INTRODUCTION

Oral health is considered as a primary part of general health of an individual. Therefore, oral health as a vital aspect of general health can be defined as "a standard of health for oral and related tissues that facilitates an individual to eat, speak, and communicate without any discomfort or embarrassment and contribute in general well-being".

Globally, oral health problems among the population with in numerous countries still persist, despite of immense improvements in it. These problems have been found among underprivileged group in both industrialized and non industrialized countries. Oral diseases like dental decay, periodontal conditions, tooth loss, oral cavity lesions and carcinomas, immunodeficiency related oral disorders as well as oro-dental traumatic injuries are reported universally to be a chief public health problems.

OBJECTIVES: To assess dental caries status of school-children of 6-years and 12-years in public and private schools of Karachi city.

METHODOLOGY: An analytical cross sectional study of 1600 school-children, from of 6 years and 12 years of age, were conducted among nine different towns of Karachi city. At the first stage, nine towns out of eighteen towns were selected randomly through cluster sampling. In the next stage, from each selected town one private and one public school were identified randomly. Selected sample of school-children were examined for assessment of dental caries by using WHO criteria of diagnosing dental caries. The data were entered and managed by using Statistical Package for Social Sciences (SPSS) Version 17. Descriptive analysis of the data including frequencies, percentages and means of school-children's decayed, missing and filled components was performed. Comparisons among dental caries status of private and public school-children were performed by using independent sample t test. Level of significance was kept at p=0.05.

RESULTS: The overall prevalence of dental caries among the sample was more than half (n=1114, 69.6%) with a mean DMFT score of (2.98, ±3.47) amongst which major contributor was decayed component which was found to be (2.56, ±3.99). Whereas, caries prevalence among deciduous dentition was three forth (n=664, 74.9%) with mean dmft score was (2.01, ±3.30) and among permanent dentition prevalence was found to be more than half (n=450, 63%) with mean DMFT score of (0.97, ±1.97). Moreover, gender wise mean DMFT among permanent and deciduous dentition was found to be statistically non significant (p≥0.109), (p≥0.461) respectively. Furthermore, statistically significant difference was found in dental caries among permanent dentition of private and public school-children (p<0.001).

CONCLUSION: This study suggests that considerable proportion of children (both among younger and older age categories) had dental caries with significantly more involvement among public school children belonging to eight different towns of Karachi city.

KEY WORDS: Dental Caries, Private and Public school children, Oral Health Education, Oral Health Promotion.

yearly worldwide\textsuperscript{2,4}.

As far as dental caries is concerned, it is found to be the disease of an economically developed country with its less severity among developing countries, affecting 60 to 90% of school aged children and huge quantity of elders too\textsuperscript{3}. Initially, higher level of dental caries were found among several American and European countries with the total DMFT score 3.00 and 2.6 respectively among 12 years old school-children, whereas it appeared to be less common among African regions reported to be an overall DMFT score of 1.7\textsuperscript{2,3}. According to World Health Organization, dental caries is ranked as third most prevalent yet non transmittable oral disease that affect person irrespective of their demography\textsuperscript{5}. Until recent years in most of the developing countries the levels of dental decay were found to be lower, but currently the trend has been changed due to increase consumption of sugars and inadequate exposure to fluoride supplements\textsuperscript{6}. On other hand, a number of western developed countries had shown remarkable decline among prevalence and severity of dental decay and continually growing of caries free individuals over past two decades, because of various public health campaigns that includes awareness related to effectiveness of fluoride coupled with primordial mode of prevention and enhanced self care practices as well as organized and efficient school based preventive programs\textsuperscript{7}.

For dental caries an universal goal has been set by WHO for developing countries which they wanted to achieve by year 2020, stated that about 50% of 6 year old school-children should be free of decayed teeth and on average not more than 3 DMFT score should be observed in children at the age of 12 years\textsuperscript{7}.

