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STUDY OF RISK FACTORS OF CHILDHOOD OBESITY AGED 9_12 YEARS OLD IN PUBLIC SCHOOLS IN BENGHAZI

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Conflicts of Interest: Nil
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Abstract:

Background

Identification of risk factors is critical to preventing the childhood obesity epidemic. Risk factors that contribute to obesity are multifactorial. However, limited research has focused on identifying obesity risk factors

Aim: To identify risk factors for overweight and obese children in public school in Benghazi aged 9-12 years old.

Methods: A cross-sectional study of children 9 to 12 y old was performed between the 5th of April to the 22th April 2019. A total of 160 students-91 girls and 69 boys were observed. Weight and height were measured, and parents filled out a questionnaire about family characteristics, birth history eating practice, and eating pattern. Overweight and obesity, using age- and sex-specific body mass index (BMI) cut-off points as defined by the International Obesity Taskforce, were used.

Results: After adjustment for age and sex, the odds ratio for childhood obesity increased by low hours of plying outside, birth rank and dietary patterns and there was no conclusive evidence of an association between paternal education and outcome. As well as, family characteristics and demographics, birth weight, breast feeding and T.V viewing

Conclusion: Our data support the perspective that education about energy intake, high fast food and high level of fat content should be used much earlier in those with high-risk children

Introduction

Obesity is an important lifestyle-related public health problem worldwide The prevalence of obesity in children has risen significantly during the past few decades not only in developed countries but also in developing countries[1]. Obesity is a serious health concern for children and adolescents, childhood obesity presents a number of immediate and long-term health risks, including several adverse physiological and psychological health consequences[2]. Childhood obesity considered a metabolic derangement has become a global health problem and is associated with increased incidence of hypertension, diabetes, coronary artery disease and osteoarthritis and overall increases morbidity and mortality during adult life[3]. Childhood obesity is an established problem in high income countries and is now becoming a major public health problem, especially in middle-low income countries [4].

Results from the 2007-2008 National Health and Nutrition Examination Survey (NHANES), using measured heights and weights, indicate that an estimated 6.5 to 19.6% of children ages 6-11-years-old are obese. As well, the prevalence of obesity among adolescents aged 12-19-year-old increased from 5 to 18.1% during the same period [5].

Body mass index (BMI) is a measure used to determine childhood overweight and obesity. Obesity is defined as a BMI at or above the 95th percentile for children and teens of the same age and sex. BMI is calculated by dividing a person's weight in kilograms by the square of height in meters [6]. Children who have a body mass index (BMI) at the same level or higher than 95 percent of their peers are considered to be obese[6].

Childhood obesity is a serious health threat to children. Kids in the obese category have surpassed simply being overweight and are at risk for a number of chronic health conditions. Poor health stemming from childhood obesity can continue into adulthood[7].

Risk factors for obesity included parental fatness, social factors, birth weight, timing or rate of maturation, physical activity, dietary factors and other behavioral or psychological factors. Offspring of obese parent(s) were consistently seen to be at increased risk of fatness, although few studies have looked at this relationship over longer periods of

childhood and into adulthood[7].. The relative contributions of genes and inherited lifestyle factors to the parent child fatness association remain largely unknown. There is good evidence from large and reasonably long-term studies for an apparently clear relationship for increased fatness with higher birth weight, but in studies, which attempted to address potential confounding by gestational age, parental fatness, or social group, the relationship was less consistent[7].. The relationship between earlier maturation and greater subsequent fatness was investigated in predominantly smaller, but also a few large studies. Again, this relationship appeared to be consistent, but in general, the studies had not investigated whether there was confounding by other factors, including parental fatness, SES, earlier fatness in childhood, or dietary or activity behaviors [8].

The purpose of this study was therefore to examine the main risk factors contributed to childhood obesity aged 9-12 years graduate 4th, 5th, 6th. In public schools in Benghazi.

Significance of study:

This study considered as the first study in Libya to identify the risk factors of childhood obesity in Benghazi aged 9-12 years old as well as the result of study have possible act as guide to reduce the risk factors of child obesity and early intervention.

