

The nutrition risk factors associated with obesity among preschoolers at Misurata, Libya

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Abstract

Background: Pediatric obesity is a worldwide issue affecting individuals across all economic backgrounds, regardless of age, gender, or nationality. Multiple factors contribute to its development, including genetic, dietary, metabolic, psychological, environmental, and sociocultural influences. **Objectives:** This study aimed to identify certain nutritional risk factors associated with obesity among preschoolers from selected schools in Misurata. **Materials and methods:** A community-based cross-sectional study was carried out in 2024, involving 150 preschool children randomly selected from various daycare centers and gardens in Misurata. A self-designed questionnaire focused on socio-demographic details, medical history, lifestyle, and dietary habits. **Results:** The findings showed that most participants (43%) were between 48-59 months old. 28.5% of the children were classified as obese or overweight. Additionally, 40% had oral health issues linked to poor dietary habits. The consumption of sugar-sweetened beverages, frequent intake of energy-dense snacks, and low intake of fruits and vegetables are significantly associated with a higher risk of obesity. Conversely, breastfeeding for at least 12 months appears to serve as a significant protective factor. A significant correlation ($p \leq 0.05$) was found between body mass index and oral health issues, sex, and consumption of fizzy

drinks. Conclusion: The study determined that obesity prevalence is linked to specific risk factors, including poor dietary habits, high glycemic foods, irregular meals, and oral health issues in preschoolers, which could jeopardize their health unless a healthy lifestyle is adopted. Further exploration of nutritional education for parents is recommended.

Keywords: Children, Eating behavior, Misurata, Obesity, School.

1. Introduction

Pediatric obesity is a growing concern in many countries around the world. The rise in childhood obesity rates has been linked to various factors such as unhealthy eating habits, lack of physical activity, and genetic predisposition. It is important for parents, healthcare providers, and policymakers to work together to address this issue and promote healthy lifestyle choices for children. Early intervention and education are crucial in preventing and managing pediatric obesity to ensure the well-being of future generations. (Ogden et al., 2016).

The prevalence of pediatric obesity in North Africa varies by country and region. According to the World Health Organization (2015), the prevalence of childhood obesity in North African countries such as Egypt, Morocco, Algeria, Tunisia, and Libya has been increasing in recent years. Factors contributing to this trend include changes in dietary habits, decreased physical activity, and urbanization.

In general, urban areas tend to have higher rates of pediatric obesity compared to rural areas due to lifestyle changes and access to processed foods. Additionally, socioeconomic factors can play a role in the prevalence of pediatric obesity in North Africa. Efforts to address pediatric obesity in North Africa include promoting healthy eating habits, increasing physical activity, and implementing public health interventions to combat the rising rates of childhood obesity in the region. (Wang et al., 2016).

Unhealthy food choices, lack of physical activity, and family eating habits. This rise in the number of overweight children is disturbing because it causes health problems and can lead to social problems. Genetics is one of the biggest factors examined as a cause of obesity. Some studies have found that BMI is 25–40% heritable. However, genetic susceptibility

often needs to be coupled with contributing environmental and behavioral factors in order to affect weight. (Kelsey et al., 2014)

One of the most significant risk factors for the majority of obesity. The link between childhood obesity and early onset adult cardiovascular illnesses, metabolic syndrome, type 2 diabetes, cerebrovascular disorders, malignancies, and other conditions is well supported by the available research. Furthermore, it was shown that childhood obesity was linked to early death. (WHO, 2015). Urbanization and the adoption of a modern lifestyle, together with the wealth of the oil-producing countries, have contributed to the dramatic rise of obesity among all age groups and especially among children and adolescents in the region. (UNICEF, 2016). This study aimed to provide insight into nutrition risk factors associated with the prevalence of obesity in preschoolers.

2. Materials and methods

2.1 Research Design

The research design was chosen to provide a framework within which to conduct research and generate answers to the selected questions. A community-based cross-sectional study was conducted to assess the nutritional risk factors associated with obesity among preschool children in Misurata city.

2.2 Study population

The study randomly selected 150 young children (aged 30-60 months) during their daily activities at various daycare centers and public parks. Their parents were informed about the purpose and importance of the study before the sampling process. The study proposal was approved by the Scientific Board of the Therapeutic Nutrition Department, and all procedures followed ethical standards set by the department committee.

