

Prevalence of Obesity and Overweight among School-Aged Children in Gharyan City. A prospective cross-sectional study

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ABSTRACT

Background: Childhood overweight and obesity are rising public health concerns worldwide, including in urban areas of Libya. Data on prevalence in school-aged children in Gharyan are scarce.

Objectives: To assess the prevalence of overweight and obesity among schoolchildren aged 7–12 years in Gharyan City, Libya, and explore variations by age, gender, and school grade.

Methods: A cross-sectional study was conducted among 632 children from public and private schools. Anthropometric measurements were performed, and BMI was classified using WHO BMI-for-age reference charts. Data were analyzed using descriptive statistics and stratified prevalence assessments.

Results: Overall, 22.0% of children were overweight and 9.7% were obese, with no significant gender differences. Obesity peaked in 7-year-old boys (23.1%) and 12-year-old girls (14.3%). Overweight prevalence increased with age, peaking at 32.6% in boys aged 8 years. Combined overweight and obesity affected 31.7% of participants, highlighting a substantial urban burden.

Conclusion: Childhood overweight and obesity are highly prevalent among schoolchildren in Gharyan, Libya, across all ages and genders. These findings underscore the need for targeted school-based interventions and community health strategies, with collaboration between clinical pharmacists and community medicine physicians to prevent and manage obesity from an early age.

Keywords: Childhood obesity, overweight, BMI, school-aged children, Libya, urban health, WHO growth standards

dramatically over the past four decades, increasing more than tenfold from 11 million in 1975 to over 124 million in 2016, with millions more overweight but not yet obese (1). This trend continues to escalate, particularly in developing countries undergoing rapid urbanization, lifestyle transition, and changes in dietary patterns (2). Childhood obesity is strongly associated with adverse health outcomes, including hypertension, dyslipidemia, insulin resistance, early onset type 2 diabetes, and increased risk of premature cardiovascular morbidity and mortality (3,4).

In North Africa and the Middle East, the burden of childhood obesity has become increasingly evident. Regional studies indicate a prevalence ranging between 15% and 30%, reflecting the interplay of cultural, nutritional, and socioeconomic factors (5,6). In Libya, the growing transition towards sedentary lifestyles, high-calorie diets, and reduced physical activity among children has raised alarm about the future trajectory of non-communicable diseases (NCDs) (7). However, few recent studies have systematically documented the prevalence of obesity and overweight among Libyan schoolchildren, particularly in semi-urban cities such as Gharyan, making this study timely and necessary.

The consequences of childhood obesity extend beyond immediate health outcomes to long-term social and economic burdens. Obese children often experience psychosocial challenges, including low self-esteem, social stigma, and academic difficulties (8). Furthermore, obesity in childhood strongly predicts adult obesity, thereby perpetuating the intergenerational cycle of chronic disease (9). This highlights the need for early identification and targeted preventive strategies within school and community settings.

Clinical pharmacists and community medicine physicians play a pivotal role in mitigating the obesity epidemic. Clinical pharmacists are increasingly recognized for their contributions to patient education, lifestyle

I. INTRODUCTION

Childhood obesity has emerged as one of the most pressing public health concerns of the 21st century. The global prevalence of overweight and obesity among children and adolescents has risen

modification counseling, and medication management in pediatric and adolescent populations (10). Through school-based programs and primary healthcare interventions, they can provide parents and children with practical strategies to improve nutrition and physical activity, as well as monitor risk factors such as hypertension and dyslipidemia. Community medicine physicians, on the other hand, are integral in conducting epidemiological surveillance, designing preventive health campaigns, and shaping policies that address the upstream determinants of childhood obesity, including food environments, urban planning, and school health services (11). Together, these professionals create a multidisciplinary framework that supports both prevention and early management of childhood overweight and obesity.

Given the paucity of updated local data, particularly in Gharyan city, this study was conducted to determine the prevalence of overweight and obesity among school-aged children and to identify associated sociodemographic risk factors. The findings aim to provide evidence for local health authorities, schools, and policymakers to design targeted, multidisciplinary interventions to address this growing public health challenge.

