

## **Sugar-Sweetened Beverages and their Association with Obesity in South Asian Children Living in UK and India**

**Saba Firdous\***

*London Metropolitan University, London, UK*

**\*Corresponding Author:** Saba Firdous, London Metropolitan University, London, UK.

**Received:** April 05, 2018; **Published:** June 20, 2018

### **Abstract**

The consumption of Sugar Sweetened and Beverages related to childhood obesity is a growing concern in most of the Transition countries. This phenomenon is predominant among South Asian children population and the current relative study is aimed to examine the association with BMI, Waist Circumference and Screen Time, to establish if the 1<sup>st</sup> generation migrants are healthier than the general children population in India. 40 volunteers 20 each from UK (London) and India (Mumbai) fastest growing metropolitan cities were analyzed for their dietary habits, anthropometry measurement, screen time and physical activity in face-to-face depth interview with nutritionist. In the study the South Asian children displayed a positive significant association between SSB consumption (kcal/day) and BMI (kg/m<sup>2</sup>),  $p = 0.000$  and  $r = 0.706$ . Similarly significant positive relationship was observed for SSB consumption (kcal/day) with waist circumference (cm),  $p = 0.002$  and  $r = 0.467$  and screen time (hours/week),  $p = 0.000$  and  $r = 0.590$ . However, there was a notable difference between the demographics of South Asian children living in UK and India. The sample living in London had higher healthy dietary score, was more physically active, took regular breakfast and had less screen time than the volunteers from Mumbai. More education, awareness and implementation of actions are needed to control the obesity epidemic. By highlighting the difference from public health standpoint South Asian countries require similar policies and interventions used in UK to reverse the global childhood epidemic.

**Keywords:** *Sugar-Sweetened Beverages; Obesity; South Asian Children*

### **Introduction**

Sugar Sweetened Beverages (SSB) with high content of added sugar has become a part of the common diet worldwide in particular that of children and adolescents [1]. This adds to the higher risk of obesity and its comorbidities - diabetes and cardiovascular diseases [2-6]. Globally and, from the recent statistics of India & UK, childhood obesity is alarming as major public health issue [7]. Obesity in young children leads to short-term morbidity extending to adverse consequences across the lifespan and generations [8-11].

Increased marketing of SSB in the transitional countries like India, has risen the sales by adding up intake in the normal diet of children, predominantly leading to positive energy balance [12-14]. According to the data from worldwide National Dietary Surveys an estimated SSB related death of 184,450 per year are reported - of which deaths from diabetes mellitus was 133,000, cardiovascular disease was 45,000 and 6,450 from cancers. The deaths linked to SSB were 5%, 71% and 24% in low income, middle income and high income countries respectively [15]. The convincing literature from many studies indicate childhood and adolescent obesity as an imperative marker in the development of obesity in adulthood and its consequences [16].

In India the youth is affected by dual problem of obesity and malnutrition - most prominent and rapidly increasing public health issue [17]. Inherently South Asians evidence a distinct "thin-fat" phenotype, accompanied by lower lean mass thereby increased visceral fat de-

posits [18], which leads to cardiovascular diseases and type 2 diabetes 5 - 10 years earlier than other ethnic groups [19]. Moreover there is a substantial rise in the immigration of the South Asian communities into the western countries such as UK, USA and Canada which is relevant to compare in this study.

Shifting the focus of obesity prevention from adult to younger demographic, especially in South Asian children [20] which is a rapidly growing minority in the western countries like UK is of high importance [21]. The primary aim of this study is to investigate a positive relationship between SSB consumption and high BMI in South Asian children living in UK and India. The secondary aim is to find out if the consumption of SSB is positively associated with the waist circumference and long screen time in both transition country (India) and developed country (UK). This is to know whether the 1<sup>st</sup> generation migrants are healthier than the general population in India.

### Methods

This is a cross-sectional study carried out in UK (London) and India (Mumbai). The children underwent comprehensive interviews and anthropometric measurements. The consented volunteers were assessed by nutritionist for their detailed standardized questionnaire evaluating their risk of obesity. Each assessment took approximately an hour to complete which included - child's background, dietary habits, lifestyle, medical history, physical activity, screen time and anthropometric measures. Separate food frequency questionnaire (FFQ) was used to determine the intake of traditional, western and SSB on daily, weekly, fortnightly and monthly basis. The FFQ was tailored for the South Asian children's Dietary choices and the scoring was generated for their westernization which was culturally relevant.

