The association of sugar-sweetened beverage consumption and inadequate physical activity with overweight and obesity in school-going children and adolescents in Pakistan

Obesity in children tracks into adulthood and is associated with premature cardiovascular disease, type II diabetes and premature death.1 Although the prevalence of childhood obesity is escalating in developing countries including Pakistan,2 the factors fuelling this trend have not been well studied. We conducted a survey on 339 randomly selected children and adolescents aged 11–17 years from four private schools in Karachi, Pakistan to determine the factors associated with overweight and obesity.

Approval to conduct the survey was obtained from the Ethics Review Committee of the Aga Khan University. From each school, a list of all the children in the specified classes was obtained. A random selection of children aged 11–17 years was conducted for enrolment in the study. Consent from the parent and assent from the child were

Table 1  Factors associated with overweight and obesity in school-going children

<table>
<thead>
<tr>
<th>School-based factors†</th>
<th>n (%)</th>
<th>Odds ratio (95% CI) for overweight and obesity in school children</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Unadjusted*</td>
</tr>
<tr>
<td>Canteen sugar-sweetened carbonated beverage consumption</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>98 (28.9)</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>241 (71.1)</td>
<td>3.10 (1.41 to 6.80)</td>
</tr>
<tr>
<td>Canteen juice consumption</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>271 (79.9)</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>68 (20.1)</td>
<td>3.92 (2.14 to 7.20)</td>
</tr>
<tr>
<td>Canteen calorie-rich snack consumption§</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>89 (26.3)</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>250 (73.7)</td>
<td>3.81 (1.58 to 9.20)</td>
</tr>
<tr>
<td>PE duration of activity per class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;30 min/class</td>
<td>202 (59.6)</td>
<td>1</td>
</tr>
<tr>
<td>≤30 min/class</td>
<td>137 (40.4)</td>
<td>4.98 (2.70 to 9.20)</td>
</tr>
<tr>
<td>Unscheduled physical activity at school¶</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥20 min/day</td>
<td>114 (33.6)</td>
<td>1</td>
</tr>
<tr>
<td>&lt;20 min/day</td>
<td>225 (66.4)</td>
<td>0.78 (0.44 to 1.39)</td>
</tr>
</tbody>
</table>

Continued
obtained prior to recruitment. Dietary patterns were assessed through a food frequency questionnaire focusing on canteen and home-based snacks and sugar-sweetened beverages, and fast foods. Physical activity was assessed using the International Physical Activity Questionnaire modified for children. Anthropometric measurements were obtained. Multivariable models were built and logistic regression was performed for the primary outcome of overweight and obesity, as defined by the International Obesity Task Force Criteria. The final model accounted for clustering effect by the school.

Of the total of 400 children approached, 399 consented to enrol. The prevalence of overweight and obesity in the study population was 17.7% (n=60): 19.9% boys and 15.2% girls (p=0.25). As shown in table 1, the OR (95% CI) for overweight and obesity was greater in children who did versus did not consume calorie-rich snacks (5.46 (1.78 to 16.75)), sugar-sweetened beverages, including carbonated colas (5.59 (1.18, 10.87)), and fruit juice (4.41 (1.89 to 10.29)) from the canteen, visited fast food restaurants more versus less than twice weekly (2.95 (1.23 to 7.05)), and performed less versus greater than 30 min of activity per physical education class (4.72 (2.08 to 10.71)), engaged in sedentary activities for more versus less than 1 h/day (8.06 (3.37 to 19.27)), or snacked more versus less than twice per week during television watching (9.92 (3.85 to 25.58)).
consumption and insufficient physical activity at school, are associated with overweight and obesity in children in Pakistan. These data suggest that the schools are well spotted to initiate public health measures to prevent the obesity epidemic in children in developing countries like Pakistan. Our findings call for proactive nutrition education coupled with regulations on sale of sugar-sweetened beverages in schools, which clearly should begin now, especially for products without nutritional value. Efforts are also required to educate children and their families about other potentially modifiable high-risk behaviours including engaging in physical activity at the school and home, so that the onset of the obesity epidemic could be restrained.

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Competing interests None.

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