Dental Caries in Larkana and Peshawar Children’s: Effect of Body Mass Index using Poisson Regression Model

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Abstract
Dental caries or tooth decay is a breakdown of teeth due to bacterial activities, in bacterial breakdown hard tissues is one of the damage of dental caries; it becomes a public health concern. Studies showed that body mass index gives association with many diseases including dental caries. Our objective of this study was to drive the relationship of body mass index and dietary habits on dental caries experience of Pakistani children. The data for this study is the part of a multicenter country wide study being conducted to determine the eruption of permanent teeth and dental caries of Pakistani children. Data from Larkana and Peshawar the cities of two major Provinces of Pakistan were examined. 3358 children of just erupted teeth of aged between 5 to 10 years from these two cities were examined. 64.1% data were received from Peshawar city and 35.9% data were obtained from Larkana city.

Results showed 52.2% were female samples and 47.8% were male sample. Outcome of Mann-Whitney U test gives the evidence that there was significant mean difference observed for carries of two cities, poisson regression model evident that the association of body mass index with carries experience. In our study mean permanent carries among Peshawar city children was almost double than Larkana city, even though height, weight and body mass index of Peshawar children higher, one of the reason of Larkana child protection from carries was more used of milk and rise as compared to Peshawar Children. This study concludes that permanent DMFT risk for Peshawar city children was higher, and primary dmft had negative association with body mass index.

Keywords: Dental caries; Body mass index; Decayed, missing and filled teeth of primary (dmft); Decayed, missing and filled teeth of permanent (DMFT); Regression model

Introduction
Dental caries or tooth decay is a breakdown of teeth due to bacterial activities. This phenomenon develops eating problem and produce pain. One of the damages of dental caries in bacterial breakdown is the hard tissues. It may be due to the acid produced from sweet foods onto the tooth surface. Dental caries becomes a major public health concern. One study reports that more than 80% population is affecting with this problem [1]. According to WHO reports 60 – 90% of school children got affected with this disease [2]. A study conducted in Riyadh, Saudi Arabia, showed that the prevalence of dental caries in preschool children was found about 69% [3]. Another study conducted in India reported that the prevalence of dental caries among children of rural Bundelkhand region was 82.62% [4]. In Pakistan one study conducted for randomly selected schools of Sargodha district showed the prevalence of dental caries was about 45% [5]. A study conducted in Karachi for up to seventy one month old children showed the prevalence of 23.5% for Early Childhood Caries [6]. Studies showed that Body Mass Index (BMI) which derives from the values of mass and weight of an individual gives the association with many diseases including dental caries. A study conducted in Tai University of outpatient clinic showed that 42.2% of subjects with high prevalence of dental caries were either overweight or obese [7]. A study of Thessaloniki, Greece showed that overweight children with 1.36 times and obese children with 1.99 times were more likely to have higher dmft than normal weight children [8]. A significant association between dental caries and BMI was reported in a study of Bhopal, India [9]. However, study conducted in Khyber Pakhtun Khwa, Pakistan on adult population, did not show any association of dental caries with BMI [10]. A study of US children of aged 2 to 6 years old showed a significant association of BMI for age associated dental carries severity in the permanent teeth using weighted multiple regression model for geometric mean [11].

Objective
The primary objective of this study was to report the mean and Standard Deviation of primary, permanent, and overall dental carries among Larkana and Peshawar city children from Pakistan and formulation of an appropriate statistical model to evaluate and predict the dental carries using the information of body mass index using Poisson regression (Figure 1).

Materials and Methods
Data for this study is the part of a secondary baseline data for dental carries of a currently going project of Pakistani children, funded by Higher Education Commission, Islamabad, titled ‘Time and Sequence of Eruption Teeth of Pakistani Children’ [12]. The co-author of this study is the Principal Investigator of that Project.

Sampling technique
We used secondary data, but in project [12] Multistage Systematic Cluster Random sampling was performed to collect the data on study variables: age, gender, and type of school. The dentists also examined the children for dental carries and eruption of teeth.

Study population
Data were collected from school going children from Larkana,

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Sindh and Peshawar, KPK province of Pakistan aged between 5 to 19 years.