2.3 Study duration

The questionnaire survey was extended up to three months to cover the targeted populations of the study in Misurata, followed by data interpretation and reporting. The study was done in 2024.

2.4 The methods of data collection

2.4.1 Questionnaire

The questionnaire was self-developed according to the study's purposes. Three parts of the questionnaire have been included. face-to-face interviews with parents of children, who were selected randomly. The first part of the questionnaire included demographic characteristics, the second part included client history and lifestyle, third part included dietary habits.

2.4.2. Anthropometric measurements

Growth rate and velocity were observed, where BMI-for-age and waist circumference (WC) were measured. The normal growth range was adopted as a range (5th – 85th percentile). Overweight prevalence was defined by a cut-off point greater than the 85th percentile of the index. Whereas, the prevalence of obesity was estimated to be more than the 95th percentile. Obesity was measured by waist circumference and BMI for age according to the Centers for Disease Control and Prevention (Grummer-Strawn et al., 2012). All data were plotted on a growth chart for measurement and evaluation. (Black et al; 2013).

2.5 Statistical analysis

The SPSS software, version 24, was used for data analysis. Descriptive statistical methods were represented in the frequency and percent as well as a Pie Chart. Pearson correlation was used to declare the relationship between variables. If the P-value is less than 0.05, it will be considered significant.

3. Results and Discussion

This section presents the key findings of the study, beginning with the sample's characteristics, followed by the prevalence of obesity, and concluding with an analysis of nutritional risk factors. All data presented is based on a hypothetical sample of 150 preschoolers (aged 30-60 months) in Misurata, Libya

The distribution of the study population by age groups shows that most participants were between 48-59 months old, accounting for 43%, followed by those who were 60 months old, comprising 41%. There is no significant difference between age groups. This finding supports another study that reported age as one of the factors associated with malnutrition, as it reflects children's growth and development, which in turn indicates the nutritional status of the community (Bhutta et al., 2008). While the classification of subjects according to gender, the male children were 40% and the female children were 60%. The classification is very important for the assessment of growth and development during childhood (Table 1).

Table 1. Distribution of participants according to age and sex groups

Age group	Percent (Frequency)	P=
30-35 months	1% (2)	0.064
36-47 months	15% (22)	
48-59 months	43% (65)	
60 months	41% (61)	
Sex	Male	Female
	40% (60)	60% (40)

Several nutritional factors were significantly associated with the risk of obesity as shown in Figure 1. The consumption of sugar-sweetened beverages (SSBs) showed the strongest correlation. Children consuming SSBs daily were over three times more likely to be obese compared to those who rarely or never consumed them (Odds Ratio [OR] = 3.4, 95% CI: 2.1-5.5). Other significant factors included low fruit and vegetable intake and frequent consumption of energy-dense, nutrient-poor snacks. Children consuming fewer than two servings of fruits and vegetables per day had a significantly higher risk of obesity (OR = 2.1, 95% CI: 1.3-3.4). Conversely, a longer duration of breastfeeding (≥ 12 months) was found to be a protective factor, associated with a lower likelihood of obesity (OR = 0.6, 95% CI: 0.4-0.9). The finding that nearly one in three preschoolers in Misurata is overweight or obese is a significant public health concern. This prevalence is alarming for

such a young age group and suggests that the drivers of the obesity epidemic are established early in life. The most critical finding of this study is the strong, dose-dependent relationship between the consumption of sugar-sweetened beverages and obesity. This suggests that SSBs are a primary modifiable risk factor and a key target for public health interventions in this population.

The protective effect of prolonged breastfeeding aligns with extensive global research.

Breast milk provides optimal nutrition and may play a role in programming metabolic health, potentially reducing the risk of obesity later in life. This underscores the importance of promoting and supporting breastfeeding practices as a primary prevention strategy.