The anthropometric measurements included - height, weight and waist circumference. Height was calculated using a portable stadiometer without footwear. Similarly, weight was measured with minimal clothing and footwear removed using Tanita weighing machines. BMI was calculated from weight in kilograms divided by height in meters squared. Waist circumference was recorded in centimeters as the average of two measures taken halfway between the iliac crest and lower rib margin against the minimal clothing, using a measurement tape.

The consent forms were drafted according to the guidelines set by Chair of Research Ethics Review Panel (RERP) at London Metropolitan University (UK). The consent was obtained from each volunteer, prior to the assessment. The researcher and the assistant were fluent in English and the regional language to avoid language barriers in obtaining the consent. All the information collected from the volunteers was recorded in the confidential and secured data base.

### Analysis

In the study a sample size of 40 children (volunteers) was collected in two weeks, 20 from London (UK) and 20 from Mumbai (India) were obtained. Statistical analysis was performed using Statistical Software (SPSS), version 25. The Shapiro-Wilk test was performed to find the distribution of data. Normally distributed continuous data were presented as Mean and Standard Deviation and not normal data as Median and Interquartile Ranges. Pearson and Spearman correlations were run depending on the normality of data to determine the relationship of variables. Categorical data were displayed as count and frequencies, Kruskal Wallis and Mann-Whitney tests were performed accordingly for comparison of medians.

### Results

A total of 40 volunteers were evaluated, 20 from UK and 20 from India. The mean age in the UK group was 11 whereas in the India group the mean age was 13. In UK sample 60% children had professional working parents and 40% children's fathers were businessmen and mothers homemakers. In India sample 80% children had fathers as businessmen and mothers homemakers. In addition, the westernization score was observed more in the UK volunteers (median 46 and IQR 11) than Indians (median 12 and IQR 10). However, the dietary score assessing the healthiness of the diet was higher in UK sample (median 23 and IQR 5) than the Indian sample (median 9 and IQR 2) implying UK participants are healthier than Indian participants.

In UK sample children were more physically active (median 15 and IQR 18) than the Indian sample (median 8 and IQR 3) with increased screens viewing in India (mean 33 and SD 4) than UK (mean 23 and SD 10). The energy obtained from SSB in India (median 555 and IQR 112) is found to be 49% more than the UK sample (median 373 and IQR 57).

Both countries had similar rates of energy from food intake. However there is a difference noticed in the BMI, UK participants were less on weight and BMI (median 16 and IQR 5) than Indian participants (median 22 and IQR 6). In the study 37.5% (n = 15) were in healthy range with Percentile >= 5 and < 85, 27.5% (n = 11) were in overweight range with Percentile >= 85 and < 95, 15% (n = 6) were in obese range with Percentile >= 95 and 20% (n = 8) were in underweight range with Percentile < 5 was observed.

Variables	UK		India		p
	Mean	SD	Mean	SD	
Age (years)	11	3	13	1	0.108
Height (cm)	138	13	145	12	0.541
Screen time/week in hours	23	10	33	4	0.063
Energy from Food (kcal/day)	1057	118	1070	113	0.53

**Table 1a:** Representation of demographic and descriptive non - parametric characteristics of the study population (n = 40).

Variables	UK		India		p
	Median	IQR	Median	IQR	
Weight (kg)	32	23	51	14	0.031
Waist Circumference (cm)	72	25	83	10	0.000
BMI (kg/m <sup>2</sup> )	16	5	22	6	0.031
Sleep during school days in hours	10	1	9	2	0.000
Sleep during non-school days in hours	9	1	10	2	0.015
Physical Activity	15	18	8	3	0.000
Taking BF	7	-	4	2	0.000
Traditional Meals/week	7	2	7	-	0.000
Outside Meals/week	5	3	9	7	0.000
Westernization	46	11	12	10	0.000
Energy from SSB (kcal/day)	373	57	555	112	0.019
Healthy diet score	23	5	9	2	0.000