Subjects and Method

Study Design, Setting and Subjects

A cross-sectional study on Libyan elementary schools' students in Benghazi city was carried out between the 5th of April to the 22th April 2019 to study the risk factors of childhood obesity aged 9-12 years old both boys and girls was included after obtaining permission from the ministry of education in Benghazi. Target group were the overweight and obese students 4th 5th, 6th grade located within the city of Benghazi covering 12 public schools in Benghazi. Total sample was160 over weight and obese children aged 9 to 12 years and chosen has been appeared to be physically overweight and obese, the mean age was 11years (34%) about 57% were girls and 43% were boys as a part of study of risk factors of obesity in childhood for one month. Overall, 160 completed questionnaires were returned, while the 40 children were excluded because their parents did not return the questionnaire.

Our study included in particular the fourth year was about 49%, fifth year 36% and sixth year 15% of primary schools aged 9-12 years both boys and girls , weights have been collected by scales, tape and questionnaire was used to collect other variable data.

Procedure and Materials:

The study has been carried out over one month, in the first ethical approval should be sought from the local Research Ethics Committee both at Benghazi University and Local School Health and Education Directorate authorities, Libya.

The study was explained, and an informed consent obtained. The following materials were used:

- Performa (students questionnaire and their anthropometric, parents questionnaire, food frequency questionnaire) (Appendix 1, 2, and 3).
- Instruments including; flexible tape measure, Portable Studio meter, weight scale.

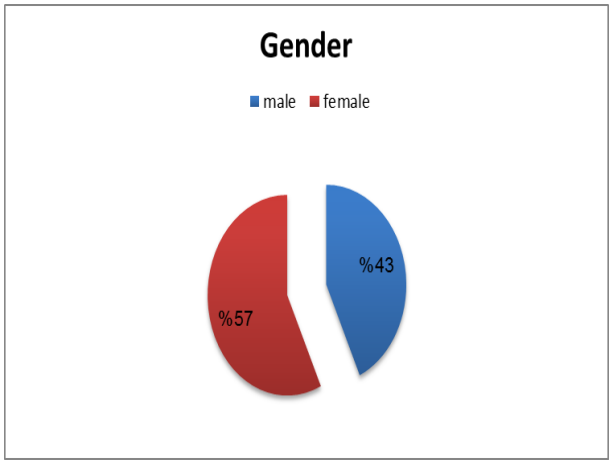
Data collection

Self-administered questionnaire was used to collect personal information of parents. The questionnaire included socio-economic characteristics, anthropometry. Questionnaire for parents was include birth history, family characteristic, method of baby delivery, any chronic disease belong mother during pregnancy, dietary information, and dietary pattern using food frequency questionnaire.

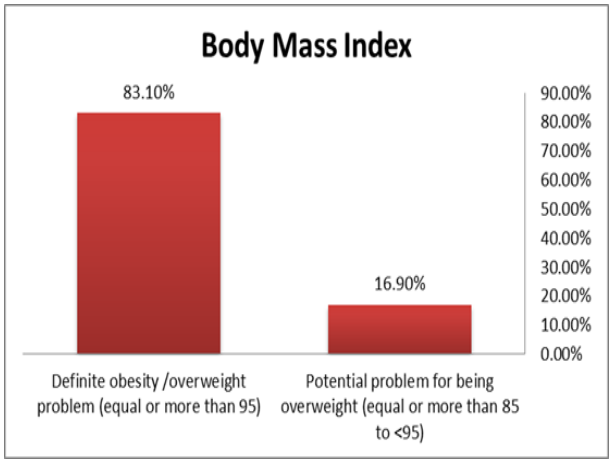
Data collection tools and techniques selected schoolchildren were subjected to the following after brief orientation.

Results

In total, 160 children from public schools participated in our study who were overweight and obese aged 9-12 years old median age 11 years (34%). of whom 69 (43%) boys, and 91 (57%) girls of 16.9% overweight pupils and 83% were definite obese. The Pie Chart below (1 & 2) show all the previously mentioned.



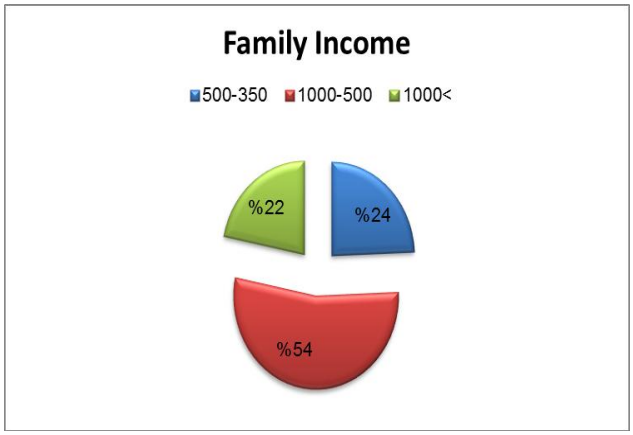
Pie Chart 1: Distribution of Gender and BMI



Pie Chart 2: Distribution of Pupils BMI

Most of family income in our sample were between 500-1000 L.D about 54%, while the pupils with low family income was 22% about 350-500 L.D, as illustrated in Pie Chart below (3).