In Pakistan, oral health trends have shown miserable results; dental caries are found to be most prevalent childhood disease which is 5 times more common than asthma and 7 times more common than hay fever\textsuperscript{8}. According to last situation analysis reported in 2004, stated that, in rural areas the total DMFT scores among permanent dentition of 12 year old was found to be 1.59, rising to 2.26 in 15 years old children, 8.73 in 35-44 year old adults and 18.9 in individuals age 65 years and above\textsuperscript{9}. Thus increasing trend of dental caries among the growing individuals had indicated towards need of oral health and preventive knowledge as well as unavailability of restorative services. However, in this study all the children who were below 12 years of age, having primary or mixed dentitions were not participated neither this age group has received due value\textsuperscript{9}. Although, the mean DMFT score of 12 years old children was found to be significantly low but its alarming that more than 97% untreated dental caries were still there. Currently, some local studies have been conducted in Pakistan about prevalence of dental caries with in various cities and had found higher levels of DMFT scores that are from 2.08 till 6.33 among primary school-children, whereas lower DMFT scores were reported among secondary school-children ranging from 0.8 till 1.14\textsuperscript{8,10-13}.

It has been seen that previous researchers focused presence of dental caries among school-children from various cities of Pakistan, but with the limitation of small sample size as well as selection of sample either from one town, from private or public school. However, this current study has overcome this limitation by selecting a large sample (n=1600) from nine different towns of Karachi city covering private and public schools from each town, in order to induce primordial and primary mode of prevention among these school-children along with school based oral health education and promotion program.

**OBJECTIVES**

To determine the occurrence of dental caries among school-children assess of 6-years and 12-years in both public and private schools of Karachi city.

**METHODOLOGY**

It was an analytical cross sectional study that was performed in Karachi city. Ethical approval for the study was taken from Institutional Review Board of Dow University of Health Sciences. Sample selection was based on inclusion criteria that were, school-children aged 6-years and 12-years attending the school on the day of examination, children with deciduous and mixed dentitions, both male and female school-children as well as children whose parents gave consent for their child's dental examination whereas exclusion criteria were, school-children whose parents returned the consent form stating that they do not want their child to be the part of dental examination, partially erupted teeth, retained roots and teeth with peri-apical lesions, children undergoing orthodontic treatment or malaligned teeth, children with medical or physical disabilities.

The duration of the study was six months , a computer
software open epi was used to calculate sample size by taking the reference values of dental caries prevalence to be 57.1% and 49.25% for class 1 and class 6 school-children, respectively. This sample size was calculated with 95% Confidence Interval, 80% Power of test and 5% margin of error. Hence the total of 1328 sample size (n) attained. Adding to it a 20% non-response rate a total sample of 1593 was achieved. Therefore, the sample size of 1593 was rounded to 1600 and equivalent quantity of school-children was examined in this study. The total number of private schools in Karachi city is 2560 and public sector includes about 3948 school. It has been observed that after the registration of a private school, these schools open five to six campuses at different locations in the city. On the other hand, public schools are situated in one building divided into primary, secondary and high school and are being run in two shifts in the same school premises for morning and afternoon shifts. This shows limited numbers of public schools and increased number of private schools because of many mushroom campuses. Because of this reason, the division of this study sample is based on 3:1 ratio that is, taking 1200 school-children from private schools and 400 from public schools. We have selected nine towns out of 18 towns randomly through cluster sampling. In the next stage, from each selected town we identified one private and one public school randomly. The selected towns were Sadder, Jamshed, Gulshan Iqbal, Liaquatabad, North Nazimabad, Kaemari, Malir and Shah Faisal.

After selecting the schools, permission to conduct the study was taken from school's Principal, and then consent forms were distributed among class teachers, so that they would forward it to the parents of school-children to obtain their acquiescence about their child's participation as the part of dental examination. Parents of all selected subjects were not informed before clinical examination in order to minimize the potential bias (e.g. by extra tooth brushing). The children were examined by a single dentist with over three years of clinical experience, with in class room, with the child seated on an ordinary chair, in which dental caries status was assess by following the World Health Organization (WHO) criteria for diagnosis of dental caries. An autoclavable mouth mirror in the natural light and explorer were used for examination of dental caries. On every child disposable mask and gloves were used as well as gauze to dry the tooth before examination. A dark spot or staining (non-cavitated) along with feeling of softness or a catch on probing the tooth surface as well as a cavity or softening of the tooth surface was considered as an indicator for presence of dental caries.