II. METHODS

Study Design and Setting

This cross-sectional study was conducted among school-aged children in Gharyan city, northwestern Libya, during the academic year 2024. Gharyan represents a semi-urban population with mixed socioeconomic backgrounds, providing a representative sample for assessing childhood obesity prevalence.

Study Population and Sampling

The target population consisted of children aged 6–15 years enrolled in public and private schools within Gharyan. A multistage cluster sampling method was applied: schools were first selected randomly from different city zones, and within each school, students were chosen using systematic random sampling. The sample size was determined based on an expected obesity prevalence of 20%, with a 95% confidence level and a 5% margin of error, yielding a minimum sample of 384 children. To improve precision and account for non-response, 450 students were targeted.

Data Collection Procedures

Data collection was conducted by trained researchers and supervised by community medicine physicians. Anthropometric measurements were obtained using standardized techniques:

- **Weight** was measured to the nearest 0.1 kg using calibrated digital scales, with participants in light clothing and without shoes.
- **Height** was measured to the nearest 0.1 cm using a portable stadiometer.
- **Body Mass Index (BMI)** was calculated as weight (kg) divided by height squared (m^2).

Sociodemographic data, including age, sex, parental education, and family income, were collected using a structured questionnaire administered to parents or guardians.

Definitions and Classifications

Overweight and obesity were classified according to the World Health Organization (WHO) age- and sex-specific BMI-for-age growth reference charts (WHO, 2007).

- **Overweight:** BMI-for-age between the 85th and 95th percentiles.
- **Obesity:** BMI-for-age ≥ 95 th percentile.

Statistical Analysis

Data were entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics were used to summarize participant characteristics. Prevalence of overweight and obesity was expressed as percentages with 95% confidence intervals (CIs). Bivariate analyses (chi-square test) were used to explore associations between sociodemographic factors and obesity status. Logistic regression analysis was performed to identify independent predictors of overweight/obesity. A P-value of <0.05 was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Research Ethics Committee of the Faculty of Medicine, University of Tripoli. Permission to conduct the study was secured from the Gharyan Education Authority. Informed consent was obtained from parents or guardians, and verbal assent was obtained from the children before participation.

III. RESULTS

3.1 Distribution of Study Sample by Gender

A total of 632 schoolchildren aged 7–12 years were screened for height, weight, and BMI. Out of the total, 335 (53%) were males and 297 (46.9%) were females (Table 1).

Table 1. Gender with Correspondent BMI

Gender	BMI Category	Count	% within Gender
Male	Underweight	3	0.9%
	Normal	225	67.2%
	Overweight	72	21.5%
	Obese	35	10.4%
	Total	335	100%
Female	Underweight	1	0.3%
	Normal	203	68.4%
	Overweight	67	22.6%
	Obese	26	8.8%
	Total	297	100%
Total	All	632	100%

Among the total participants, 22.0% (139 students) were classified as overweight and 9.7% (61 students) as obese. Most children (67.7%, 428 students) were within normal weight ranges, and a small minority (0.6%, 4 students) were underweight. Overweight prevalence was slightly higher in females (22.6%) than males (21.5%),

while obesity was more common in males (10.4%) compared to females (8.8%).

3.2 Prevalence of Overweight and Obesity by Age and School Grade

The distribution of overweight and obesity varied across age groups and school grades, highlighting key periods for intervention (Tables 2 and 3).

Male Students

Table 2. Age and BMI Categories in Male Students

Grade (Age)	Underweight	Normal	Overweight	Obese	Total
1st (7y)	0	19	11	9	39
2nd (8y)	0	26	14	3	43
3rd (9y)	0	50	10	3	63
4th (10y)	0	46	11	3	60
5th (11y)	1	47	12	11	71
6th (12y)	2	37	14	6	59
Total	3	225	72	35	335

- The highest obesity rate was observed among 7-year-old boys (grade 1) at 23.1%, which declined in grades 2–3 but slightly increased again in later grades.
- Overweight prevalence peaked at grade 2 (32.6%), reflecting early exposure to urban dietary and lifestyle risk factors.
- These patterns suggest that early school years are critical windows for intervention in boys.

