

**TO ASSESS RELATIONSHIP BETWEEN OBESITY AND DENTAL
CARIES, AND LIFESTYLE FACTORS AMONG 12-15 YEARS
SCHOOL GOING CHILDREN IN LUCKNOW CITY: A CROSS-
SECTIONAL SURVEY.**

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Article Received on
27 Feb. 2018,

Revised on 19 March 2018,
Accepted on 09 April 2018

DOI: 10.20959/wjpr20188-11096

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ABSTRACT

Introduction: Obesity is a global epidemic, and the World Health Organization (WHO) estimates that it is the fifth leading cause of mortality worldwide. A number of epidemiological studies had studied this association but the result were partially inconclusive. **Objective:** To evaluate the possible relationship between obesity, dental caries and lifestyle factors among 12-15 yrs school going children in Lucknow city. **Materials & Method:** The subjects constituted a representative sample of school going children population both government and private school 2 each with a total population of 300 divided equally 150 in each private and public schools aged 12 to 15 years from Lucknow city participating in the study. The participants completed a

self-administered questionnaire on dietary habits, oral health behaviour, exercise, height, and weight. Overweight was defined as body mass index (BMI) > 25 kg/m² using the World Health Organization criteria. Caries Status is assessed by WHO dentition status 2013. **Results:** Overweight and obese children had higher dental caries 29.7% and 71.4% respectively compare to underweight and normal children 22.9% and 14.2% respectively and this difference was found to be statistically significant (p < 0.001). Overweight and obese

Children have soft drinks more often, often eat outdoor, received less dental care before which was found to be statistically significant ($p < 0.001$). Dental caries among children was found to be 22%. **Conclusion:** Prevalence of dental caries was higher among overweight and obese children as compared to underweight and normal children suggesting obesity to be a potential risk factor for dental caries.

KEYWORDS: Adolescents, Dental Caries, Lifestyle, Obesity.

INTRODUCTION

Living a healthy lifestyle and maintaining a healthy weight requires a combination of reliable access to healthy food and physical activity options, knowledge of nutrition, and appropriate amounts of physical activity. A coordinated effort by the entire community is needed and should include child nutrition professionals, school board members, families, students, school administrators, teachers, worksites, local businesses and agencies, healthcare, and others in the community.^[1]

Obesity is a global epidemic, and the World Health Organization (WHO) estimates that it is the fifth leading cause of mortality worldwide. Obesity rates have doubled within the last 20 years in many developing and developed countries.^[2] Moreover, it is a risk factor for many diseases such as type 2 diabetes, hypertension, hyperlipidemia, cerebrovascular diseases and certain types of cancers. The rapid cultural and social changes that have occurred in the Gulf region since the discovery of oil and the subsequent economic boom of the 70s and 80s have been associated with an alarming increase in obesity. There are many causes of obesity, but change in the region's diet quantity and quality is one of the major causes.^[3]

Excessive weight in children is a cause of major concern. Obesity is a chronic disease, a global epidemic both in developed and developing countries.^[4] Obesity and overweight are defined as being an excess of body fat related to lean mass, with multifactor conditions, involving psychological, biochemical, metabolic, anatomic and social alterations.^[2] The definitions of overweight ($BMI \geq 25 \text{ kg/m}^2$), obesity ($BMI \geq 30 \text{ kg/m}^2$) and morbid obesity ($BMI \geq 40 \text{ kg/m}^2$) are based on health risks for adult Caucasian populations. Children at risk for being overweight during preschool years carry a greater risk of being overweight by age twelve years.^[5]

Beside being the significant risk factor for various diseases obesity had also been suggested to be a risk factor for dental caries.^[6] A number of epidemiological studies had studied this association but the result were partially inconclusive. Hence, the present study was undertaken with an aim to evaluate the relationship between obesity and dental caries, and lifestyle factors among 12-15 years school going children in Lucknow city.

MATERIALS AND METHOD

A cross-sectional study was designed to evaluate the relationship between obesity, dental caries and lifestyle factors among 12-15 yrs old school going children in Lucknow city from April to September 2017 for a period of 6 months. Before the start of study ethical clearance was obtained from the institutional ethical committee and informed consent was taken from all the participants of the study.

The school children population aged 12-15 years was determined for the study. The subjects were taken from two government and private school each. Subjects were included, who were present on the day of examination and children who gave the consent. Those subjects who were not present on the day of examination were excluded from the study.