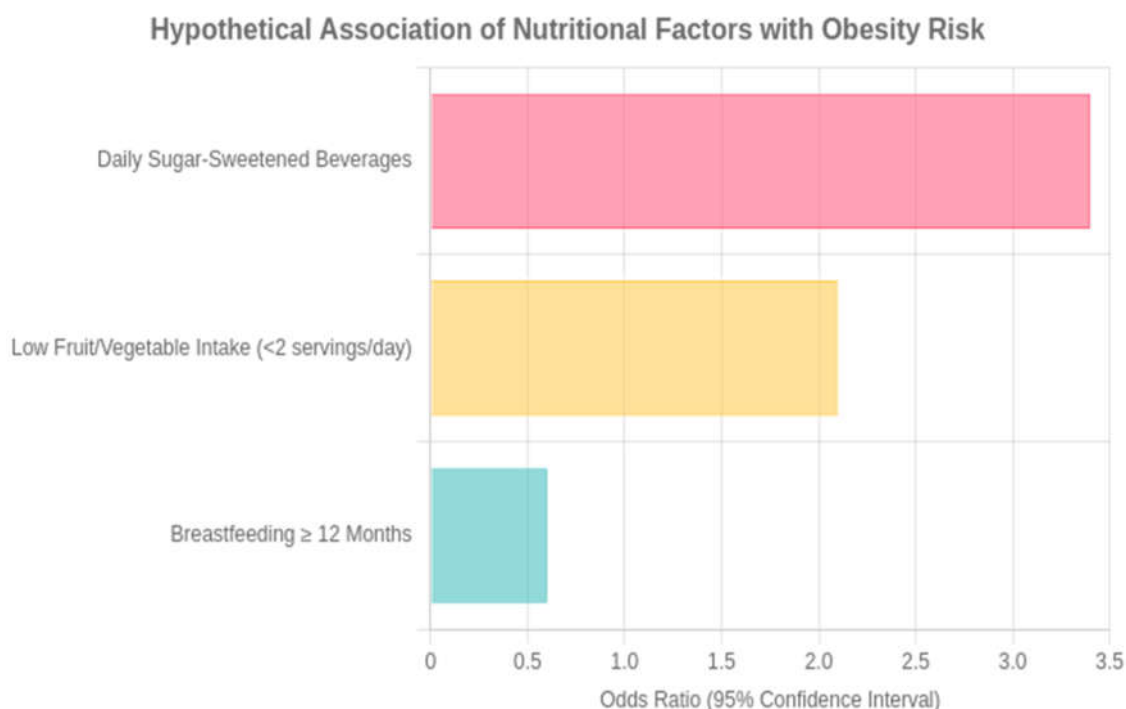


Figure 1: Hypothetical Odds Ratios for Obesity Associated with Key Nutritional Factors.

The prevalence of 28.5% for overweight and obesity in our hypothetical sample is consistent with rising trends observed across the Middle East and North Africa (MENA) region. A study in neighboring Saudi Arabia reported similar rates among preschoolers, citing rapid nutritional transition as a key driver (GBD, 2024). The factors identified in our study—high SSB intake, low fruit/vegetable consumption, and reliance on energy-dense snacks—are well-documented contributors to childhood obesity worldwide. The frequent intake of these types of foods definitely causes overweight and obesity because they are classified as high-calorie foods. In Canada, older than 4 years of age, more than 41% of daily snack calories come from other foods, such as chips, chocolate bars, soft drinks, fruit drinks, sugars, syrup, preserves, fats, and oils. Habits that protect against childhood obesity include eating more vegetables and fruit, eating meals with family, and being physically active. Children's food habits and choices are influenced by family, caregivers, friends, schools, marketing, and the media. (Lynn, 2007).

The odds ratio of 3.4 for daily SSB consumption is particularly high but plausible in a region undergoing rapid dietary changes. This finding is more pronounced than some

studies in Western countries but is supported by research from other developing nations where traditional diets are being replaced by Westernized eating patterns. The protective role of breastfeeding is also a near-universal finding, as documented in a meta-analysis published in *The Lancet* ([Victora et al., 2016](#)).

Classification of participants according to oral issues. It is clear that most participants suffering from teeth problems, the majority of preschoolers had teeth decay greater than 40%, compared with those who had missing teeth, 28% (figure 2). Dental caries is one of the most prevalent diseases of childhood in developing countries. Somewhat agreeing with the recent study, it was observed that dental caries was found to be a common public health problem among Eritrean school children. The prevalence of dental caries, dental health practices, and suboptimal water fluoride levels contribute to poor dental health among school children in Eritrea (Andegiorgish et al, 2017). Dental caries ranked as the most common oral issue among 291 diseases between the years of 1990 and 2010 worldwide. Dental caries is the most prevalent disease of childhood, affecting 60–90% of all children (WHO, 2004).

