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Original article

General Health Parameters in Children Aged 6–10 Years in El-Beyda, Libya

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Abstract
Pupils belonging to particular grades underwent a methodical screening process to check for a number of health issues, such as obesity, eye issues, dental cavities, clinical symptoms, and chronic illness. The purpose of this cross-sectional study was to ascertain how common these health issues were among El-Beyda City, Libya, primary school pupils. This study included 526 (61.6% female and 38.4% male) students from a primary public school during the academic year 2022-2023. Overall, the most prevalent health problems identified were underweight (83.7), short stature (24.5%), visual impairment (31%), dental caries (80.2%), presence of allergies (10%), and asthma (7%). The majority of health issues were found to be more common in girls than in boys. The findings provided an overview of the high and low frequency of certain health diseases among El-Beyda City's primary school kids, allowing for the identification of specific health issues that warrant further investigation. In conclusion, the implementation of comprehensive school health services for the prevention, early identification, diagnosis, and treatment of these health problems is crucial.
Keywords. *Prevalence, Health Status, Primary School Students, El-Beyda City, Libya.*

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Introduction

To address children's health requirements, school health programs were established as a crucial part of the nation's overall health care delivery system Libya is a war-torn nation in North Africa that has seen many military conflicts and a financial crisis since 2011, which have brought about difficulties in life that have an impact on social and behavioral facets of life [1]. Compared to the general population, children are more susceptible to illness and malnutrition. Caries and obesity represent worldwide public health issues with substantial costs, detrimental effects on quality of life, and a shared risk factor: sugar consumption [2].

Children's growth spurts throughout puberty, which is linked to changes in body composition, morphology, and increased bone mineralization and growth [3]. Age- and gender-appropriate normal growth patterns are markers of a child's developmental health [4]. A crucial component of children's health programs should be the identification of short stature in children, as it has a significant role in minimizing physical and mental disorders [5]. Meanwhile, several studies show that children who are overweight or obese are more likely to have a range of health issues, including dental caries [6, 7]. Additionally, a recent study that compared the pre-conflict greater frequency of dental caries to the concomitant drop in caries and sugar intake has revealed the influence of lower sugar intake during the Libyan conflict [8]. Another risk factor in children is visual impairment. The incidence of visual impairment in children varies across nations and is impacted by factors such as the rate of childhood mortality and socioeconomic level. An estimated 19 million children globally are estimated to be visually impaired; of these, 1.4 million are blind, and 17.5 million have low vision, with the majority of them living in Africa [9]. Precise data regarding the frequency and origins of visual impairment in children may facilitate the creation of an organized eye care program to promptly identify and effectively address potential causes [10]. According to a Global Burden of Disease research, the main causes of death worldwide are chronic, non-communicable diseases like diabetes, hypertension, and cardiovascular conditions [11. 12]. The majority of these diseases start in childhood and have an ongoing negative impact on health throughout life [13]. The objectives of this study were to investigate the prevalence of body mass index, short stature, visual impairment, dental caries, and other clinical signs among students aged 6-12 years at El-Beyda City, Libya.

Methods

Study Design and Setting

This descriptive cross-sectional study was conducted in primary public schools in El-Beyda, Libya, between September 1, 2022, and June 30, 2023. The study population consisted of children aged 6 to 10 years. All participants were enrolled in the National Program of Childhood Immunization.

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Data Collection and Sample

Data were collected using structured questionnaires administered to parents and school records. The sample included children from multiple schools in El-Beyda, selected to represent the target age group.

Ethical Approval

Ethical clearance and permissions were obtained from the Libyan Ministry of Education, local authorities, the Libyan Ministry of Health, and the Libyan Authority for Scientific Research through the National Committee for Biosafety and Bioethics, Al-Mukhtar Bioethics Committee (NBC: 007.H.24.13). Written informed consent was secured from the parents of all participating children prior to enrollment.