A simple random sampling was used. The survey was in the form of a closed-ended questionnaire which comprised 14 questions relating to possible sources of lifestyle. Survey form also included demographic information, socio-economic status (Kuppuswamy's socio-economic status scale 2013), WHO dentition status 2013 Oral Health Survey^[7] and BMI was calculated according to WHO. All descriptive as well as inferential statistical analysis using Chi-square was carried out using SPSS version 17.0 for windows and the value of $P < 0.05$ was considered statistically significant.

RESULTS

Fig 1. Represents proportion of participants according to age group which was 20%, 32.7%, 31% and 16.3% respectively in 12yrs, 13yrs, 14yrs and 15yrs respectively.

Among 300 children, 164 (54.7%) were males and 136 (45.3%) were females. Equal number of children were in private and government school. 24.7% children lived in rural areas and 75.3% lived in urban area.

Fig 2. Represents the distribution of BMI among children which was found to be (36.3%) were underweight, (40.0%) were normal (21.3%) were overweight and (2.3%) were obese.

Fig 3. Represents prevalence of dental caries among children which was found to be 22%.

Fig 4. Out of all the questions in the survey questionnaire which evaluated lifestyle factors and had a correlation with obesity and overweight and was found to be significant in obese and overweight children were children often had soft drinks, received less dental care before, often ate outdoor and ate late night.

Fig 5. Represents prevalence of dental caries according to BMI with highest prevalence of caries in obese (71.4%) followed by overweight (29.7%), underweight (22.9%) and normal (14.2%).

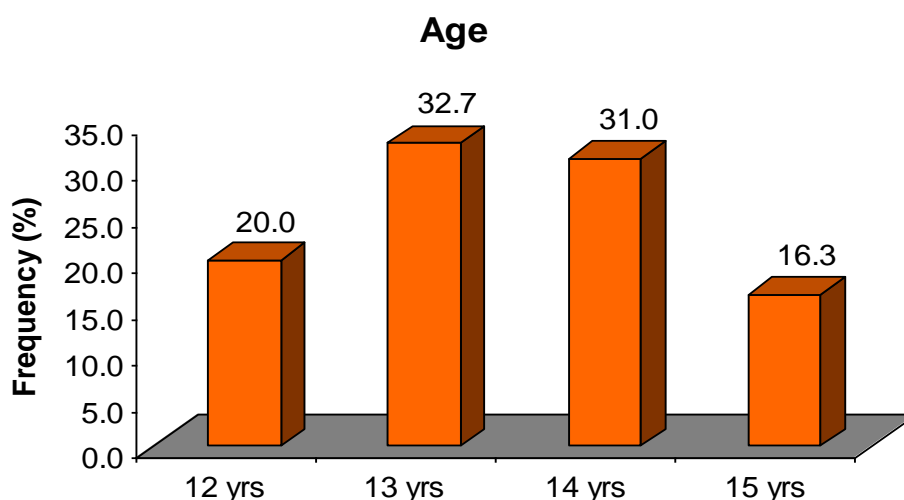


Figure 1: Participants according to age group.

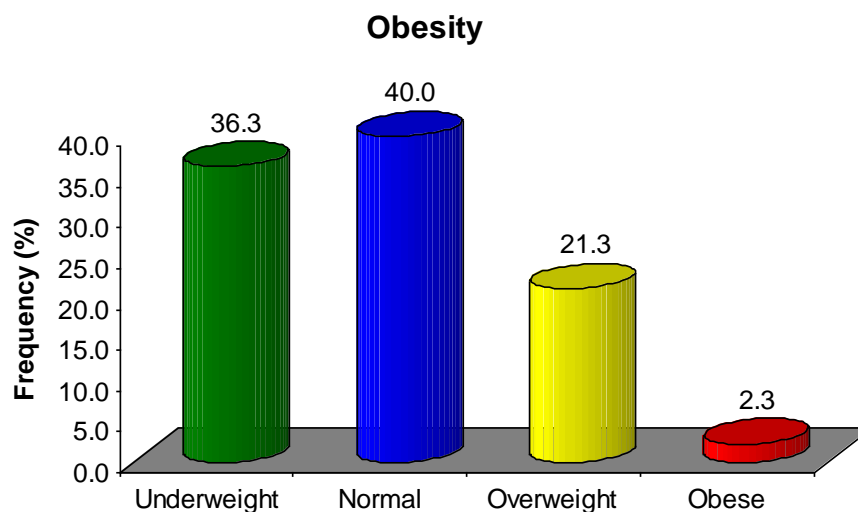


Figure 2: Distribution of BMI among children.

