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Prevalence and Risk Factors of Stunting among Under-5 Years Children Attending Primary Healthcare Units in Gharbia Governorate

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ABSTRACT

Background: Growth is a typical characteristic of childhood; it is regarded as the best global indicator of children's well-being as growth impairment has both short- and long-term consequence. This cross sectional study aimed to measure prevalence of stunting among under 5 years children and to determine risk factors of stunting among under 5 years children.

Methods: This cross sectional study conducted on 317 children under 5 years children in Gharbia governorate.

Results: Our study, found that 33.7% were categorized as stunted. Mother's age was higher in the Stunted group (31.32 years) compared to the Non Stunted group (26.91 years). A higher proportion of children in urban areas were stunted. There were significant differences in socioeconomic status, with a higher percentage of the Stunted group in lower categories and a lower mean socioeconomic score.

Conclusion: Several significant findings emerged from the study, including a higher mean age of mothers in the stunted group compared to the non-stunted group, a higher proportion of stunted children in urban areas. Other significant associations were observed with birth order, birth interval, tonsillitis, delayed growth, anemia, cardiac diseases, family history of stunting, maternal education, per-capita income, socioeconomic status and weight measurement. However, child age, child sex, antenatal clinic visits, sewage disposal and refuse disposal did not show significant differences between the stunted and non-stunted groups.

Keywords: *Prevalence- Risk Factors - Stunting – Children Under 5 Years.*

1. INTRODUCTION

Assessment of a child's height and weight is well established as an indicator of his general health and well-being. Such assessment can also lead to the identification of treatable disorders in the apparently normal child. Early detection and diagnosis of causes of short stature help to optimize final adult height and minimize the impact of any underlying health condition. However, children are frequently diagnosed at a late age. (1).

In children the three most commonly used anthropometric indices to assess their growth status are weight-for-height, height-for-age and weight-for-age. Low height-for-age: Stunted growth reflects a process of failure to reach linear growth potential as a result of suboptimal health and/or nutritional conditions. (2).

Stunting is defined as height-for-age z-score (HAZ) of equal to or less than minus two standard deviation (-2 SD) below the mean of a reference standard. It is a well-established child-health indicator of chronic malnutrition which reliably gives a picture of the past nutritional history and the prevailing environmental and socioeconomic circumstances. (1).

Stunting results from long-term nutritional deprivation, inadequate childcare and poor environmental and socio-cultural conditions. It is associated with higher morbidity and mortality, delayed mental development, poor educational achievement and reduced intellectual capacity, and is a strong predictor of human capital and social progress. (3).

Stunting results from complex interaction of household, environmental, socioeconomic and cultural influences that are described in the world health organization (WHO) conceptual framework on childhood stunting (4).

Stunting is a major public-health problem in low and middle-income countries because of its association with increased risk of mortality during childhood. Apart from causing significant childhood mortality, stunting also leads to significant physical and functional deficits among survivors (5).

In 2010, it is estimated that 171 million children (167 million in developing countries) were stunted. Globally, childhood stunting decreased from 39.7% (95% confidence intervals (CI) 38.1, 41.4) in 1990 to 26.7% (95% CI 24.8, 28.7) in 2010. This trend is expected to reach 21.8% (95% CI 19.8, 23.8), or 142 million, in 2020. While in Africa stunting has stagnated since 1990 at about 40% and little improvement is anticipated, Asia showed a dramatic decrease from 49% in 1990 to 28% in 2010, nearly halving the number of stunted children from 190 million to 100 million. (6)

According to Egypt Demographic and Health Survey (EDHS) 2014, stunting remains a very important problem in Egypt, as 21 % of children less than 5 years old suffer from stunted growth. (7)

Child growth is internationally recognized as an important indicator of nutritional status and health in populations. Stunting (low height-for-age) is acknowledged as the best indicator for child growth. It indicates chronic under-nutrition and reflects the cumulative effects of under-nutrition and recurrent infections. Child under-nutrition is estimated to be the largest contributor to global burden of disease, killing millions of children in the developing countries and causing heavy health expenditures (4).

Nutrition assessment is considered the best way to determine the nutritional needs. It provides evidence-based information for planning and evaluating programs aiming at reduction of the burden of malnutrition (7).

According to the latest EDHS 2014, one in every five children is stunted. Less than 10% of children are wasted or underweight. Stunting and underweight are very similar to rates reported in 2000 and 2005 while wasting is increasing slightly over time. More than one in four children in Egypt suffers from some degree of anemia. Ten percent were found to be moderately anemic (6).

Our nation performs better than other low/ middle-income neighbor countries, but some countries with similar income have lower rates of child stunting: Malnutrition can be caused by a variety of factors such as insufficient food intake, infections, psychosocial deprivation, an unsanitary environment, social inequality, and possibly some genetic contribution (7).