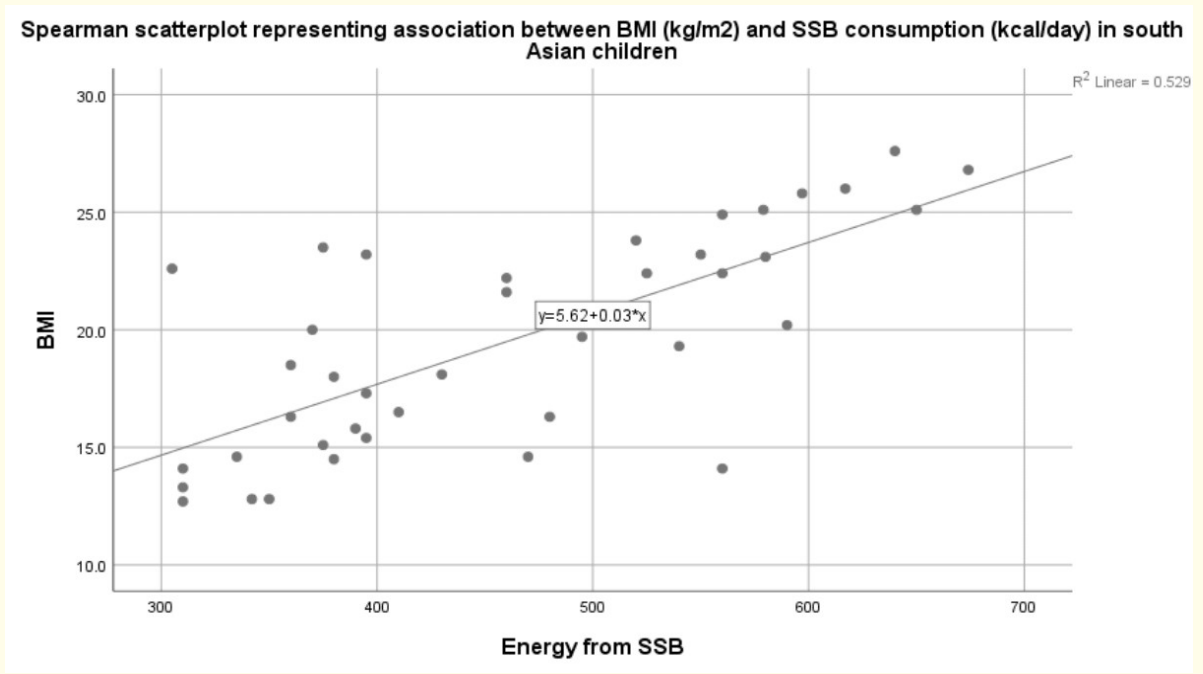
**Table 1b:** Representation of demographic and descriptive parametric characteristics of the study population (n = 40).

*P is significant at 0.05*

*BF: Breakfast; SSB: Sugar Sweetened Beverages*

**Primary Analysis**

There was a strong and positive correlation between Energy from SSB and BMI (Figure 1) or with height and weight. The significant association observed is as follows.



**Figure 1:** Spearman’s correlation between Energy from SSB (kcal/day) and BMI (kg/m<sup>2</sup>,  $p = 0.000$  and spearman’s coefficient ( $r$ ) = 0.706.

N = 40 with SSB	Bivariate correlation	Sig. ( 2 - tailed)
Weight (kg)	0.685**	0.000*
Height (cm)	0.405**	0.009*
BMI (kg/m <sup>2</sup> )	0.706**	0.000*
Z - score	0.574**	0.000*

**Table 2:** Representing Bivariate correlation.

\*\* : Correlation is significant at the 0.01 level (2-tailed).

\* : Correlation is significant at the 0.05 level (2-tailed).