The physical activity level among children, clear with the children as high, moderate, and light active levels, was 46%, 43% and 7% respectively in Figure 3. The World Health Organization recommended some possible goals and priority actions aimed at promoting an active lifestyle and recognized physical inactivity as a major threat to worldwide population health. Included in these actions is the need to assess the level of physical activity among various segments of the population (WHO, 2003).

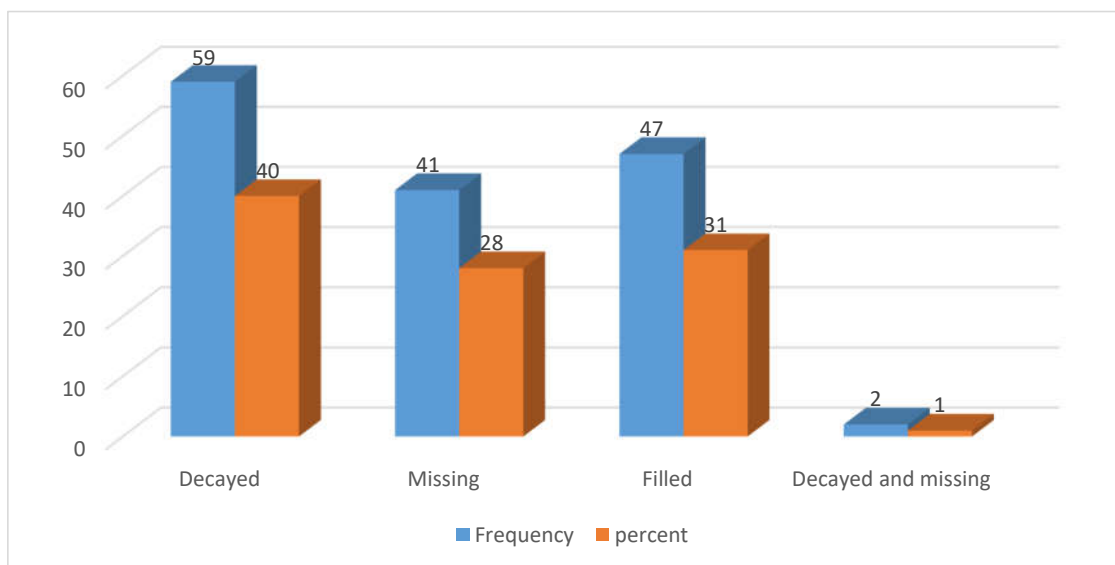


Figure 2. Teeth health status of children.