Overall dentition status (dental caries)

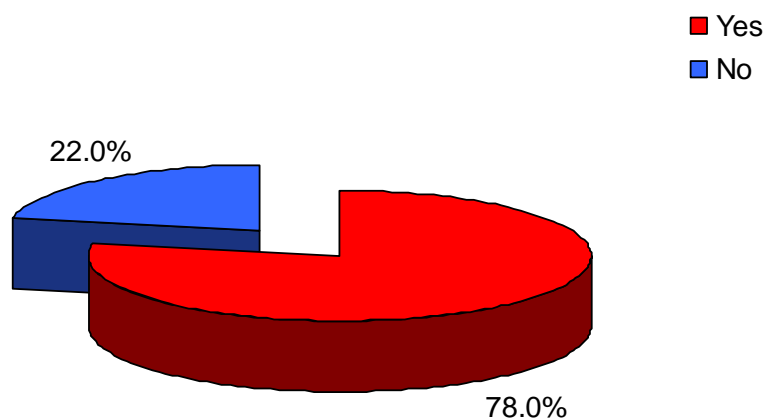


Figure 3: Prevalence of dental caries.

Figure 4. Correlation between obesity and life style of enrolled children (n=300)

Life style	Obesity (BMI)				χ^2 value	p value
	Underweight (n=109) (%)	Normal (n=120) (%)	Overweight (n=64) (%)	Obese (n=7) (%)		
Q1. Breakfast everyday?					14.29	0.112
Yes, alone	39 (35.8)	47 (39.2)	21 (32.8)	4 (57.1)		
Yes, with family	59 (54.1)	56 (46.7)	27 (42.2)	3 (42.9)		
Seldom	8 (7.3)	17 (14.2)	13 (20.3)	0 (0.0)		
No	3 (2.8)	0 (0.0)	3 (4.7)	0 (0.0)		
Q2. Regular exercise?					9.23	0.161
Yes, everyday	12 (11.0)	28 (23.3)	15 (23.4)	1 (14.3)		
Yes, sometimes	43 (39.4)	43 (35.8)	23 (35.9)	1 (14.3)		
No	54 (49.5)	49 (40.8)	26 (40.6)	5 (71.4)		
Q3. Use electronic media for longer than 3 hrs?					16.09	0.065
Everyday	12 (11.0)	27 (22.5)	15 (23.4)	1 (14.3)		
3 or 4 days per week	38 (34.9)	32 (26.7)	22 (34.4)	3 (42.9)		
1 or 2 days per week	37 (33.9)	45 (37.5)	25 (39.1)	2 (28.6)		
1 day per week or less	22 (20.2)	16 (13.3)	2 (3.1)	1 (14.3)		
Q4. How often eat snacks?					6.26	0.100
Everyday	42 (38.5)	38 (31.7)	17 (26.6)	0 (0.0)		
Less than 4 days per week	67 (61.5)	82 (68.3)	47 (73.4)	7 (100.0)		
Q5. Eat snacks before dinner?					8.52	0.202
Yes, everyday	9 (8.3)	20 (16.7)	4 (6.3)	0 (0.0)		
Yes, sometimes	54 (49.5)	46 (38.3)	30 (46.9)	4 (57.1)		
No	46 (42.2)	54 (45.0)	30 (46.9)	3 (42.9)		
Q6. Eat snacks before going to bed?					2.69	0.441
Yes	10 (9.2)	6 (5.0)	3 (4.7)	1 (14.3)		
No	99 (90.8)	114 (95.0)	61 (95.3)	6 (85.7)		