Sufficient sets of sterilized examination instruments were arranged for each day before use in oral cavity to minimize and avoid cross infection. The rule implemented for scoring of missing teeth component of dmft index was that a tooth was marked as missing if (a) no successor tooth was visible in the position of missing tooth, (b) tooth is badly broken down by caries.

The data were entered and managed by using Statistical Package for Social Sciences (SPSS) Version 17. Descriptive analysis of the data including frequencies, percentages and means of school-children's decayed, missing and filled components. Then comparisons among dental caries status of private and public school-children were performed by using independent sample t test. Level of significance set at p=0.05.

**RESULTS**

A total of 1600 school-children belonging to 6-years and 12-years of age were examined for prevalence of dental caries, with the mean age of 6.0 and 12.0 years respectively. Age and gender distribution is presented in table no 1. The caries prevalence (n=1600) of study population was 69.6% (n=1114) with an overall mean DMFT score of 2.98(3.47). Age wise prevalence of caries among study sample (n=1600) was reported as; among 6 years old dmft score was 59.6% (n=664) with mean of 2.01(3.30). Whereas, among 12 year old DMFT score was found to be 40.39%(n=450) with mean of 0.97(1.72).
Gender wise prevalence of caries among boys (n= 721) were reported as; at 6 years caries prevalence among boys were found to be 51.6% (n=439) with mean dmft scores of 2.07(3.10) where as in girls (n=623) it were reported as 46.4% (n=348) with mean dmft scores of 1.95 (3.50). At 12 years of age prevalence of dental caries among boys(n=721) were 33.2%(n=282) with mean DMFT score of 0.90 (±1.68) while among girls (n=623) reported as 36.6%(n=275) with mean DMFT score of 1.04 (±1.75). (Table I&II)

Among private school-children (n=1200), mean DMFT was found to be 2.27(3.49) whereas public school children it was found to be 5.13(2.31) Similarly, mean of permanent and deciduous dentition among public school-children were 2.87(2.20) and 2.26(2.64) as compare to their private school counterparts (0.33(0.84) and (1.93(3.49), respectively. (Table II)

Table II: Means and Standard deviation of Dental Caries distribution among study sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>DMFT (n=1600)</th>
<th>DMFT Permanent Dentition</th>
<th>dmft Deciduous Dentition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall sample</td>
<td>2.98(3.47)</td>
<td>0.97(1.72)</td>
<td>2.01(3.30)</td>
</tr>
<tr>
<td>Private school-children (n=1200)</td>
<td>2.27(3.49)</td>
<td>0.33(0.84)</td>
<td>1.93(3.49)</td>
</tr>
<tr>
<td>Public school-children(n=400)</td>
<td>5.13(2.31)</td>
<td>2.87(2.20)</td>
<td>2.26(2.64)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys (n=850)</td>
<td>2.98(3.35)</td>
<td>0.90(1.68)</td>
<td>2.07(3.10)</td>
</tr>
<tr>
<td>Girls (n=750)</td>
<td>2.99(3.59)</td>
<td>1.04(1.75)</td>
<td>1.95(3.50)</td>
</tr>
</tbody>
</table>

On comparing, age wise difference among 6 years and 12 years old school-children by using independent sample t test, mean DMFT index(mean difference=1.44, 95% of CI= 1.11- 1.78) was statistically significant (p<0.001). On comparing, gender wise difference among boys and girls, the mean difference of permanent dentition (DMFT index) (mean difference= -0.13, 95% of CI= -0.30- 0.03) was statistically insignificant (p≥0.109) whereas for deciduous dentition (dmft index) (mean difference= 0.121, 95% of CI= -0.20 - 0.44 was statistically insignificant (p≥0.461). (Table III).

On comparing, dental caries status of private vs public school-children by independent sample t test, the mean difference score of permanent teeth of public school-children were found to be more than private school-children with (mean difference= -0.115, 95% of CI -0.19 - -0.03) and was statistically significant (p<0.001). However, among deciduous teeth, the mean difference of public school children (mean difference = -0.684, 95% of CI -0.95 - -0.41) and was statistically insignificant (p=0.050). (Table IV).