Secondary Analysis

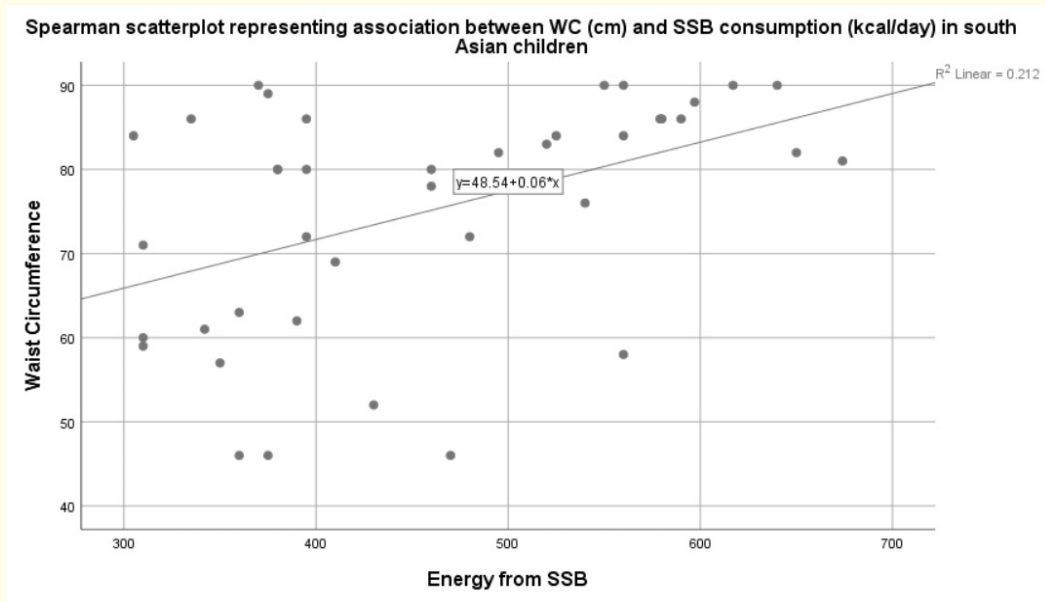


Figure 2: Spearman’s correlation between Energy from SSB (kcal/day) and WC (cm),  $p = 0.002$  and spearman’s coefficient ( $r$ ) = 0.467.

There was a strong and positive correlation between Energy from SSB and waist circumference in South Asian children.

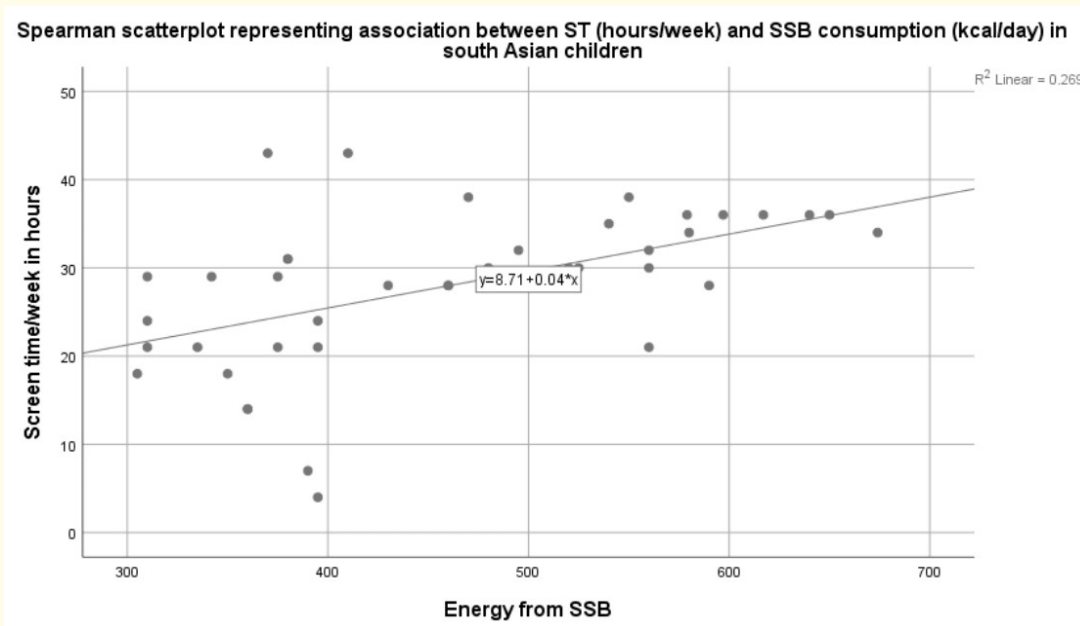


Figure 3: Spearman’s correlation between Energy from SSB (kcal/day) and Screen Time (hours/week),  $p = 0.000$  and spearman’s coefficient ( $r$ ) = 0.590.

There was a strong and positive correlation between Energy from SSB and screen time in South Asian children.

There was no difference found within the ethnic groups with respect to waist circumference, SSB consumption, physical activity and Screen time of the South Asian children in the study as follows.

Ethnic groups with	Sig value	Kruskal - Wallis test inference
Waist circumference (cm)	0.407	No significant difference within the group
Energy from SSB (kcal/day)	0.366	No significant difference within the group
Physical Activity Score	0.205	No significant difference within the group
Screen Time (hours/week)	0.380	No significant difference within the group

**Table 3:** Representing kruskal - Wallis test inference.

### Discussion

The study was conducted in UK at London Metropolitan University, South Asian Volunteers 20 from UK (born and bought up) and 20 from India were examined for association between SSB and BMI, between 8 - 17 years of age. This age group is important as it is associated with rapid weight gain [22,23]. The extraneous empty calories added through SSB containing high fructose corn syrup, sucrose and fruit juice concentrates in the normal diet of children are linked with obesity and its comorbidities [24]. South Asians the largest ethnic group in UK (4%) are at a higher risk of metabolic syndrome with significant greater subcutaneous abdominal fat tissue and intra-abdominal adipose tissue [25]. The current study is aimed to examine the association between SSB and obesity in South Asian children living in UK and India to check whether the 1<sup>st</sup> generation migrants in the UK are at lower risk than the general population in India.