Q7. Drink soft drinks before going to bed? Yes No	17 (15.6) 92 (84.4)	13 (10.8) 107 (89.2)	4 (6.3) 60 (93.8)	2 (28.6) 5 (71.4)	5.31	0.150
Q8. How often drink soft drinks? Everyday Fewer than 4 days per week	2 (1.8) 107 (98.2)	2 (1.7) 118 (98.3)	6 (9.4) 58 (90.6)	0 (0.0) 7 (100.0)	9.29	0.026
Q9. Time of dinner? Before 7 PM 7 PM-9 PM After 9 PM	0 (0.0) 80 (73.4) 29 (26.6)	4 (3.3) 60 (50.0) 56 (46.7)	5 (7.8) 26 (40.6) 33 (51.6)	0 (0.0) 2 (28.6) 5 (71.4)	28.54	<0.001
Q10. Eat yellow-green vegetables everyday? Yes No	103 (94.5) 6 (5.5)	117 (97.5) 3 (2.5)	64 (100.0) 0 (0.0)	7 (100.0) 0 (0.0)	4.65	0.199
Q11. Eat 3 meals at regular times of the day? Yes No	87 (79.8) 22 (20.2)	100 (83.3) 20 (16.7)	43 (67.2) 21 (32.8)	6 (85.7) 1 (14.3)	6.88	0.076
Q12. How often family eat outdoors? Once a week Twice a week Seldom	22 (20.2) 5 (4.6) 82 (75.2)	36 (30.0) 10 (8.3) 74 (61.7)	16 (25.0) 18 (28.1) 30 (46.9)	3 (42.9) 4 (57.1) 0 (0.0)	43.95	<0.001
Q13. Received dental care before? Yes No	18 (16.5) 91 (83.5)	42 (35.0) 78 (65.0)	43 (67.2) 21 (32.8)	1 (14.3) 6 (85.7)	47.03	<0.001
Q14. Developed any illness requiring hospitalization? Yes No	9 (8.3) 100 (91.7)	7 (5.8) 113 (94.2)	7 (10.9) 57 (89.1)	2 (28.6) 5 (71.4)	5.30	0.151

Overall dental caries

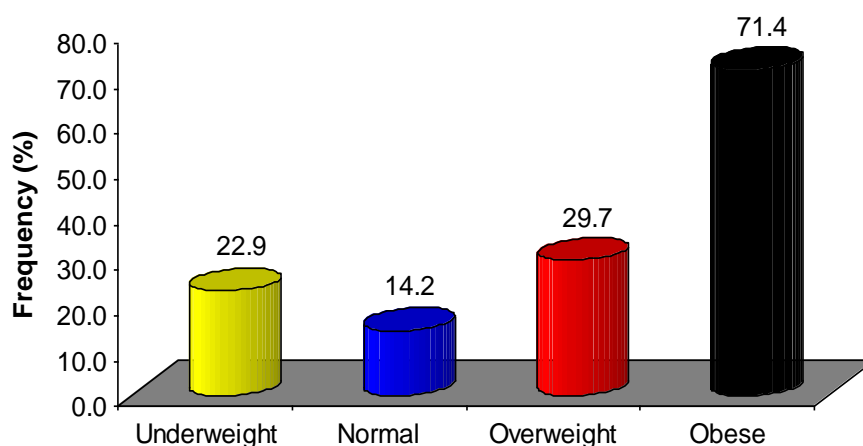


Figure 5: Prevalence of dental caries according to BMI.

DISCUSSION

Although, there are several methods to assess obesity, BMI is commonest of all. However, BMI is a determinant of overweight but does not truly reflect the body fat as it takes height into consideration which confounds the assessment of total body fat.^[8] Complications of the obesity epidemic include high cholesterol, high blood pressure, type II diabetes mellitus, coronary plaque formation, and serious psychosocial implications Hiroya Osawa *et al*^[9] (2015). The overweight condition in childhood and adolescence increases the risk for adult obesity and its consequent health risks during adulthood. In the present study we have also measured the association between obesity and the risk of dental caries.

In the present study, prevalence of dental caries in 12-15 years school going children is 22%. This result was in agreement with the study conducted by Basha Sakeenabi *et al*^[10] (2012) which showed the prevalence of dental caries in 6 to 13 years school going children was 28.9%.

This study shows that overweight and obesity was significantly associated with the prevalence of dental caries in age group 12-15yrs old school going children was significantly higher in obese(71.4%) and overweight(29.7%) children. This result was in agreement with the study conducted by Alm *et al*^[11] (2011) who found a statistically significant association between obesity and dental caries in the 15yrs children i.e 67%. Another similar study conducted by Bailleul- Forestier *et al*^[12] (2007) showed a significant association between high dental caries and increase in obesity i.e 90% in 12-18yrs school going children.