As shown in the result (Table 1) We found not significant relation between family income and being overweight or obese pupils. (P-value 0.792) .

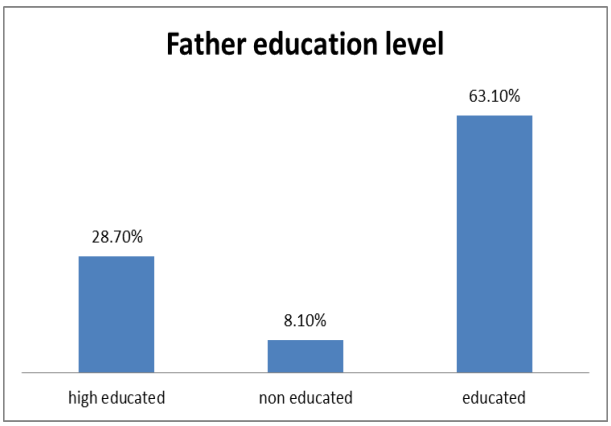


Pie Chart 3: Family Income

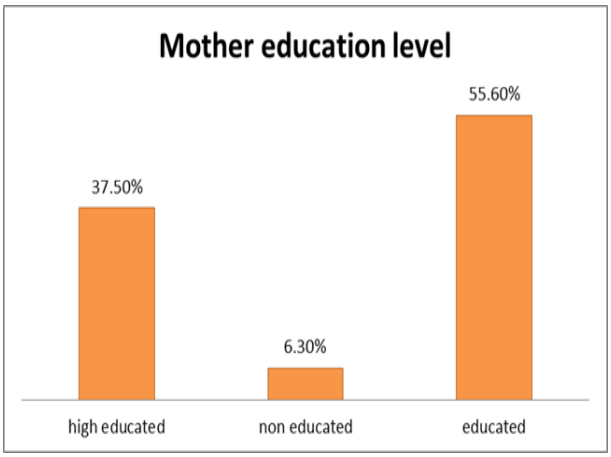
Table1: Shows the Relation between Family Income among Body mass index

			Body Mass Index		Total
			Potential problem for being overweight (equal or more than 85 to < 95)	Definite obesity/ overweight problem (equal or more than 95)	
Family Income	350-500	Count	7	32	39
		% of Total	**4.4 %**	**20.0 %**	**24.4%**
	500-1000	Count	13	73	86
		% of Total	**8.1 %**	**45.6%**	**53.8%**
	> 1000	Count	7	28	35
		% of Total	**4.4%**	**17.5%**	**21.9%**
Total	Count		27	133	160
	% of Total		**16.9%**	**83.1%**	**100.0%**

Most of students had parents with some level of formal education. the highest percent of fathers and mothers educated was 63.10%, 55.60% respectively. For high educated parents the percentage was 28.7%, 37.5 respectively, while the lowest level of both was non educated 8.10%, 6.30% respectively.



Bar Chart 4: Father Education Level



Bar Chart 5: mother Education Level

The result shows the children whose parents had attained levels of educated or non-educated did not appeared to be as a risk factor contributed to overweight or obese childhood. (P-value 0.317, P-value 0.617) as illustrates in table below (2,£)

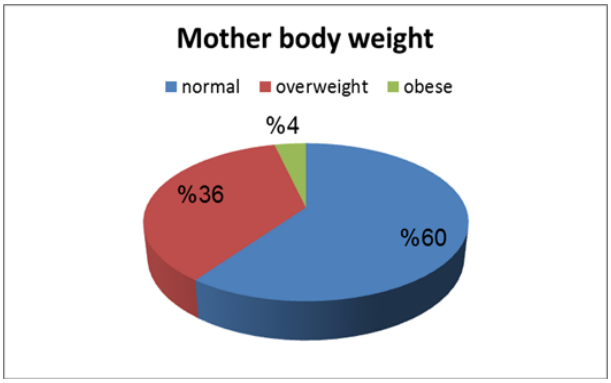
Table 2:

			Body Mass Index		Total
			Potential problem for being overweight (equal or more than 85 to < 95)	Definite obesity/ overweight problem (equal or more than 95)	
Father Education Level	Educated	Count	18	32	39
		% of Total	**8.8 %**	**20.0 %**	**24.4%**
	Non-Educated	Count	2	11	13
		% of Total	**1.2 %**	**6.9%**	**8.1%**
	High Educated	Count	7	28	35
		% of Total	**4.4%**	**17.5%**	**21.9%**
Total	Count		27	133	160
	% of Total		**16.9%**	**83.1%**	**100.0%**

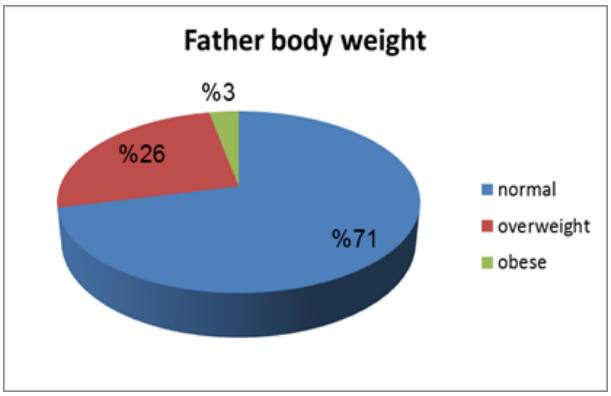
Table 3: Shows the relation between Index Mother Education Level among Body Mass Index

			Body Mass Index		Total
			Potential problem for being overweight (equal or more than 85 to < 95)	Definite obesity/ overweight problem (equal or more than 95)	
Mother Education Level	Educated	Count	18	71	89
		% of Total	**11.2 %**	**44.4 %**	**55.6%**
	Non-Educated	Count	1	9	10
		% of Total	**1.2 %**	**6.9%**	**8.1%**
	High Educated	Count	8	53	61
		% of Total	**0.6%**	**5.6%**	**6.2%**
Total	Count		27	133	160
	% of Total		**16.9%**	**83.1%**	**100.0%**

Regarding parent's body weight, parents with normal body weight was the highest percent 71% for fathers and 60% for mothers. While the percent of obese parents was the lowest, about 4% belong mother and 3% belong father. Bar chart below shows the previously mention



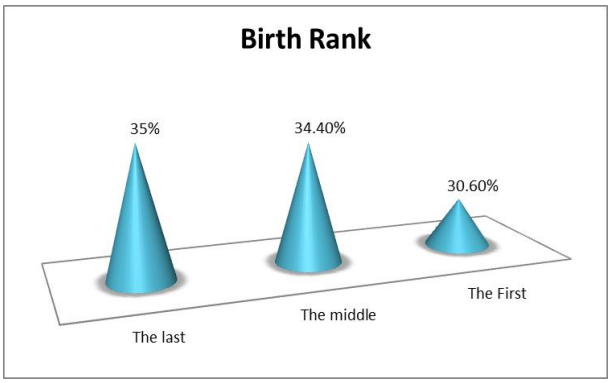
Bar chart6: Mother Body Weight



Bar chart 7: Father Body Weight

So, the result demonstrated there were not statistically significant between parent's body weight and category of overweight and obesity status belong pupils.

As well in the analysis of possible risk factors, birth rank was a significant factor overall, with first-born children less frequently to be overweight or obese, while the lastborn children most likely to be obese.
In the (chart 8) below shows that, the highest percentage of children in our study was the last birth rank which was 35%, while the lowest percentage of children participant was the first birth rank which was 30%.