The major finding of the study is agreeable with other researchers which include a positive association between the SSB consumption and BMI. However the South Asian children living in the UK reported healthy dietary score than those living in India. Further analysis of the intake of SSB with waist circumference and screen time was positive with no difference within the ethnic group of South Asians.

The notable difference between the South Asian children living in UK and India could be attributed to the awareness of obesity and its consequences, which is recorded 57.5% in a study conducted in UK [26] than a study in India where only 17.3% students could recognize answer correctly [27]. Likewise the South Asian children living in UK were more physically active and had less screen time, regular breakfast and higher healthier dietary score than the children living in India.

Overall, in the study the South Asian children displayed a positive significant association between SSB consumption and the waist circumference evidenced as a potential risk factor for obesity [28]. SSB's not only increase T2DM but contribute in triggering the GL promoting inflammations, impairing beta cells functions and creating insulin resistance in the body. The metabolic consequences from the fructose of SSB include elevated hepatic de novo, leading to atherogenic dyslipidemia, visceral adiposity and hyperuricemia causing hypertension. These risk factors are dual burden of chronic and infectious diseases unwelcomed in developing countries like India [29,30]. Furthermore, the study findings were consistent with other researches showing a positive relationship between SSB consumption and screen time, which increased within the group from UK to Indian participants and decreased healthy dietary score. As evidenced in previous studies, SSB consumption is also a marker of poor dietary habits and behavior, seen in the present study [31,32].

Convincing results from the present and previous studies identifying SSB consumption relation to behaviors like more screen time and decreased physical activity leads to obesity with dire consequences and demands for a multi-faceted prevention intervention program to combat the world childhood obesity epidemic. The present study is a timely update on the current situation of SSB consumption in the children living in Mumbai (India) and London (UK). Education, awareness and further interventions are needed to battle the critical public health issue of obesity by reducing screen time, changing SSB advertisements, easy access and control the obesogenic environment.

## Conclusion

Although there was a positive association with SSB consumption seen in South Asian children living in London (UK) and Mumbai (India), yet the South Asian children from UK were healthier, physically active and aware about obesity. By highlighting the difference in the study, from public health standpoint South Asian countries require similar policies and interventions used in UK to reverse the global childhood epidemic.

## Bibliography

1. Bleich SN and Vercammen KA. "The negative impact of sugar-sweetened beverages on children's health: an update of the literature". *BMC Obesity* 5 (2018): 6.
2. Ferraro AA and Bechere Fernandes MT. "Relationship between childhood growth and later outcomes". *Nestle Nutrition Institute Workshop Series* 71 (2013): 191-197.
3. Juonala M., et al. "Childhood environmental and genetic predictors of adulthood obesity: the cardiovascular risk in young Finns study". *The Journal of Clinical Endocrinology and Metabolism* 96.9 (2011): E1542-E1549.
4. Freedman DS., et al. "The contribution of childhood obesity to adult carotid intima-media thickness: the Bogalusa Heart Study". *International Journal of Obesity (2005)* 32.5 (2008): 749-756.
5. Field AE., et al. "Weight status in childhood as a predictor of becoming overweight or hypertensive in early adulthood". *Obesity Research* 13.1 (2005): 163-169.
6. Deckelbaum RJ and Williams CL. "Childhood obesity: the health issue". *Obesity Research* 9.4 (2001): 239S-243S.
7. Hudda MT., et al. "Patterns of childhood body mass index (BMI), overweight and obesity in South Asian and black participants in the English National child measurement programme: effect of applying BMI adjustments standardising for ethnic differences in BMI-body fatness associations". *International Journal of Obesity* 42.4 (2018): 662-670.
8. Freedman DS., et al. "Classification of Body Fatness by Body Mass Index-for-Age Categories Among Children". *Archives of Pediatrics and Adolescent Medicine* 163.9 (2009): 805-811.
9. Freedman DS., et al. "The Relation of Childhood BMI to Adult Adiposity: The Bogalusa Heart Study". *Pediatrics* 115.1 (2005): 22-27.
10. Guo SS., et al. "Predicting overweight and obesity in adulthood from body mass index values in childhood and adolescence". *The American Journal of Clinical Nutrition* 76.3 (2002): 653-658.
11. Freedman DS., et al. "Relationship of childhood obesity to coronary heart disease risk factors in adulthood: the Bogalusa Heart Study". *Pediatrics* 108.3 (2001): 712-718.
12. Singh GM., et al. "Estimated Global, Regional, and National Disease Burdens Related to Sugar-Sweetened Beverage Consumption in 2010". *Circulation* 132.8 (2015): 639-666.
13. Speakman JR and O'Rahilly S. "Fat: an evolving issue". *Disease Models and Mechanisms* 5.5 (2012): 569-573.
14. Welsh JA., et al. "Consumption of added sugars is decreasing in the United States". *American Journal of Clinical Nutrition* 94.3 (2011): 726-734.
15. Singh GM., et al. "Global, Regional, and National Consumption of Sugar-Sweetened Beverages, Fruit Juices, and Milk: A Systematic Assessment of Beverage Intake in 187 Countries". *PLoS One* 10.8 (2015): e0124845.