Data Analysis

The collected data were summarized in tables and expressed as frequencies and percentages. Associations between independent variables and gender were assessed using odds ratios (OR) and the chi-square test for categorical variables. Statistical analyses were performed using Minitab software, Version 17. A p-value of less than 0.05 was considered statistically significant.

Results

There were 526 random subjects who participated in this study. The sample was 61.6% female and 38.4% male. Overall, 526 subjects were screened for their height and weight to calculate body mass index (BMI) and short stature. Among all, the males were found to be 0.0, 0.0, 14.0, and 85.0% as overweight, obese, normal, and underweight, respectively. For the females, it has been found 0.3, 0.3, 16.0, and 82.0% as overweight, obese, normal, and underweight, respectively, as shown in (Table 1).

Table 1. Overweight /obesity of subjects on the basis of gender and BMI categories, and percentage of short stature, normal, high, and tall stature overall, on the basis of subjects ' gender

BMI	Female (No. %)	Mean ±SD	Male (No. %)	Mean ±SD	Total
>18.5	268 (82.7)	15.69 ± 1.5	172 (85.1)	15.69 ± 1.5	440 (83.7)
18.5-24.9	54 (16.7)	20.2 ± 1.5	30 (14.9)	20.2 ± 1.3	84 (15.97)
25-29.9	1 (0.3)		0 (0)		1 (0.19)
< 30	1 (0.3)		0 (0)		1 (0.19)
Upon BMI	Chi-squared: 656.6118, P < 0.0001		Chi-squared: 401.6436, P < 0.0001		
Short stature	80 (24.4)	115.7 ± 5.8	49 (24.3)	117.5 ± 6.15	129 (24.5)
Normal high.	231 (71.3)	125.7 ± 6.7	152 (75.24)	126.9 ± 6.99	383 (72.8)
Tall stature	13 (4.01)	143.4 ± 9.1	1 (0.5)		14 (2.7)

The overall prevalence rate of short stature was 24.5%. The survey results showed that the average height of males was more than that of the female participants, with the same percentage for each gender separately. General health examinations were diagnosed by the presence of pallor at the lower palpebral conjunctiva, hand pale and skin surface. The personal hygiene and presence of hair nits /lice were illustrated in (Table 2).

Table 2. General examination of overall subjects basis of gender

Parameters	Female (No. %)	Male (No. %)	Total	Odds ratio	P. Value
Skin color					
Pink	48 (14.8)	23 (11.4)	71 (13.5)	0.7388	0.2643
Normal	276 (85.2)	179 (88.6)	455 (86.5)		
Eye examination					
Pale (Yes)	69 (21.3)	15 (7.43)	84 (15.67)	3.3733	0.0001
Pale (No)	255 (78.7)	187 (92.6)	442 (84.03)		
Hygiene					

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Yes	168 (51.9)	99 (49)	267 (50.8)	1.1204	0.5261
No	156 (48.1)	103 (51)	259 (49.2)		
Hand					
Pale (Yes)	14 (4.3)	5 (2.5)	19 (3.6)	1.7794	0.2759
Pale (No)	310 (95.7)	197 (97.5)	507 (96.4)		
Hair nits					
Yes	24 (7.4)	4 (2)	28 (5.3)	3.9600	0.0120
No	300 (92.6)	198 (98)	498 (94.7)		
Hair lies					
Yes	22 (6.8)	4 (2)	26 (4.9)	3.6060	0.0200
No	302 (93.2)	198 (98)	500 (95.1)		

Overall, 86.5% of them had normal skin. In terms of eye examination, 16% had pale eyes with a significant difference between males and females. Hair nits and lice were recorded at around 8.0% in female subjects, with a significant difference compared to male subjects. Visual acuity was illustrated in (Table 3).