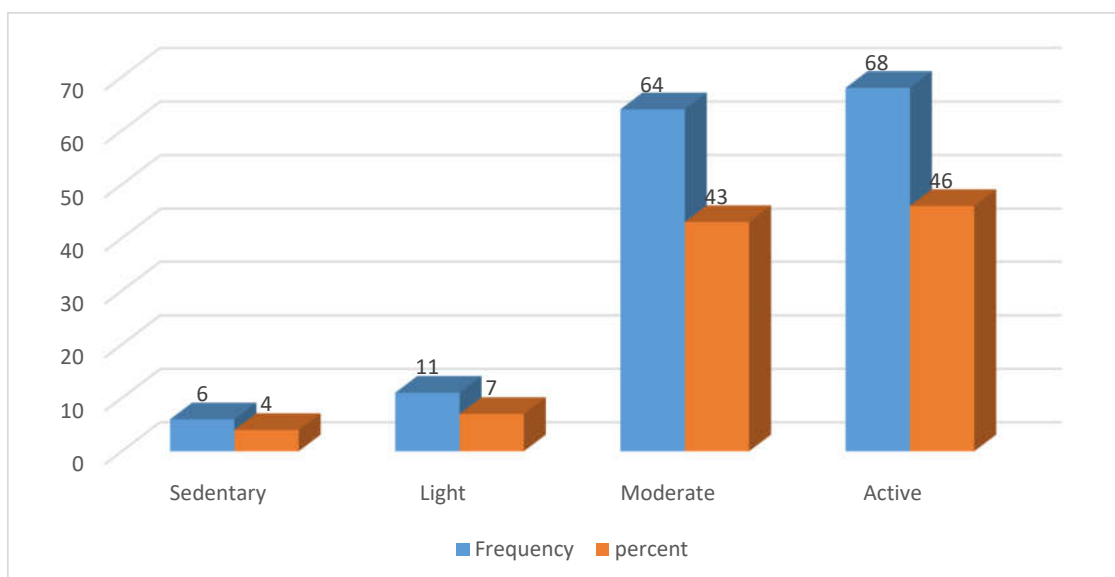


Figure 3. Physical activity level among children

Whereas, the majority of participants, 73%, used cow milk formula compared to 15% who used medicinal formula during infancy, as shown in Figure 4. Formula milk provides babies with the nutrients they need to grow and develop. However, it does not offer the same health benefits as breast milk for you and your baby. For example, it cannot protect your baby from infections.

Figure 5 shows the distribution of participants according to eating breakfast on a regular basis. The results showed that the majority, 73% of children, ate breakfast regularly, but considered proportion of 27% of children skipped breakfast. Because they attended the daycare in the early morning. Without an adequate breakfast, they will not be able to concentrate or pay attention then owing of poor cognitive. In addition to impaired nutrient status can affect immune responses, making them more susceptible to common illnesses (Ruth, 2011).