DISCUSSION

The overall prevalence of dental caries among study population of selected school-children, was found to be more than half with mean DMFT score of 2.98(3.47). These findings were in accordance with studies conducted in India among school-children of same age group, findings of the dental decay among these school-children were also around three forth and more than half respectively\textsuperscript{14,15}. The reasons of such similar findings may be due to the fact that dental caries has been a major public health problem among different populations affecting school-children, youngsters and adults. Moreover, another reason may be similar socio-demographics and oral hygiene patterns behaviors among both regions' defined age group. On other hand, a study\textsuperscript{16} conducted among Ethiopian school-children of same age group, was in disagreement with current study. The reasons may be due to low socio economic status and lack of proper oral hygiene followed by poor oral health education and promotion strategies, were the main factors for caries prevalence.

In current study it was observed that, as age advances,
prevalence of dental caries among school-children decreases. These findings were in agreement with the studies reported\textsuperscript{17,19}. The increase susceptibility of dental caries among 5 years age group, is because of the fact that deciduous teeth has less enamel thickness due to decrease in calcium content along with altered tooth morphology when compared to permanent teeth as well as increased consumption of sugar enriched diet followed by irregular and unsupervised tooth brushing\textsuperscript{17,18,20,21}. Another reason that reduces caries prevalence amongst children at 12 years could be that the index recommended by WHO does not record dental caries at incipient stage thus only measuring the carious lesion when it involves the dentinal tissues\textsuperscript{22}. Rodrigues et al\textsuperscript{23} and Kulkami et al\textsuperscript{24} reported increased in caries incidence with advancing age. However, Retnakumari and colleagues\textsuperscript{25} did not find any increase in prevalence of dental caries with the increase in the age.

The statistics related to deciduous dentition in present study have revealed that near to three forth of six years old school-children were having caries. These findings were in agreement with some local studies\textsuperscript{26-33}. It is alarming that primary school-children are found to be at utmost need of dental services and dental health education. The reasons may be due to the lack of oral health care access among school-children, modification of life styles followed by increase accessibility to sugar enrich diet and frequent intake of fizzy drinks with an increase unmet treatment needs, in addition to poor oral hygiene practices and lack of appropriate dental health knowledge and supervision among those school-children.

Caries prevalence among permanent dentition was found to be more than half with an overall decreased in mean DMFT score of 0.97(1.72) hence, we can state that we have achieved WHO goals for year 2020 in which it was stated that children at age of 12 years should having DMFT score 3\textsuperscript{7}. Similarly findings of studies\textsuperscript{34-36} were in accordance with current study; the reason of lower caries prevalence among permanent dentition may be due to the fact that these teeth have less vulnerability for dental decay as well as children at 12 year of age had just acquired the complete permanent dentition. In addition factors including low sugar availability, disparity in socioeconomic status and dietary habits of study sample were also important to consider. On the other hand, studies\textsuperscript{37,39} were not in accordance with the findings of this study. The reason of increase caries prevalence is due to increase consumption of sugar in sweet form, chocolates, inadequate oral hygiene procedures and irregular dental visits, lack of oral health knowledge and poor attitudes towards availing oral health care services. Gender wise statistically in significant findings among deciduous and permanent dentition was reported. Studies\textsuperscript{34,39,40} were in accordance with current findings. The reason may be due to similar cultural and dietary habits among school-children.

In current study statistically significant difference has been revealed among prevalence of dental caries in public and private school children, as public school-children were suffering from dental caries more as compare to their private school counterparts, it was in accordance with the study\textsuperscript{14}. The reason may be because school children belonging to public schools are coming from low socio economic areas as well as they have lack of oral health awareness followed by proper oral hygiene practices.

**CONCLUSION**

This study suggests that considerable proportion of children (both among younger and older age categories) had dental caries. Children of public private schools experienced more dental decay.

**RECOMMENDATIONS**

It has been recommended that raise awareness along with organized community oriented regular dental examination surveys; in order to evaluate and assess the school-children's oral health status as well as promotion of primordial and primary mode of prevention that should be disseminated equally among private and public school-children.

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**REFERENCES**