Malnutrition has an impact on the community in both direct and indirect ways. The occurrence of subclinical nutritional deficiency diseases such as kwashiorkor and marasmus is a direct effect. The indirect effect is that nations are trapped in intergenerational cycle of poor nutrition, illness, and poverty (8).

According to Egypt's Cost of Hunger Study, the economic and social cost of child malnutrition is 20.3 billion EGP. Without measures to combat and eliminate undernutrition, this cost is projected to rise by approximately 32% by 2025, so systematic response within the national health agenda is needed (9).

The aim of this study was to measure prevalence of stunting among under 5 years children in Gharbia governorate and to determine risk factors of stunting among under 5 years children in Gharbia governorate.

2. PATIENTS AND METHODS

The study was conducted through the following phases

Preparatory phase

1- Survey of literature**:** a review of literature was conducted in order to help in the proper understanding, identify tools and to design and prepare the research questionnaire.

2- Instruments and tools**:**

- A Questionnaire was used in data collection.
- Anthropometric measurements: Tape and digital electronic scale were used to measure height and weight respectively.

3- Study setting**:**

The study was carried out in Gharbia governorate

Sample frame: all primary healthcare units at Gharbia governorate.

- Sample technique: Multistage random sample was taken from Gharbia governorate (which has 8 health districts) to choose 3 health districts.
- From each one of the three chosen health districts, stratified random sample was taken to choose one urban and one rural primary health care units .
- So, the study included (randomly):

Three urban primary health care units

Three rural primary health care units

4- Study Design**:**

- A cross sectional study was conducted on the studied sample to investigate the current topic.
- After calculating prevalence, risk factors were concluded.

5- Administrative and Ethical consideration**:**

- Concerning the health facilities entry and to avoid any problem may occur during the work, a written permission were taken from Gharbia governorate health authority.
- Verbal consent was taken from the interviewed subject who participated in the study.

❖ Implementation Phase**:**

1- Sampling technique: Multistage random sample was performed. Tanta, Zefta and Elmahalla Elkubra districts were chosen from each one of them, one urban and one rural primary health care units were chosen.

2- Sample size: Accordingly, the following formula was used (10)

$n = p (1-p) * Z\alpha 2/ME2$

Where

n = minimum sample size

Zα = 1.96 at 95% confidence interval, obtained from standard statistical table of normal distribution,

p = 0.25 (recent prevalence of WHO is 30%, recent prevalence of EDHS is 21% . so, range is 25%)

(1-p) = 0.75

ME = margin of error (0.05).

n= 288(+ 10 % for fear of drop outs of cases) = 317

3- Pilot Study: was carried out in 10 % of the studied sample.

The aim of pilot study:

- To formulate the final form of the questionnaire.
- To determine the time needed to complete the filling of the questionnaire.
- To assess subject's impression ,reaction and cooperation with the study.

4- Data Collection**:**

All subjects were subjected to the following:

History Assessment of socioeconomic standard according to (11)

- Personal data: name, age, sex, birth order and residence.
- Past and present history**:**
    - Delivery factors as antenatal clinic visits, birth order, type of feeding, duration of breastfeeding, weaning, adequate nutrition and birth interval (The period between two successive live births, from birth date to birth date).
    - History of diseases as frequent gastroenteritis, asthma, anemia, cardiac diseases, tonsillitis, delayed growth, history of operation, hospitalization and its causes.
- Housing condition**.**

- History of medications.
- Family history: history regarding stunting in first and second degrees.
    - Anthropometric measurement**.**
        - Weight: Weight was measured on a digital electronic scale.
        - Height: Height was measured using tape.

Stunting is defined as height-for-age z-score (HAZ) of equal to or less than minus two standard deviation (-2 SD) below the mean of a reference standard. (1).

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 (12).

Statistical Analysis

The collected data were tabulated and analyzed using SPSS version 24 software (Spss Inc, Chicago, ILL Company). Categorical data were presented as number and percentages. Chi square test (X2), were used to analyze categorical variables. Quantitative data were expressed as mean ± standard deviation, median and range. Student "t" test was used to analyze normally distributed variables among 2 independent groups.

P value was considered significant as the following:

* P > 0.05: Non significant

* P ≤ 0.05: Significant

3. RESULTS

Table (1) showed among the children, 58.4% are female and 41.6% are male. Regarding residence, 47.3% live in rural areas, while 52.7% reside in urban areas. 107 children, constituting 33.7%, are categorized as stunted. On the other hand, 210 children, constituting 66.3%, are not stunted.

Table (2) shows: mother's age exhibited a statistically significant difference between the two groups, with the Stunted group having a higher mean age (31.32 years) compared to the Non stunted group (26.91 years). Additionally, birth order showed a significant difference, with the Stunted group having a higher mean birth order (3.26) compared to the Non stunted group (2.90). Child age and sex did not show significant differences between the two groups.