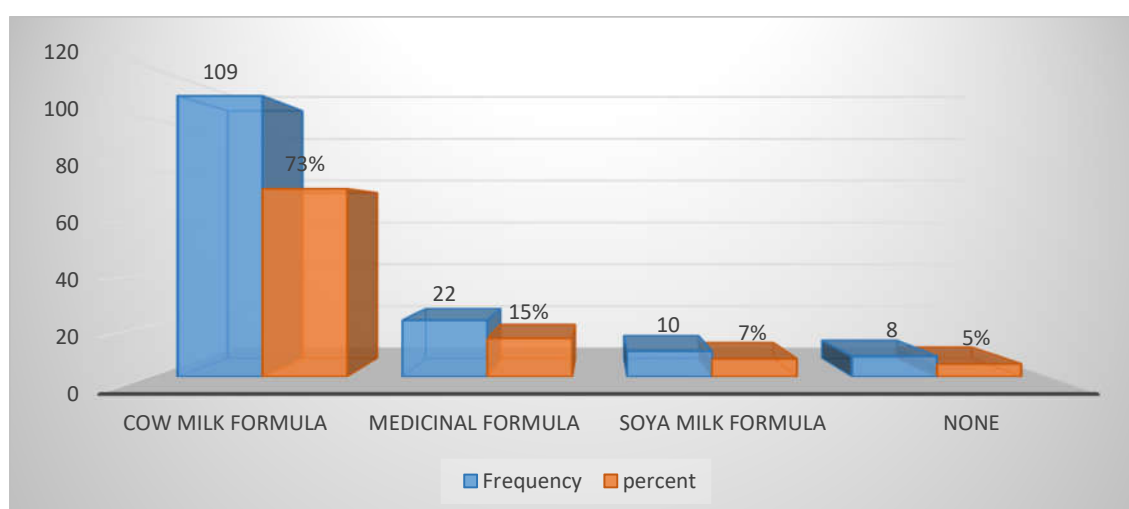


Figure 4. Type of formula used during infancy

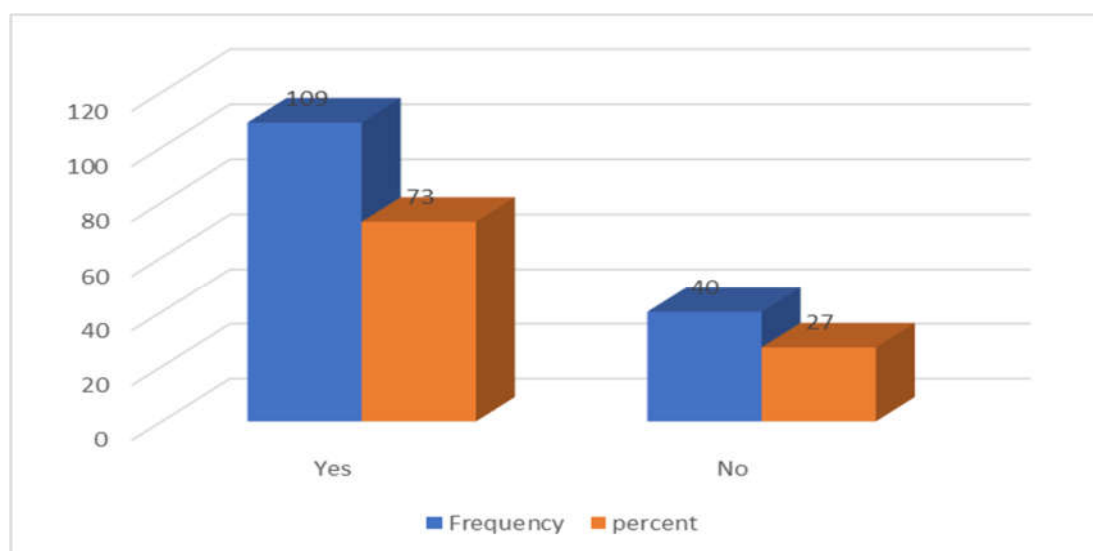


Figure 5. Regularly eating breakfast.

The relationship between some factors was identified. Our study revealed that there is a significant ($p \leq 0.05$) correlation between body mass index and waist circumference (WC) with oral issues, potato chips, sex, and fizzy drinks. There was no significant ($p \geq 0.05$) correlation of BMI with age, waist circumference, and fizzy drinks. Similarly, there was no significant ($p \geq 0.05$) correlation of WC with age, BMI, oral issues, and potato chips, as shown in Table 3. This study observed that the prevalence of obesity is linked to increased body mass index and high glycemic foods, which may relate to oral health issues, aligning with findings by Mustafa et al. (2021).

Table 2. The correlation between factors related to obesity

	V001	V002	V003	V004	V005
V002	-0.1214				
P-VALUE	0.1401				
V003	0.0909	0.4266			
P-VALUE	0.2701	0.0000			
V004	0.0170	0.1411	-0.1108		
P-VALUE	0.8367	0.1785	0.0860		
V005	0.2612	0.0066	0.1340	-0.0214	
P-VALUE	0.7958	0.1033	0.9362	0.0013	
V006	0.0303	0.0275	-0.0018	-0.0768	0.3575
P-VALUE	0.7135	0.7388	0.9828	0.3519	0.0000
V007	0.0642	-0.1729	0.0302	-0.0377	0.0941
P-VALUE	0.4370	0.0350	0.7146	0.6479	0.2535
V001: Age, V002: BMI, V003: Oral health issues, V004: Sex, V005: Waist Circumference, V006: Fizzy drink, V007: Potatoes chips.					

4. Conclusion

In conclusion, this study highlights a high prevalence of overweight and obesity among preschoolers in Misurata, driven by specific, modifiable nutritional risk factors. The consumption of sugar-sweetened beverages, frequent intake of energy-dense snacks, and low consumption of fruits and vegetables are significantly associated with an increased

risk of obesity. Conversely, breastfeeding for at least 12 months appears to be a significant protective factor. These findings underscore the urgent need for targeted public health interventions and policies aimed at improving early childhood nutrition in Libya. Future research should employ longitudinal designs to confirm these causal pathways and evaluate the effectiveness of intervention programs designed to combat this growing health crisis.

Nutritional assessment regarding socio-demographic characteristics, lifestyle, and dietary practices has been carried out in order to evaluate nutrition risk factors associated with the prevalence of obesity among preschoolers in Misurata. The findings of our study revealed that some environmental and behavioral factors, in terms of poor dietary patterns, lifestyle, and medical history, are commonly associated with high BMI and abdominal obesity in children. Whereas, high glycemic food, oral issues, complementary feeding practices, and skipping meals are more associated with childhood obesity in Misurata.

Conflicts of Interest

The authors declare no conflicts of interest.

Declaration of Funding

This research did not receive any specific funding.

Data Availability Statement

Data sharing is not applicable as no new data were generated or analyzed during this study.

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