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Prevalence of overweight/obesity and associated factors in children underfive years – of age in Marrakesh, Morocco

Overweight/obesity and factors in under-five-year-old children in Morocco

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Abstract

Aim: Childhood overweight and/or obesity is becoming a significant public health problem in the 21st century. This study aimed to determine the prevalence of overweight/obesity and its determinants among under-five children in Marrakesh, Morocco.

Material and Methods: A community-based cross-sectional study design was used to determine the prevalence of overweight/obesity and its associated factors among children under five years of age. A structured questionnaire was used to collect data from 450 children paired with their mothers. Anthropometric measurements and determinant factors were collected. SPSS version 19.0 statistical software was used for the analysis. Multivariate logistic regression analysis was conducted to identify factors associated to overweight/obesity in children. Statistical association was declared significant if p- value was less than 0.05.

Results: In this study, the prevalences of overweight and obesity were 112 (24.9%) and 84 (18.7%), respectively. Mother's age, parental educational level and birth order were significantly associated with the problem.

Discussion: The current study showed a relatively high prevalence of overweight/obesity among children under five years of age. Mother's age, parental educational level and birth order were the predictors of overweight/obesity. Therefore, nutritional educational intervention programs in Marrakesh province should focus on these factors.

Keywords

Overweight/Obesity, Under age of five, Children; predictors, Marrakesh, Morocco

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Introduction

According to the World Health Organization (WHO), overweight and obesity are defined as abnormal or excessive fat accumulation that can impair health. Childhood obesity has been progressively increasing over the last few decades, being considered a worldwide epidemy by the WHO. Thus, it is estimated that 43 million children under 5 years are overweight worldwide, including 35 million in developing countries and 8 million in developed countries. Furthermore, 92 million children are at risk of being overweight [1].

The worldwide increase is related to the nutrition transition, including urbanization, economic growth, and globalization, leading to lifestyle changes, including reduced physical activity and poor dietary habits with increased intake of highly processed, high-energy foods [2]. Although childhood overweight and obesity have been considered the problems of high-income countries, they are now on the rise in low- and middle-income countries like Morocco. While these countries continue to deal with the problems of infectious diseases and undernutrition, childhood overweight and obesity are the "double burdens" and the most serious public health challenges of the twenty-first century. Since 2000, the number of overweight children under the age of 5 has increased by nearly 24% in Africa according to WHO.

Overweight/obesity during the childhood period affects physical and psychological health with the likelihood to stay obese during the adulthood period. According to WHO, childhood overweight and obesity are linked to more deaths than underweight and are associated with a higher chance of breathing difficulties, increased risk of fractures, hypertension, early markers of cardiovascular disease, insulin resistance, psychological effects, and adulthood obesity, premature death, and disability and resulting in an increased risk of non-communicable diseases and reproductive disorders later in their life .

Several studies have been dedicated to identifying risk factors for excess weight in children, such as birth weight [3], breastfeeding [4], family income [5], environmental factors [6] and socioeconomic status [7].

Indeed, studies on breastfeeding have shown a protective effect on the development of child obesity. However, this relation is yet quite controversial in the literature, because of its delineations, samples and different diagnostic methods, making the comparison between them rather difficult [4].

WHO (1988) indicates the importance of early life overweight and/ or obesity management used for mitigating the risk of obesity later in life. Globalization and nutrition transition improved the living standards of individuals. However, they had some negative consequences that directly or indirectly led to poor dietary consumption and physical activity patterns. Because of this, the occurrence of overweight and/or obesity among children under five years of age, besides diet-related chronic non-communicable diseases later in life increased persistently.

In Morocco, literature on overweight/obesity in children under five years of age is scarce, except for data from Pan Arab Project for Child Development (PAPCHILD 1997), which has shown that undernutrition persists among children under five years of age (24% stunting and 9% under-weight), while overweight is rising (13.7% in 1997 compared with 5.6% in 1987 for children under five years of age).