Table 3. Visual impairment for male and female subjects

Parameters	Female (No. %)	Male (No. %)	Total	Odds ratio	P. Value
Assessment of Vision					
1/6	2 (0.62)	1 (0.5)	3 (0.57)		
2/6	6 (1.85)	1 (0.5)	7 (1.3)		
3/6	11 (3.4)	7 (3.5)	18 (3.4)		
4/6	32 (9.9)	15 (7.4)	47 (8.9)		
5/8	62 (19.1)	26 (12.9)	88 (16.7)		
6/6	211 (65.1)	152 (75.2)	363 (69.01)		
Upon Chi-squared:	P < 0.0001	P < 0.0001			
Conversion					
Yes	4 (1.2)	3 (1.5)	7 (1.3)	0.8292	0.8076
No	320 (98.8)	199 (89.5)	519 (98.7)		
Color vision					
Yes	7 (2.2)	2 (0.99)	9 (1.7)	2.2082	0.3262
No	317 (97.8)	200 (99)	517 (98.3)		
Oclomotor					
Not good	9 (2.8)	2 (0.99)	11 (2.1)	2.8571	0.1822
Good	315 (97.2)	200 (99)	515 (97.91)		

It was discovered that female students had a comparatively higher prevalence of moderate vision impairment. Oral ulcer, teeth dental caries, oral thrush, and Sore throat were found to be relatively higher among female students (Table 4). The main clinical signs of the overall subjects were analyzed (Table 5). Except presences of rash, all previous conditions were found to be relatively higher among female students. In the same Table: levels of pulse rate were low with 4.6 and 6.9% in females and male respectively. (Table 6) shown presence of chronic diseases. High prevalence was noticed with allergic conditions, with 9.6 and 10.9% in female and male subjects, followed by seizures, with 5.6% in female and 7.4% in male students. Asthma was recorded with different grades in both males and females.

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Table 4. Statistics of dental caries based on gender for the overall subjects

Parameters	Female (No. %)	Male (No. %)	Total	Odds ratio	P. Value
Mouth (Oral ulcer)					
Yes	25 (7.7)	9 (4.5)	34 (6.5)	1.7930	0.1439
No	299 (92.3)	193 (95.5)	492 (93.5)		
Teeth dental caries					
Yes	274 (84.6)	148 (73.3)	422 (80.2)	1.9995	0.0017
No	50 (15.4)	54 (26.7)	104 (19.8)		
Oral thrush					
Yes	16 (4.9)	2 (0.99)	18 (3.4)	5.1948	0.0292
No	308 (95.1)	200 (99)	508 (96.6)		
Sor throt recurrent					
Yes	14 (4.3)	8 (3.69)	22 (4.2)	1.0952	0.8408
No	310 (95.7)	194 (96)	504 (95.8)		

Table 5. Main clinical signs examination overall subjects' basis of gender

Parameters	Female (No. %)	Male (No. %)	Total	Odds ratio	P. Value
Fever					
Yes	35 (10.8)	10 (5)	45 (8.6)	2.3253	0.0227
No	289 (89.2)	192 (95)	481 (91.5)		
Arthritis					
Yes	8 (2.5)	2 (0.99)	10 (1.9)	2.5316	0.2431
No	316 (97.5)	200 (99)	516 (98.1)		
Fatigue					
Yes	10 (3.1)	2 (0.99)	12 (2.3)	3.1847	0.1375
No	314 (96.9)	200 (99)	514 (97.7)		
Chest pain					
Yes	8 (2.5)	3 (1.5)	11 (2.1)	1.6793	0.4479
No	316 (97.5)	199 (98.5)	515 (97.9)		
Chorea					
Yes	4 (1.2)	0 (0)	4 (0.8)	5.6864	0.2445
No	320 (98.8)	202 (100)	522 (99.2)		
Nodule					
Yes	4 (1.2)	0 (0)	4 (0.8)	5.6864	0.2445
No	320 (98.8)	202 (100)	522 (99.2)		
Rash					
Yes	6 (1.9)	5 (2.5)	11 (2.1)	0.7434	0.6282
No	318 (98.1)	197 (97.5)	515 (97.9)		
On antibiotic					
Yes	30 (9.3)	17 (8.4)	47 (8.9)	1.1104	0.7416
No	294 (90.7)	185 (91.6)	479 (91.1)		
Puls rate					
>70	15 (4.6)	14 (6.9)	29 (5.5)		
700-115	307 (94.8)	187 (92.6)	494 (93.9)		
<115	2 (0.6)	1 (0.5)	3 (0.6)		
Rhythm					
Regular	324 (100)	202 (100)	526 (100)	1.6025	0.8138
Not regular	0 (0)	0 (0)	0 (0)		
Volum					