16. Biro FM and Wien M. "Childhood obesity and adult morbidities". *The American Journal of Clinical Nutrition* 91.5 (2010): 1499S-1505S.
17. Yadav S and Arokiasamy P. "Understanding epidemiological transition in India". *Global Health Action* 7 (2014): 10.
18. Lear SA., et al. "Ethnic variation in fat and lean body mass and the association with insulin resistance". *The Journal of Clinical Endocrinology and Metabolism* 94.12 (2009): 4696-4702.
19. Bhopal R. "Epidemic of cardiovascular disease in South Asians". *British Medical Journal (Clinical Research ed.)* 324.7338 (2002): 625-626.
20. Gupta R., et al. "Younger age of escalation of cardiovascular risk factors in Asian Indian subjects". *BMC Cardiovascular Disorders* 9 (2009): 28.
21. Guardian T. "Ethnic minorities to make up 20% of UK population by 2051" (2010).
22. Williams DP., et al. "Body fatness and risk for elevated blood pressure, total cholesterol, and serum lipoprotein ratios in children and adolescents". *American Journal of Public Health* 82.3 (1992): 358-363.
23. Janz KF., et al. "Physical Activity, Not Sedentary Time, Predicts Dual-Energy X-ray Absorptiometry-measured Adiposity Age 5 to 19 Years". *Medicine and Science in Sports and Exercise* 49.10 (2017): 2071-2077.
24. Hu FB and Malik VS. "Sugar-sweetened beverages and risk of obesity and type 2 diabetes: Epidemiologic evidence". *Physiology and Behavior* 100.1 (2010): 47-54.
25. Misra A and Shrivastava U. "Obesity and Dyslipidemia in South Asians". *Nutrients* 5.7 (2013): 2708-2733.
26. Hooper L., et al. "Public awareness and healthcare professional advice for obesity as a risk factor for cancer in the UK: a cross-sectional survey". *Journal of Public Health* 16 (2017): 1-9.
27. Samudre M and Kulkarni SM. "Knowledge on Prevention of Obesity among the Students from Selected High Schools". *International Journal of Science and Research (IJSR)* 5.3 (2016): 682-687.
28. Te Morenga L., et al. "Dietary sugars and body weight: systematic review and meta-analyses of randomised controlled trials and cohort studies". *British Medical Journal (Clinical Research ed.)* 346 (2012): e7492.
29. Maskarinec G., et al. "Diabetes prevalence and body mass index differ by ethnicity: the Multiethnic Cohort". *Ethnicity and Disease* 19.1 (2009): 49-55.
30. Zimmet PZ., et al. "The global epidemiology of non-insulin-dependent diabetes mellitus and the metabolic syndrome". *Journal of Diabetes and its Complications* 11.2 (1997): 60-68.
31. Grimes CA., et al. "Dietary salt intake, sugar-sweetened beverage consumption, and obesity risk". *Pediatrics* 131.1 (2013): 14-21.
32. DeBoer MD., et al. "Sugar-sweetened beverages and weight gain in 2- to 5-year-old children". *Pediatrics* 132.3 (2013): 413-420.

**Volume 13 Issue 7 July 2018**

**©All rights reserved by Saba Firdous.**