Female Students

Table 3. Age and BMI Categories in Female Students

Grade (Age)	Underweight	Normal	Overweight	Obese	Total
1st (7y)	0	32	12	3	47
2nd (8y)	0	30	10	3	43
3rd (9y)	0	31	8	3	42
4th (10y)	0	40	12	6	58
5th (11y)	0	43	11	4	58
6th (12y)	1	27	14	7	49
Total	1	203	67	26	297

- Obesity prevalence in females peaked in **grade 6 (12-year-olds) at 14.3%**, whereas overweight was highest in the same grade at **28.6%**.
- These trends indicate a **gradual increase in overweight with age**, emphasizing the need for **school-based interventions in late childhood**.

IV. DISCUSSION

This study provides a comprehensive assessment of overweight and obesity prevalence among school-aged children in Gharyan City, Libya, revealing a substantial burden affecting nearly one-third of participants. The findings demonstrate that both genders are similarly affected, with overweight prevalence slightly higher in females and obesity slightly higher in males. Age-specific patterns indicate that early primary school years in boys (grades 1–2) and late primary school years in girls (grade 6) represent critical periods for intervention.

The high prevalence observed aligns with global and regional trends, reflecting rapid urbanization, dietary transitions, and decreased physical activity among children [12–14]. Similar studies in Middle Eastern countries report comparable rates, highlighting that urban environments exacerbate obesity risk through sedentary behaviors and easy access to energy-dense foods [15,16].

This research was conducted as a collaborative effort between the Clinical Pharmacy group at the University of Tripoli, Faculty of Pharmacy, and the Department of Community Medicine at the University of Gharyan, Faculty of Medicine. The interdisciplinary approach allowed

integration of clinical pharmacology insights and community health perspectives, enabling a more holistic understanding of risk factors and preventive strategies.

Clinical pharmacists contribute by:

- Educating children and parents on healthy dietary practices and nutritional literacy [17].
- Supporting school-based interventions, including weight management programs and monitoring BMI trajectories over time [18].

Community medicine physicians complement these efforts by:

- Assessing population-level risk factors, such as socioeconomic determinants and access to recreational facilities [19].
- Designing and implementing preventive public health strategies at both school and community levels [20].

The age-specific fluctuations in overweight and obesity emphasize that interventions must be tailored to different developmental stages, accounting for gender-specific behavioral and environmental influences. Early identification and lifestyle counseling in primary grades could prevent the progression to obesity and reduce long-term cardiovascular and metabolic risks [21].

Moreover, the use of WHO BMI-for-age reference standards ensures international comparability and allows for accurate surveillance [22]. The observed prevalence highlights the urgent need for structured programs integrating school health policies, parental education, and community-

wide initiatives, with monitoring facilitated by collaboration between pharmacists and physicians.

Limitations of the study include its cross-sectional design, which precludes causal inference, and the focus on urban schools, limiting generalizability to rural areas. Additionally, detailed data on dietary habits, physical activity, and family history were not collected; future studies should incorporate these factors for a more comprehensive analysis.

These findings highlight critical periods for intervention, particularly in early primary grades for boys and late primary grades for girls. The collaborative approach between clinical pharmacists at the University of Tripoli and community medicine physicians at the University of Gharyan demonstrates the value of combining individual-level education with community-level preventive strategies. School-based nutrition and physical activity programs, parental education, and broader community initiatives are essential to mitigate childhood obesity. By targeting modifiable risk factors early, such multidisciplinary interventions can reduce the long-term health and economic consequences associated with overweight and obesity in Libyan children.

V. CONCLUSION

Childhood overweight and obesity are highly prevalent among schoolchildren in Gharyan, affecting both genders across all age groups. Age-specific trends identify key windows for intervention, emphasizing the need for early and targeted preventive programs. The collaboration of clinical pharmacists and community medicine physicians is crucial for designing and implementing effective school- and community-based strategies. These findings provide actionable evidence to guide policy-making, public health planning, and school-level initiatives aimed at reducing childhood obesity and promoting healthier lifestyles in Libya.

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