Table (3) shows that regarding residence type (Rural vs. Urban) demonstrated a significant association with stunting, with a higher proportion of children in the urban area being stunted.

Mean value of birth interval was significantly lower among stunted group compared to Non stunted group **(Table 4).**

Family history regarding stunting was significantly higher among stunted group compared to Non stunted group **(Table 5).**

There was statistically significant difference between stunted group and Non stunted group regarding categories of socioeconomic. Mean value of Total Score of socioeconomic was significantly lower among stunted group compared to Non stunted group **(Table 6).**

There was statistically significant difference between stunted group and Non stunted group regarding Weight measurement **(Table 7).**

Table (1): Demographic data and prevalence of the Stunted among the studied children

		No.	**%**
Child Sex	**Female**	185	**58.4**
	Male	132	**41.6**
Residence	**Rural**	150	**47.3**
	Urban	167	**52.7**
Studied Children	**Stunted**	107	**33.7**
	Non stunted	**210**	**66.3**

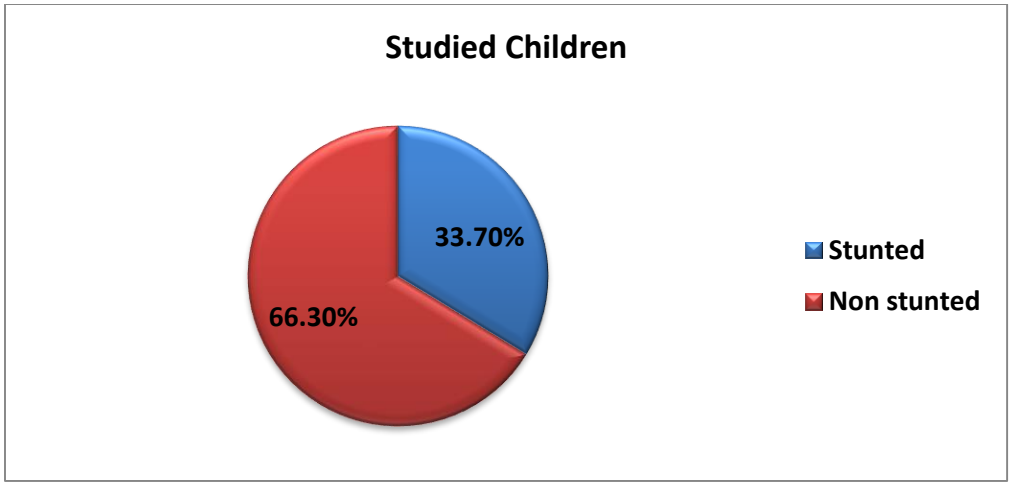

Fig 1: Prevalence of the Stunted among the studied group.

Table (2): Comparison between Stunted group and Non stunted group regarding Personal data.

			Stunted group	Non stunted group	t. test	P. value	Odds Ratio	%95 CI
Mother age per year	**Mean ± SD**		31.32± 3.80	26.91± 1.97	13.598	.000		
Child Age per month	**Mean ± SD**		31.55± 11.38	30.54± 15.59	.596	.552		
Child Sex	**Female**	**No.**	67	118	X^2 1.205	.272	.915	**.783-1.070**
		%	62.6%	56.2%				
	Male	**No.**	40	92				
		%	37.4%	43.8%				
birth order	**Mean ± SD**		**3.26± 1.45**	**2.90± 1.42**	**2.150**	**.032**		

Table (3): Comparison between Stunted group and Non stunted group regarding Residence.

			Stunted group	Non stunted group	t. test	P. value	Odds Ratio	%95 CI
Residence	**Rural**	**No.**	27	123	X^2 31.603	.000	1.574	**1.336-1.854**
		%	25.2%	58.6%				
	Urban	**No.**	80	87				
		%	**74.8%**	**41.4%**				

Table (4): Comparison between Stunted group and Non stunted group regarding birth interval.

		Stunted group	Non stunted group	t. test	P. value
birth interval	**Mean ± SD**	**2.25± .837**	**2.82± .856**	**-5.617**	**.000**

Table (5): Comparison between Stunted group and Non stunted group regarding Family history regarding stunting.

			Stunted group	Non stunted group	X^2	P. value	Odds Ratio	%95 CI
Family history regarding stunting	**No**	**No.**	73	192	27.832	.000	2.093	**1.430-3.063**
		%	68.2%	91.4%				
	Yes	**No.**	34	18				
		%	**31.8%**	**8.6%**				

Table (6): Comparison between Stunted group and Non stunted group regarding categories of socioeconomic and Total Score of socioeconomic.