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Good	323 (99.7)	202 (100)	525 (99.8)	0.5325	0.7000
Not Good	1 (0.3)	0 (0)	1 (0.2)		
Synchronized					
Yes	80 (24.7)	38 (18.8)	118 (22.4)	1.4150	0.1169
No	244 (75.3)	164 (81.2)	408 (77.6)		
Tremor					
Yes	0 (0)	0 (0)	0 (0)	0.6240	0.8138
No	324 (100)	202 (100)	526 (100)		
Rhumatoid					
Yes	0 (0)	0 (0)	0 (0)	0.6240	0.8138
No	324 (100)	202 (100)	526 (100)		
Enlargment lynph node					
Yes	16 (4.9)	13 (6.4)	29 (5.5)	0.7912	0.5423
No	308 (95.1)	189 (93.6)	497 (94.5)		
Lung (Equal)					
Yes	269 (83)	176 (87)	445 (84.6)	0.7225	0.2060
No	55 (17)	26 (13)	81 (15.4)		
Dimnished					
Yes	3 (0.9)	5 (2.5)	8 (1.5)	0.3682	0.1746
No	321 (99.1)	197 (97.5)	518 (98.5)		
Add sound					
Yes	4 (1.2)	2 (0.99)	6 (1.1)	1.2500	0.7977
No	320 (98.8)	200 (99)	520 (98.9)		
S1S2 (heart sounds)					
Yes	0 (0)	0 (0)	0 (0)	0.6240	0.8138
No	324 (100)	202 (100)	526 (100)		

Table 6. Presence of chronic diseases in the overall 526 students

Parameters	Female (No. %)	Male (No. %)	Total	Odds ratio	P. Value
Asthma					
No	301 (92.9)	192 (95)	493 (93.7)		
Intermittent	4 (1.2)	1 (0.5)	5 (1)		
Mild	5 (1.5)	4 (2)	9 (1.7)		
Moderate	3 (0.9)	1 (0.5)	4 (0.8)		
Severe	0 (0)	0 (0)	0 (0)		
Exercise	11 (3.4)	4 (2)	15 (2.9)		
Allergies					
Yes	31 (9.57)	22 (10.89)	53 (10.1)	0.5864	0.0948
No	293 (90.4)	180 (89.1)	473 (89.9)		
Diabetes					
Yes	1 (0.3)	1 (0.4)	2 (38)	0.6223	0.7378
No	323 (99.7)	201(99.5)	524 (99.6)		
Seizures					
Yes	18 (5.6)	15 (7.4)	33 (6.3)	0.7333	0.3912
No	306 (94.4)	187 (93.6)	493 (93.7)		
Congenital heart disease					
Yes	0 (0)	2 (1)	2 (0.4)	2.7778	0.1942
No	324 (100)	200 (99)	524 (99.6)		
Skin disorder					
Yes	0 (0)	2 (1)	2 (0.4)	2.7778	0.1942

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No	324 (100)	200 (99)	524 (99.6)		
Celiac dis					
Yes	0 (0)	0 (0)	0 (0)	0.6240	0.8138
No	324 (100)	202 (100)	526 (100)		

Discussion

In this study, the prevalence of underweight was higher than the prevalence of overweight and obesity. Boys in the current study were found to be thinner than girls; this meant that girls are more at risk of developing obesity. The prevalence of childhood obesity varies across populations [14]. This result is less than a report from Tripoli City in Libya found that (8.4%) of students are obese [15], and another study in Punjab, Pakistan reported that 10.7% of children aged 9–16 was classified as obese [16]. These findings were in disagreement with the study at same City [17]. A total of 526 student 24.5% of them, were identified as short stature without a difference between male and female. This result is similar to a report from Tripoli City in Libya [15], Taif City in Saudi Arabia [18], and in Kashmir, India, with student at same age [19].