Indeded, determining the magnitude and identifying risk factors for child undernutrition in the study area is important to guide public health planners, policy makers and implementers to plan and design appropriate intervention strategies in order to enhance the nutritional status of children. Therefore this study was designed to estimate the prevalence of overweight/obesity and its associated factors among children under five years of age in Marrakesh province, Morocco.

Material and Methods

Research design

A community-based cross-sectional study was conducted from January to December 2020 in Marrakesh.

Data collection tool and procedures

A pretested, structured questionnaire was used to collect data. Five data collectors (clinical nurses) and two supervisors (pediatrician) were recruited for the task. To maintain consistency, the questionnaire was first translated from French to Arabic, the native language of the study area. It contains socio-demographic, environmental characteristics and healthcare conditions. Women were recruited from health centers that were selected on the basis of the following criteria: accessibility to our field team and a large attendance of women enough to cover the required number for the study age range.

Anthropometric data were collected using the procedure stipulated by the WHO (2006) for taking anthropometric measurements. Before taking anthropometric data for children, their age should first be determined to ensure the study population. The child's age was asked of the mother and confirmed with a birth certificate or vaccination cards.

Weight was measured by an electronic digital weight scale with minimum/lightly/clothing and no shoes. Calibration was done before weighing every child by setting it to zero [8].

In line with a study carried out by Brasilian Institute of Geography and Statistics, the length of children aged up to 24 months was estimated.

Overweight and obesity were determined according to the WHO definition. Overweight was defined as a BMI that was 2 standard deviations above the WHO growth standard median, and obesity was defined as a BMI that was 3 standard deviations above the WHO growth standard median [9].

Data processing and analysis

Data were entered into Epi-info version 7 and exported to the Statistical Package for Social Sciences (SPSS) version 19 for analysis. Descriptive statistics, including frequencies and proportions were computed and presented using texts, and tables. The multivariate logistic regression model was carried out. The technique was a backward stepwise regression method. Finally, a p-value of less than 0.05 in the multivariable logistic regression analysis was used to identify variables significantly associated with overweight/obesity.

Ethical considerations

Participation was voluntary and anonymous. Participants were informed about the study objective. All data were confidential and protected at all stages of the study. This study was performed in accordance with the ethical standards of the

committee and with the Helsinki Declaration. The study was approved by the institution of Maternal and Child Hospital. It was approved, and numbered with a Ref. (SAA N°252/2020).

Results

Socio-demographic and economic characteristics

A total of 450 mothers were included in the study. Nearly half (46.4%) of mothers were in the age range of 19–29 years. Two hundred nine (48.2 %) of the mothers and 132 (30.7%) of the fathers were illiterate. The majority (92.9%) of the mothers were housewives. One-quarter, (22.4%) of the households had lower income (Table 1).

Health service and environment related characteristics

About 250 (55.6%) of the children were males. The two-third, 307 (68.2%), of the households had a second newborn and above for birth order. A large proportion, 296 (65.8%), were primiparous. The majority (97.3%) of births were in a health institution. When the delivery way was considered, 77.3% of women delivered vaginally (Table 2).

Prevalence of overweight/obesity and feeding practices in children

In this study, the prevalences of overweight and obesity were 112 (24.9%) and 84 (18.7%) respectively. One-quarter of children (102 (21.8%)) children did not get the first milk (the colostrum). One-half (235 (52.2%)) of the children were on exclusive breastfeeding. About 128 (28.4%) of mothers had supplementation during pregnancy (Table 2).

Table 1. Socio-demographic and economic characteristics of sampled children

Characteristics	Total n=450	Percentage (%)
Mother's age groups (in years)		
19-24	104	23.1
25-29	96	21.3
30-34	120	26.7
35-39	95	21.1
40 and above	35	7.8
Mother's professional activity		
Housewife	418	92.9
Paid worker	32	7.1
Mother's educational level		
Illiterate	209	48.2
Primary school	143	32.9
Secondary school	48	11.1
Higher education	34	7.8
Husband educational level		
Illiterate	132	30.7
Primary school	161	37.4
Secondary school	57	13.3
Higher education	80	18.6
Household income		
Lower	101	22.4
Medium	274	60.9
Higher	75	16.7
Household size		
≤3	216	48.0
4–6	194	43.1
> 6	40	8.9

Factors associated with overweight/obesity among children under five years of age

In the bivariate analysis, mother's age, mother's education level, husband's education level, household size, birth order and parity were factors associated with overweight at a p-value of less than 0.05. Consequently, these variables were subjected to multivariate logistic regression analysis, and it was noted that mother's age, mother's education level, husband's education level and birth order were significantly associated with overweight/obesity at a p-value of 0.05.