Statistical analysis

Data were analyzed using STATA 12.0 MP version. Frequency and percentages were reported for baseline characteristics of 3358 samples. Decayed, missing and filled teeth of Primary(dmft), permanent(DMFT) and overall were computed for sampled children and Mann-Whitney U test was used to compare the mean of decayed, missing and filled teeth between Larkana and Peshawar samples. Body mass index of children was categorized into four categories using percentiles, child who were measured at more than or equal to 95th Percentile were considered as obese, child who were measured at the 85th to 94th percentiles were considered overweight, child whose body mass index is between the 5th percentile to 85th percentile were considered in the normal weight and child who were below the 5th percentile were considered underweight as per world Health Organization criteria. Poisson regression analysis was used to fit a model to estimate the dmft using information of body mass index. All p-values less than 0.05 were considered significant.

Results

Table 1 provides the baseline characteristics of studied sample, results showed out of 3358 sampled children 64.1% were from Peshawar city, 53.6% children were more than eight years old; the mean age of sample children was 8.62 ± 2.19 years with 95% confidence interval (8.42, 8.69). More than 50% data were received from female gender and the male to female sample ratio was 1:1.09. Body mass index was measured at more than or equal to 95th Percentile were considered as obese, child who were measured at the 85th to 94th percentiles were considered overweight, child whose body mass index is between the 5th percentile to 85th percentile were considered in the normal weight and child who were below the 5th percentile were considered underweight as per world Health Organization criteria. Poisson regression analysis was used to fit a model to estimate the dmft using information of body mass index. All p-values less than 0.05 were considered significant.

Table 2, provides the comparison of means with Standard deviation

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Province</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sind (Larkana)</td>
<td>1205</td>
<td>35.9</td>
</tr>
<tr>
<td>KPK (Peshawar)</td>
<td>2153</td>
<td>64.1</td>
</tr>
<tr>
<td>Age Group</td>
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<td></td>
</tr>
<tr>
<td>more than 8</td>
<td>1799</td>
<td>53.6</td>
</tr>
<tr>
<td>or equal to 8</td>
<td>1559</td>
<td>46.4</td>
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<tr>
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<td></td>
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<tr>
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<td>47.8</td>
</tr>
<tr>
<td>Female</td>
<td>1754</td>
<td>52.2</td>
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<tr>
<td>Body Mass Index</td>
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<tr>
<td>Overweight</td>
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<td>10.0</td>
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<tr>
<td>Obesity</td>
<td>166</td>
<td>5.0</td>
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<tr>
<td>Oral Hygiene</td>
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<td></td>
</tr>
<tr>
<td>Good</td>
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<td>45.7</td>
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<tr>
<td>Fair</td>
<td>1313</td>
<td>39.1</td>
</tr>
<tr>
<td>Poor</td>
<td>510</td>
<td>15.2</td>
</tr>
</tbody>
</table>

Note: *p<0.05 was considered using Mann-Whitney U test

Discussion

In the present study the mean dmft was 1.43 ± 2.11, mean DMFT was 0.75 ± 1.36 and overall mean decayed, missing and filled teeth was 2.18 ± 2.49. Sami et al. showed that the 12-year Quetta children had mean DMFT of 0.61. The mean DMFT of this study is close to Quetta children. A Saudi Arabian study [3] reported the mean dmft score was 3.4, which was much higher than this study. This study also gives significant mean of primary, permanent and overall differences between Larkana and Peshawar children. It was observed that Peshawar children have higher caries as compared to Larkana children. Another study from Pakistan [10] showed that, the mean permanent caries among Peshawar children was 4.77, which was almost double than current study.

Results of poison regression model showed that primary dmft gives negative association with body mass index and positive association with permanent and overall DMFT, another study [7] also reported significant positive association between permanent DMFT and body mass index.

Study from European archives of pediatric dentistry [8] showed that overweight and obese children were 1.36 times and 1.99 times more likely to have higher caries respectively. Study from Indian Journal [9] also reported a significant association between body mass index and DMFT. One more current international study [13] showed that higher caries among overweight and obese children as compared to control group.

Concusion

This study showed that there was significant mean differences for
Table 3: Estimation of primary, permanent and overall DMFT using Poisson regression model

dmft of Larkana and Peshawar samples, Poisson regression model gives the evidence that primary dmft has negative association with BMI whereas, permanent and overall dmft gives positive association with statistical significance.

References