Overall, 86.5% of them had normal skin. 16.0 % had pale eyes with a significant difference in deference between males and female which is similar to previous studies in Taiwan [20] and in Wardha [21]. Hair nits and lice were recorded at around 8.0% in female subjects. This result is almost similar to previous studies conducted in Misurata [22]. However, this result is differed than previously studied in other cities in Libya in Benghazi [23] and in Sebha [24]. The lifestyle, season, geographic distribution, personal cleanliness habits, and the quantity of cases in each research could all be contributing factors to these variations in infestation rates. Visual acuity was analyzed. Current finding was comparable with a study done in Darnah City, which found the prevalence of refractive error [25]. Meanwhile, the prevalence of refractive error was lower than that in the in Ethiopia [26] and Sudan [27] for children around the same age. The study's discovery of refractive error may have been caused by familial and/or heritable factors.

Racial and environmental variety, as well as certain countries' low accessibility, availability, price, and knowledge of pediatric eye care services, could also have contributed to this [10]. It was discovered that female students had a comparatively higher prevalence of moderate vision impairment. This aligns with comparable research conducted among primary school students in Riyadh, Saudi Arabia [28] and Qatar [29]. However, it was in disagreement with the study done in Sudan that found the prevalence of visual acuity impairment was slightly higher among boys as compared to girls [30].

Dental caries was found to be relatively higher among female students. Previous studies in Libya found that the total caries prevalence of 78.0% among first-grade children in Tripoli [31], 55.0% of children aged 6 years in Zawia and Zehra [32], and 63.5% of children in Benghazi [33]. This finding could be explained by the well-known facts that girls tend to erupt permanent teeth earlier than boys do, and that they are exposed to dental caries risk factors for a longer duration of time [34]. Presence of fever, arthritis, fatigue, chest pain, nodule, rash, and using antibiotic were ranged from 8.7-0.8%.

These are the main symptoms of Rheumatic fever. Although it can happen at any age, Rheumatic fever is far less common in resource-rich countries than it is in resource-poor ones. This is likely due to the widespread use of antibiotics to treat streptococcal infections at an early stage. However, for unexplained causes, the prevalence of rheumatic fever might occasionally grow or decrease in a given location [35]. Other clinical signs were low in both genders. This observation may be related to the results above of BMI. In a previous study, the correlation between pulse rate and age was consistent for all ages between 6 and 18 years old, and BMI was associated to puls rate in both genders [36]. According to a previous study, children aged 6 to 9 were more likely than children of other ages to have asthma. The younger kids are exposed to a variety of allergies and pathogens [37]. In another study at same City found that the prevalence of positive cases with food allergens ranged from 19.0-20.0% in 1- to 4-year-old children [38], and the prevalence of asthma was similar in both male and female [39]. Presence of seizures was recorded. In the United States, children and adolescents aged 6 to 17 were reported to have experienced seizures [40].

Conclusion

There was variation in the prevalence of health issues among elementary school pupils. Dental cavities, refractive errors, underweight, low stature, and the presence of allergies and asthma were the most prevalent health issues. Compared to boys, girls experienced a much larger number of these issues. To address these issues, primary schools should put in

place suitable school health initiatives. Children's cognitive capacities are influenced by their diet and overall health, which in turn influences how effectively they learn.

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Disclaimer
The article has not been previously presented or published, and is not part of a thesis project.

Conflict of Interest
There are no financial, personal, or professional conflicts of interest to declare.

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