According to the multivariable logistic regression analysis, the chances of having overweight/obese children among mothers younger 24 years of age were 8 times higher compared with mothers over 30 years of age (aOR = 8.806; 95% CI: (1.05-5.52)). The odds of overweight/obesity were more observed among children of parents with high educational level. Similarly, the odds of overweight children among the first baby in birth order were 8 times more likely compared to second and subsequent babies (aOR = 8.86 ; 95% CI: (1.09-6.47)) (Table 3).

Table 2. Child caring practices, nutritional status, feeding-related practices and maternal health service utilization

Characteristics	Total n=450	Percentage (%)
Sex of infant		
Female	200	44.4
Male	250	55.6
Birth order		
First	143	31.8
Second and above	307	68.2
Parity		
Primiparous	296	65.8
Multiparous	154	34.2
Place of birth		
Health institution	438	97.3
Home	12	2.7
Mode of delivery		
Vaginal/normal	348	77.3
Cesarean section	102	22.7
Feeding		
Exclusive breastfeeding	235	52.2
Formula	22	4.9
Combination of formula and breastfeeding	193	42.9
Timely initiation of breastfeeding within 1h		
Yes	352	78.2
No	102	21.8
Supplementation during pregnancy		
Yes	128	28.4
No	322	71.6
Overweight (BMI z-Scores >2 SD)	112	24.9
Obesity BMI z-Scores >3 SD)	84	18.7
Underweight (WAZ)	48	10.7
Stunting (HAZ)	156	34.7
Wasting (WHZ)	40	8.9
Complementary feeding started		
< 6 months	96	26.2
At 6 months	222	60.5
6–7 months	8	02.2
> 7 months	41	11.2

Discussion

Table 3. Factors associated with overweight/obesity among children under five years of age

Variables	Overweight/ obesity		x^2 test	Multivariate analysis	
	Yes n (%)	No n (%)	p-value	Adjusted OR (95% CI)	p-value
Mother's age groups (in years)					
19-24	04(3.8)	100(96.2)	<0.001*	8.806(1.05-5.52)	0.003*
25-29	36(37.5)	60(62.5)		1.468(0.74-3.51)	0.226
30 and above	72(28.8)	178(71.2)		1	
Educational level					
Illiterate	52(24.9)	157(75.1)	0.027*	1	
Primary school	32(22.4)	111(77.6)		0.53(0.48-4.92)	0.870
Secondary school	04(8.3)	44(91.7)		4.27(1.43-3.48)	0.008*
Higher education	12(35.3)	22(64.7)		9.58(1.02-4.47)	0.002*
Mother's professional activity					
Housewife	100(23.9)	318(76.1)	0.087	-	-
Paid worker	12(37.5)	20(62.5)			
Husband educational level					
Illiterate	28(21.2)	104(78.8)	<0.001*	1	
Primary school	36(22.4)	125(77.6)		0.23(0.04-0.32)	0.730
Secondary school	08(14.0)	49(86.0)		10.04(1.03-6.80)	0.007*
Higher education	36(45.0)	44(55.0)		16.04(1.03-7.80)	0.001*
Household size					
≤ 3	48(22.2)	168(77.8)	0.009*	2.95(0.86-9.26)	0.086
4–6	60(30.9)	134(69.1)		3.29(0.91-5.08)	0.069
> 6	04(10.0)	36(90.0)		1	
Household income					
Lower	20(19.8)	81(80.2)	0.405	-	-
Medium	72(26.3)	202(73.7)			
Higher	20(26.7)	55(73.3)			
Birth order					
First	16(11.2)	127(88.8)	<0.001*	8.86(1.09-6.47)	0.003*
Second and above	96(31.3)	211(68.7)		1	
Parity					
Primiparous	56(18.9)	240(81.1)	<0.001*	0.21(0.46-3.45)	0.642
Multiparous	56(36.4)	98(63.6)		1	
Place of birth					
Health institution	112(25.6)	326(74.4)	0.053	-	-
Home	0(0.0)	12(100)			
Mode of delivery					
Vaginal /normal	88(25.3)	260(74.7)	0.718	-	-
Cesarean section	24(23.5)	78(76.5)			
Feeding					
Exclusive breastfeeding	64(27.2)	171(72.2)	0.133	-	-
Combination of formula and breastfeeding	40(20.7)	153(79.3)			
Formula	08(36.4)	14(63.6)			
Supplementation during pregnancy					
No	24(18.8)	104(81.3)	0.058	-	-
Yes	88(27.3)	234(72.7)			
Complementary feeding started					
< 6 months	08(8.7)	84(91.3)	0.807	-	-
At 6 months	20(9.5)	190(90.5)			
6–7 months	0(0.0)	08(100.0)			
> 7 months	04(10.8)	33(89.2)			