We found the girls to be normal or underweight than boys. Boys were more overweight and obese. Similar observation was noted by Gonzalez *et al*^[13] (2009) where more girls than boys were classified as having normal weight.

This study result shows that overweight and obesity was significantly associated with children living in urban area are more than children living in rural area. It is supported by a study done by Opara *et al*^[13] (2010) that found that most of the urban children had higher prevalence of underweight and obesity. The difference result between these studies maybe due to difference in culture, genetics as well as geographical condition.

Present study shows that prevalence of overweight and obesity was significant with children studying in private school were more than government school Tripathi Swati *et al*^[2] (2010)

showed similar results with higher prevalence were seen in overweight and obese adolescents of private school than government school.

This study shows that prevalence of overweight and obesity was significantly associated with children high socioeconomic status. It can be explained by more consumption of soft drinks and low-intensity physical activities. Tripathi Swati *et al*^[21] (2010) showed similar results the larger prevalence of obesity in high socioeconomic level Children could be explained by them adopting low-intensity physical activities together with consuming high-energy value food.

The on going study results showed that prevalence of overweight and obesity was significantly associated with children lifestyle like more consumption of soft drink. These children often eat outdoors with their family and obese children rarely received dental care before. Taeko Kanemoto *et al*^[15] (2016) showed similar results the children those who were obese or overweight often eat outdoors with family. Study suggested that fast food and eating out an affect the BMI. The higher the frequency of eating out and fast food intake, the higher the children's BMI. Fast food and eating out maybe can contribute to higher BMI because the restaurant will serve food that is high in calorie content compared to self cooking. Children who had visited dental clinics for prevention of dental caries or periodic dental checkups were especially low. This result was in agreement with the study conducted by Nihtila Annamari *et al*^[5] (2016) result showed overweight drank more soft drinks and energy drinks compared with those who were non-overweight, emergency treatment as the reason for last dental visit and having seven or more eating or drinking occasions daily were statistically significantly associated with overweight. Associations were found between lifestyle and overweight.

Present study showed that more number of overweight and obese children don't do regular exercise but was found to be statistically insignificant. This finding is in contrast with a study conducted by Nihtila Annamari *et al*^[5] (2016) who showed that prevalence of overweight and obese children who do not do regular exercise was found to be significant.

Change in lifestyle and improvement in socioeconomic status have extensively added to the growing health concern in developing nations. Particularly, lifestyle and food stuffs have an impact on obesity. Therefore, the pattern of eating among overweight children may be a prevalent risk factor for dental caries. Inadequate education about oral health and reduced

physical preparation to elementary schoolchildren can also be associated with prevalence of obesity and dental caries.^[16]

One of the limitation of this study is that the role of genetics, oral health behaviours or other factors (e.g. nutrition, smoking, alcohol consumption, stress levels etc.) which have been shown to affect the prevalence of, obesity and dental caries are not considered in this study. However, study's strengths include evaluation of lifestyle factors, sugary beverage drinking, use of electronic media. and physical activities.

RECOMMENDATION

In line with earlier studies, obesity and dental caries share common lifestyle factors among adolescents, regardless of nationality and different health-care systems. Thus, it seems that dental health is a global health concern. There is a need for collaboration between dental and general health-care providers to manage both obesity and dental caries in adolescents by using a holistic approach.

CONCLUSION

The study findings indicated that prevalence of dental caries was higher in overweight and obese subjects than their thinner counterparts. Changes in behaviour resulting in the development of obesity may be associated with reduced awareness and practice of behaviours associated with maintaining long-term dental health. Obesity may, however, have an independent effect leading to the manifestations of signs of dental caries.

Although the relationship between obesity and dental caries needs further investigation, The role of oral health professionals should be more active in endorsing weight management as they see young adults regularly. They should counsel obese persons regarding the possible complications, to diminish morbidity for these individuals. The importance of obesity is limited not only to general diseases but also with regard to carious lesions. Hence, educating school children is very important.

PUBLIC HEALTH SIGNIFICANCE

Awareness of the detrimental lifestyle factors including inadequate oral health habits and dental caries among overweight children is important for all healthcare providers, including oral health care professionals.

Financial support and sponsorship

NIL.

Conflicts of interest

There are no conflicts of Interest.

