries	
Age	19	Count	7	11	1	19
		% within caries activity on basis of number of carious lesions in 3 years	21.2%	7.4%	5.6%	9.5%
	20	Count	5	23	2	30
		% within caries activity on basis of number of carious lesions in 3 years	15.2%	15.4%	11.1%	15.0%
	21	Count	3	23	6	32
		% within caries activity on basis of number of carious lesions in 3 years	9.1%	15.4%	33.3%	16.0%
	22	Count	5	28	2	35
		% within caries activity on basis of number of carious lesions in 3 years	15.2%	18.8%	11.1%	17.5%
	23	Count	4	25	3	32
		% within caries activity on basis of number of carious lesions in 3 years	12.1%	16.8%	16.7%	16.0%
	24	Count	5	20	3	28
		% within caries activity on basis of number of carious lesions in 3 years	15.2%	13.4%	16.7%	14.0%
	25	Count	4	19	1	24
		% within caries activity on basis of number of carious lesions in 3 years	12.1%	12.8%	5.6%	12.0%
Total		Count	33	149	18	200
		% within caries activity on basis of number of carious lesions in 3 years	100.0%	100.0%	100.0%	100.0%

Of 18 high risk patients, 6 (33.3%) were present in 21years age group. 28 (18.8%) out of 149 moderate risk patients were present in 22 years age group and 7 (21.2%) out of 33 low caries risk patients were present in 19 years age group. This is shown in detail in **Table 3**.

DISCUSSION

Dental Caries is an infectious disease of multifactorial etiology and is associated with compromised quality of life. It is evident from various studies that caries has been linked to socio-economic status, demographic conditions and behavioral aspects as well.[12] Therefore in many well developed countries, the prevalence of dental caries show a declining tendency in past 20 years.[13]

The results of this study were quite diverse because not only risk status was assessed but it also showed positive correlation with gender and age. Caries risk status was categorized into 3 groups. 16.5% (33) students were in low caries risk group. 74.5% (149) were in moderate caries risk group while 9.0% (18) constituted high caries risk group. These statistics mean that majority of the students fall into moderate caries risk group i.e. 74.5% and it constitutes more than half of the sample included in this study i.e. 149. These findings corroborate with a local study conducted by Qasim M et al, where it was concluded that caries risk status can be categorized among groups using past caries lesion activity and is a novel method to manage caries. This is the same finding as in present study.[14] However, unlike present study, the study conducted by Qasim M et al found no association between caries risk & age group or gender. [14]

In low caries risk group, males were found to be 48.5% (16) and females were 51.5% (17). In moderate group, males were 43.0% (64) while females were 57.0% (85). In high caries risk status group, both males and females were found to be equal i.e. 50% (9). These results show that female percentage is higher in low and moderate caries risk group than males i.e. 51.5% and 57.0% respectively. Furthermore, overall female count is also higher for caries than male i.e. 111 (55.5%). This is due to consuming high sugar diet by females and also due to earlier tooth eruption in girls.[15] Total Male count was found to be 89 (44.5%). These findings correlate with the study conducted by Hu J et al in which female percentage was also higher for caries than males.[16]

Caries activity according to age groups also show dynamic results. Total number of students present in 22 years age group were 35 which constitute 17.5% and is the highest among all age groups. Of 18 high risk patients, 33.3% (6) were present in 21 years age group. Out of 149 moderate risk patients, 18.8% (28) were present in 22 years age group and out of 33 low risk patients, 21.2% (7) were present in 19 years age group. Majority of high risk & moderate risk patients fall into 21 & 22 years age groups respectively which means that these age groups are the most susceptible to caries. The reason for this is due to the negligence when young people are involved in various activities during these age groups and ignore their oral hygiene.[17] Moreover, caries count was decreased in later age. These findings seemed to match with the study conducted by EL-Khateeb SM et al who also showed that the incidence of caries was higher in 21 and 22 years age group.[18] Yet in another study, by Sajjad F et al, it was concluded that although females were more prone to caries but age group has no relation to it, unlike previous study.[15]

This study tends to prove that caries risk assessment on basis of past caries experience is considered as most powerful caries indicator in all age groups which allows to determine timely interventions according to risk status.[19] It will also encourage the patients to take measures that will shift them from a high/moderate-risk status to a low risk category. Moreover it also helps in educating the patients and making them more aware towards disease. [20]

This study presents with certain limitations i.e. the sample size could have been bigger, study duration could have been longer, information gathered from participants could be too late to be useful in prevention of caries because sometimes irreversible events might already have taken place.

CONCLUSION

Determining caries risk status based on past caries lesion activity is a novel, dynamic, effective, acceptable and repeatable method. It can be used to treat caries in a conservative way. This study helps in better understanding of caries progression with regards to age & gender based on caries activity and treatment required to treat each caries risk group tailored to special needs of each patient.

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3 Umair ul Haq:	Introduction, abstract and literature search.
4 Imran Khattak:	Results, discussion and conclusion.