In this study, the overall prevalences of overweight and obesity was 24.9% and 18.7%, respectively. In comparison with some African countries, our finding was higher than in studies conducted in Ethiopia [10], Cameron (8%) [11], sub-Saharan Africa (6.8%), Malawi 8.7% and Mozambique 7.7% [12].

The prevalences of overweight and obesity are high in developing countries. In accordance with analysis of economic viability, it was found that overweight prevalence showed a gradual reduction from upper-middle-income to low-income countries, with intermediate prevalence in lower-middle-income countries. According to some estimates, the prevalence of childhood obesity in Africa and Asia is still far below (<10%). The levels seen in the Americas and Europe were 20% [13].

Indeed, in a study in the United States, the prevalences of overweight and obesity in children were 31.7% and 16.9%, respectively [14]. Another study found that 25.6% of the children in the United States were obese [15]. These differences may stem from disparities in social and economic status.

The present study showed that maternal age was significantly associated with overweight/obesity in children under-five years of age. Indeed, the chances of having overweight/obese children among mothers younger 24 years of age were 8 times higher compared with mothers above 30 years of age. This result can be explained by the lack of experience among young mothers.

Furthermore, the likelihood of overweight/obesity was more often observed among children of parents with high educational level, which was supported by a study in India [16]. In Nepal, mothers are the primary caregivers of the children. Educated mothers have a higher chance of employment resulting in lesser time to monitor their children's physical activities or sedentary behaviors like watching TV, which in turn, significantly increases their BMI. Previous studies in Ethiopia [10], South Asia [17], sub-Saharan Africa [18], and Guangzhou, China [19] reported that children born from rich households were at high risk of overweight and/or obesity. Thus, financial well-being in the household is associated with obesogenic behaviors (high intakes of calories rich food and physical inactivity) [24].

The present study also showed that birth order was significantly associated with overweight /obesity of children under five years of age. Indeed, the first child in birth order was 8 times more likely to be overweight than the second child and subsequent babies (aOR = 8.86 ; 95% CI: (1.09-6.47)). In line with a study carried out in kindergartens in São Paulo with a sample of 556 children aged 4 to 84 months, having 2 or more siblings was a protective factor against overweight (aOR= 0.28) compared to children who had no siblings. In this later study, it was demonstrated that in children who were the only one in the family, the prevalence of overweight was 26% higher than in those who had one or more siblings [21]. The possible explanation might be the lack of experience in nutrition for the first baby.

Conclusions

Based on the findings of the current study, it can be concluded that in this community, the prevalence of overweight/obesity was higher. In addition, the study found that overweight/obesity was linked to various factors. Mother's age, parental education level and birth order were significantly associated with the problem. These findings indicate the need for broader

and longer-term interventions focusing on maternal and child nutrition promotion to reduce overweight/obesity among children under five years of age.

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Scientific Responsibility Statement
The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement
All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest
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