REFERENCES

1. Alswat Khaled, Waleed S, Mohameda, Moustafa A. Wahab, Aboelil. Ahmed A. The Association Between Body Mass Index and Dental Caries: Cross-Sectional Study. *J Clin Med Res*, 2016; 8(2): 147-152.
2. Tripathi Swati, Kiran K, Kamala B K. Relationship between obesity and dental caries in children- A preliminary study. *JIOH*, 2010; 2(4): 65-72.
3. Ekuni Daisuke, Fuji Takaaki Tomo, Mizutani Shinsuke , Furuta Michiko, Irie Koichiro, Azuma Tetsuji, Kojima Azusa, Iwasaki Yoshiaki, Morita Manabu. Dental caries is correlated with knowledge of comprehensive food education in Japanese university students. *Asia Pac J Clin Nutr*, 2013; 22(2): 312-318.
4. Cinar Ayse Basak, Boge Lisa, Christensen, Hedeb Borge. Clustering of Obesity and Dental Caries with Lifestyle Factors Among Danish Adolescents. *oral Health & Preventive Dentistry*, 2010; 1-8.
5. Nihtila Annamari, West Nicola, Lussi Adrian, Bouchard Philippe, Ottolenghi Livia, Senekola Egita, Llodra Juan Carlos, Viennot Stephane and Bourgeois Denis. Oral Health Behavior and Lifestyle Factors among Overweight and Non-Overweight Young Adults in Europe: A Cross-Sectional Questionnaire Study. *Healthcare*, 2016; 21(4): 1-10.
6. Elangovan A, Joseph E, Mungara J. Exploring the relation between body mass index, diet, and dental caries among 6-12-year-old children. *Journal of Indian Society of Pedodontics and Preventive Dentistry*, 2012; 30(4): 293-300.
7. World Health Organization. *Oral Health surveys 5th edition*. Geneva: WHO, 2013.
8. Panwar NK, Mohan A, Arora R, Gupta A, Marya CM, Dhingra S. Study on relationship between the nutritional status and dental caries in 8-12 year old children of Udaipur City, India. *KUMJ*, 2014; 12(45): 26-31.
9. Hiroya Osawa, Naoki Sugihara, Tokuko Ukiya, Yoichi Ishizuka, Dowen Birkhed, Masaru Hasegawa and Takashi Matsukubo. Metabolic Syndrome, Lifestyle, and Dental Caries in Japanese. *Bull Tokyo Dent Coll*, 2015; 56(4): 233-241.

10. Basha Sakeenabi, Hiremath Shivalinga Swamy, Roshan Noor Mohammed Association Between Obesity, Dental Caries and Socioeconomic Status in 6- and 13-year-old School Children Oral Health Prev Dent, 2012; 10(3): 231-241.
11. Alm A, Isaksson H, Fahraeus C, Koch G, Andersson-Gare B, Nilsson M, Birkhed D, Wendt LK. Bmi Status In Swedish Children And Young Adults In Relation To Caries Prevalence. Swed Dent J, 2011; 35: 1–8.
12. Bailleul-Forestier I, Lopes K, Souames M, Azoguy-Levy S, Frelut ML, Boy-Lefevre ML. Caries experience in a severely obese adolescent population. Int J Paediatr Dent, 2007; 17: 358–363.
13. Gonzalez-Suarez, C.K Grimmer-Somers and A. Worley. Is Food Intake Is Associated With Pre-Adolescent Obesity? An Observational Study In Metromanila, Philippines. Asian. J. Clin. Nutr, 2009; 107-119.
14. Opara. D.C., E.E. Ikpeme and U.S. Ekaanem. Prevalence Of Stunting, Underweight and Obesity In School Aged Children in Uyo, Nigeria. Pak. J. Nutr, 2010; 9: 459-466.
15. Taeko Kanemoto, Hiroki Imai, Atsuo Sakurai, Hongwei Dong, Sizhen Shi, Masashi Yukushiji and Seikou Shintani. Influence Of Lifestyle Factors On Risk Of Dental Caries Among Children Living In Urban China. BTDC, 2016; 57(3): 143-157.
16. Mohammed AS Abu El Qomsan, Mohammed N Alasqah, Fahad A Alqahtani, Mohammed AA Alobaydaa, Muteb M Alharbi, Zaheer Kola. Intricate Evaluation of Association between Dental Caries and Obesity among the Children in Al-Kharj City (Saudi Arabia). The Journal of Contemporary Dental Practice, 2017; 18(1): 29-33.