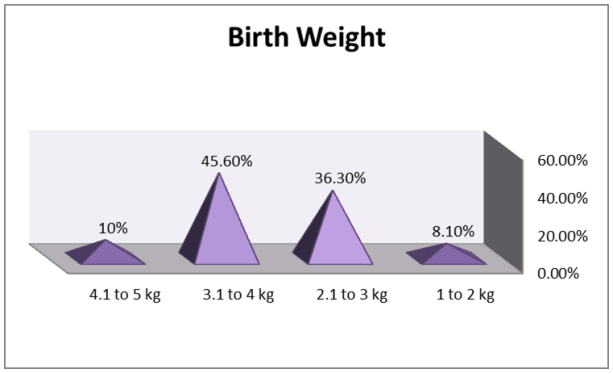
Bar chart 8: Distribution of Birth Rank

As demonstrated in the (table 4) most of obese children were last birth (35%); regarding the definite obesity was 32.5%, although the potential problem of being overweight was 2.5%. While the total percentage of obese children with the first birth rank was 30.6%, although 21.9% were definite obesity and the other 8.8% were potential problem for being overweight. In addition, the total percentage of obese children with the middle birth rank were 34.4%, however,28.7% were definite obesity whereas, the other 5.6% were potential problem for being overweight. The result shown the relation between birth rank of pupils and their BMI was significant. (P-value 0.014).

Table 4: Relation between Birth Rank and Body Mass Index

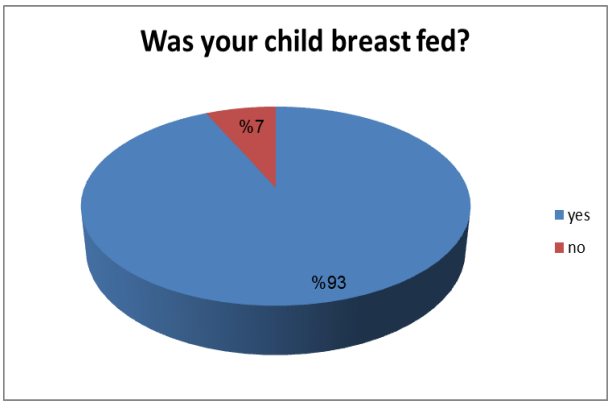
			Body Mass Index		Total
			Potential problem for being overweight (equal or more than 85 to < 95)	Definite obesity/ overweight problem (equal or more than 95)	
Birth Rank	The First	Count	14	35	49
		% of Total	**8.8 %**	**21.9%**	**30.7%**
	The Middle	Count	9	46	55
		% of Total	**11.8 %**	**55.0 %**	**66.8 %**
	The Last	Count	4	52	56
		% of Total	**2.5 %**	**32.5 %**	**35.0 %**
Total	Count		27	133	160
	% of Total		**16.9%**	**83.1%**	**100.0%**

With regard to history of birth weight, the (chart 9) below shows that the highest percentage of birth weight was appearing in the range between (3.1to 4kg) which was 45.60% and the lowest percentage was appearing in the range between (1to 2kg) which was 8.10%.The result shown the relation between birth weight for children participant and their BMI was no significant.



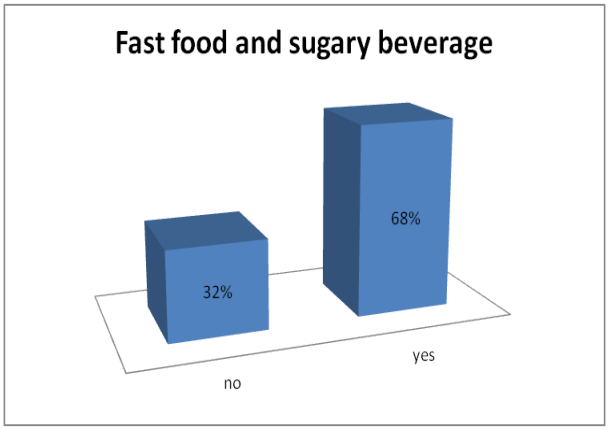
Bar chart 9: Distribution of Birth Weight

About feeding practice the (chart 16) below shows that the highest percentage of obese children were breast fed 93% whereas the rest percentage was non breast-fed about 7%. We noted that most of children were breast fed whereas the least was non breast-fed, our results clarified that a history of breast-feeding during infancy was non-significant associated with overweight or obesity and did not has any protective effect against childhood obesity.

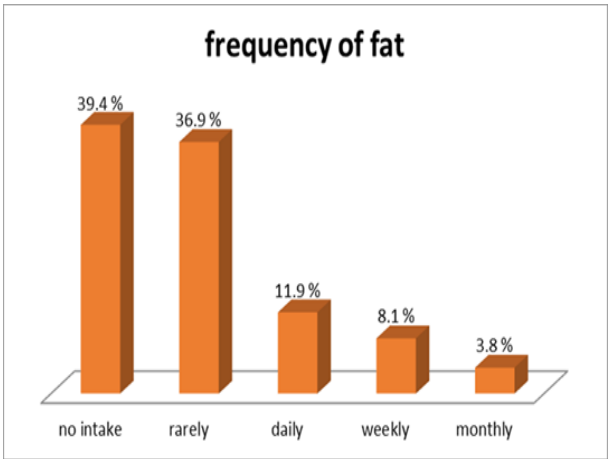


Bar chart 10: method of feeding practice

Excess calorie intake (represented by fast food and sugary beverage fat) 68% of children were regularly consumption of fast food and sugary beverage, however, only 32% of children were not ate fast food and sugary beverage and there was showed the excess of calorie intake from fast food and sugary beverage had a highly significant association with high values of BMI . as shows in chart 11below. The (chart 12) below reveal that the highest percent in our sample is 39.4% who was did not intake of fat frequently, while the lowest percent 3.8% was monthly intake. As well as, children who intake daily and weekly was 11.9% and 8.1% respectively. the association between frequency of fat and the risk of overweight or obesity was statistically significant.

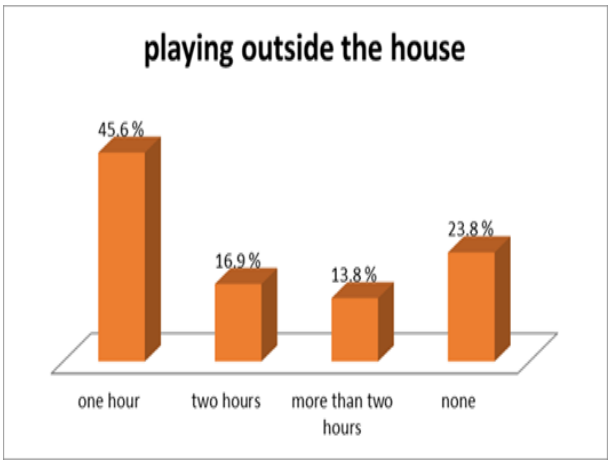


Bar chart11:



Bar chart12

The study showed that a significantly higher association between percent of overweight and obese pupils according to playing outside was positively related. As shows in chart 13 most of children in our sample were playing outside for one hour about 45.6%, in addition, the children playing for two hours and more than two hours were 16.9% and 13.9% respectively. However, the percentage of children who do not playing outside was 23.8%.



Bar chart 13: Playing Outside the House

Discussion

Childhood obesity is a serious public health problem with a rapidly increasing prevalence worldwide. This study was conducted to identify the main risk factors of childhood obesity in elementary school in Benghazi.

As shown in our result the family income and education of parents was non-significant relation with both over weight and obesity. Study in Bangladesh was done by Madhusudan saha. et al (2018) had similar observation with our result[3]. In addition, other study was done by Nancy F. Butte(2008) In the United States, shows that the relationship between SES and overweight were weaker and less consistent[9].

On the other hand, Riyadh K., Lafta, Maher J. & Kadhim (2005) noted that the percentage of overweight children according to educational level of their fathers was more belong those who had only a primary education (P=0.001)[10]. Our study demonstrated that there is no relation between both overweight and obesity children and parents weight.

While other two studies done by Nancy F. Butte (2008), Lisa Y Gibson MPSYCH (2007), reveals that the majority of the parents were either overweight or obese (34%, 57%) respectively the risk of childhood obesity increased significantly)[9,11]). As demonstrated in result there is relation between birth rank and both obesity, overweight children. similarly, study done by Riyadh K. Lafta, Maher J. Kadhim (2005), convinced that the birth rank was a significant factor overall, with first-born children more frequently of normal weight than lastborn children (P=0.02)[10]. As shown in our result, the relation between breast-fed and both obesity & overweight children was not significant.Similarity study done by Nancy F. Butte (2008) illustrated that the breast-feeding was negatively associated with the risk of overweight or obesity [9]. As demonstrated in our result the relation between eat fast food and sugary beverage for both obese and overweight children was significant. Similarity study done by Robert W Jeffery et al fast food restaurants was positively associated with having children, a high fat diet and Body Mass Index (BMI)[12].

As demonstrated in our result, the relation between playing outside the house for both obese and overweight children {P-value 0.000} the high percent 45.6% one hour playing outside the house this means had low activity. On the other hand study done by MS Tremblay1,2 & JD Willms (2003)physical activity are negatively associated with being overweight(10–24% reduced risk) or obese (23–43% reduced risk)[13].

Conclusion:

This study identifies three key early-life risk indicators for childhood overweight/obesity in schoolchildren (i.e., birth rank, high fat content and fast food, low number of hours playing outside home as a part of physical activity).Simultaneous analysis of other risk factors included socioeconomic factors, educational level of parents, parents body weight, eating practice,

baby birth weight, were indicated did not related of overweight or obesity belong participant in our study. Childhood obesity prevention efforts may benefit from targeting these key risk factors including eating fast food, high serving number of bread, and high content of fat and placed interventions focused on improving dietary quality and playing outside as focus areas for obesity prevention. Although excess weight gain is an outcome of an energy imbalance resulting from consumption of energy-dense foods and decreased physical activity .And so on, we suggest more research is needed to confirm our findings for dietary behavior and playing outside as part of physical activity among childhood.

We conclude that childhood obesity may prevented and therefore they present opportunities for targeting this problem.

Recommendations for action include more physical education classes and promotion of healthy food at schools and of family at home. Future interventions might focus on environmental changes targeted in childhood, which are independently related to the risk of overweight/obesity. Moreover, future research should consider the correlates of overweight and obesity from a multi factorial perspective, considering the role of multiple lifestyle behaviors.

Study limitation: Is the cross-sectional design, which introduces uncertainties regarding the sequence of cause and effect of the observed associations. We used questionnaire for parents to assess the risk factors of childhood obesity, some parents were did not complete the questionnaire, and others did not return it. As well we used FFQ to assess the dietary habit of children. However, FFQ normally ask about intake within given time frame aimed to know habitual intakes without collect information about the portion size. Therefore, FFQ did not obtained standard food portion size. Although there was difficulties implicit in calculating the absolute nutrition intake of children from FFQ.

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Appendices

Appendix 1

1. **Socioeconomic History :**

Student name: _____

Age: _____

Gender: Boy ◯ Girl ◯

School year: 4th ◯ 5th ◯ 6th ◯

School name: _____

School Address: _____

Student nationality: _____

2. **Anthropometry :**

Weight: _____

Height: _____

BMI: _____

Classification	Percentile
Normal	15th to < 85th
Potential problem for being overweight	≥ 85th to < 95th
Definite obesity/ overweight problem	≥ 95th

Appendix 2

Questionnaire for parents:

Socioeconomic status:

Educational levels of the parents

Father education level:

non educated ◯ Educated ◯ High Education ◯

Mother education level:

non educated ◯ Educated ◯ high education ◯

Father Occupation: _____

Mother occupation: _____

Family income: 350-500 ◯ 500-1000 ◯ >1000 ◯

Birth rank: _____

Birth weight: _____

Any other children obese in family: yes ◯ No ◯

Mother body weight: normal ◯ over weight ◯ obese

Father body weight: normal ◯ over weight ◯ obese

Overweight or obese of mother during pregnancy: yes ◯ no ◯

Method of baby delivery: Normal ◯ Caesarean section ◯

Any chronic disease belong mother during pregnancy:

Hypertension ◯ Diabetes ◯ hypertension and diabetes ◯ other ◯ none ◯

Dietary information

Types of feeding

Was your child breast-fed? Yes ◯ No ◯

If they answered yes, for how long was your child exclusively breast-fed:

(a) 2 months or less (b) 3 to 5 months

(c) 6 to 12 months (d) more than a year

2-Was your child Bottle feeding? Yes ◯ no ◯

Current dietary pattern:

Number of meals/ days: 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 or more ◯

Number of snacks: 2 ◯ 3 ◯ 4 ◯ >4 ◯

Fast food and sugary beverage: Yes ◯ No ◯

Eating outside the house: school restaurant

Eating between meals: Yes ◯ No ◯

Appendix 3

Food Frequency Questionnaire

Type of food group	Frequency of intake of specific food group				
	No Intake	Rarely	Daily	Weekly	Monthly
Milk					
Milk product					
Vegetables					
Fruits					
Red meat					
White meat					
Fat					
Fast food					
Bread					
Cereal					
Soft drinks					
Juice					
Chocolate					
Potato chips					
Pizza					

Life style

current pattern of physical activity

Playing outside the house: 1 hr ◯ 2 hrs ◯

more than 2 hrs /day ◯ None ◯

Watching TV: 1 hr ◯ 2 hrs ◯ 3 hrs ◯

more than 3 hours/day ◯