			Stunted group	Non stunted group	X^2	P. value
categories of socioeconomic	**=>70% (High)**	**No.**	0	38	85.612	**.000**
		%	.0%	18.1%		
	40 to <70% (Medium)	**No.**	74	172		
		%	69.2%	81.9%		
	<40% (Low)	**No.**	33	0		
		%	30.8%	.0%		
Total Score of socioeconomic	**Mean ± SD**		**20.56± 3.18**	**29.58± 4.09**	**-19.904**	**.000**

Table (7): Comparison between Stunted group and Non stunted group regarding weight measurement.

			Stunted group	Non stunted group	X^2	P. value	Odds Ratio	%95 CI
Weight measurement	**Normal**	**No.**	66	173	19.506	.000	0.22	**(0.1, 0.47)**
		%	61.7%	82.4%				
	Obese	**No.**	21	12			0.48	**(0.25, 0.92)**
		%	19.6%	5.7%				
	Overweight	**No.**	20	25				
		%	**18.7%**	**11.9%**				

4. DISCUSSION

Our study showed among 107 children, constituting 33.7%, were categorized as stunted. On the other hand, 210 children, constituting 66.3%, were not stunted.

In accordance, Akram et al. (13) observed that the overall prevalence of stunting was 36.3%.

Our finding was also considerably higher than the stunting percentage of 20.3% found in a study from Minia, Egypt (14).

Farahat et al. (3) showed that the prevalence of stunted growth was 13.32% of the study sample and prevalence of children with normal height was 86.68

This prevalence was slightly lower when compared with the national surveys included in the WHO. The prevalence of childhood stunting was 26.7% in 2010, whereas in Africa the prevalence of childhood stunting was about 40% in 2010 (15).

In our study, mother's age exhibited a statistically significant difference between the two groups, with the Stunted group having a higher mean age (31.32 years) compared to the Non stunted group (26.91 years).

On the other hand, Hagag et al. (7) reported that, mother age at giving her first birth was considered a contributing risk for malnutrition especially stunting, where children of mothers giving birth at younger ages were 5 times more likely to be stunted.

This result was contradicted by Sultana et al. (16) in Bangladesh where more stunted children belong to younger mothers.

In our study, residence type (Rural vs. Urban) demonstrated a significant association with stunting, with a higher proportion of children in the Urban area being stunted.

Nomura et al. (17) also found regional differences in child stunting. Their findings indicated that compared to women in the capital, those from rural areas have a lower risk of stunting. This may suggest that the environment in which the mother lives can have a great impact on her child's growth and development. The availability of resources such as health care facilities, health care professionals, and accessibility to health facilities might have played a vital role in bringing these disparities in stunting prevalence across various municipalities.

Akram et al. (13) found that the prevalence of stunting was higher among rural children when compared to urban children. This can be explained by the fact that lower education, poor socioeconomic status, scarcity of potable water supply, prevalence of infectious disease, and poor nutritional knowledge persist more in rural areas than in urban ones. Furthermore, the knowledge on infant and young child feeding practices was also poor among rural mothers (18). Moreover, the rapid urbanization and high poverty had an effect on malnutrition (19).

In our study, child age and sex did not show significant differences between the two groups.

In contrast, Nomura et al. (17) reported that, child's sex and age were significantly associated with child stunting.

Our results also contradict with a previous study, stunting was statistically associated with increasing child age in children aged 0–59 months. (20).

In our study, mean value of birth interval was significantly lower among stunted group compared to Non stunted group.

This is in accordance with Rana and Goli, (21) who showed that children born following a long birth interval have a lower risk of malnutrition for all birth orders. The importance of birth intervals decreases with increasing birth order.

In harmony, Mohamed et al. (22) revealed several sociodemographic factors that were significantly inversely associated with stunting, including the spacing between the child and previous siblings.

These findings were consistent with those from previous investigations of associations between stunting and family planning practices (23).

In our study, there was statistically significant difference between Stunted group and Non stunted group regarding categories of socioeconomic. A low category was more prevalent among stunted group compared to Non stunted group.

In our study, mean value of Total Score of socioeconomic was significantly lower among Stunted group compared to Non stunted group (30.8%). A medium category was more prevalent among stunted group compared to Non stunted group (69.2%).

Higher socioeconomic positions are likely to represent better living conditions with higher affordability, which again contributes to better child care and improved feeding practices. This leads to a decline in the occurrence of different forms of malnutrition (24).

In accordance, Farahat et al. (3) reported that, stunting was higher among children of middle socioeconomic status (48.3%) compared with those of low socioeconomic status.

This is in agreement with the study by Larrea and Kawachi (25), who reported that the association between child stunting and socioeconomic status in the Northeast region of Brazil decreased from 34% in 1986 to 6% in 2006 with improved a socioeconomic level of their family.

Another study by Rivera et al. (26) reported that ~53% of children under 5 years of age from the middle socioeconomic level were stunted compared with only 34% of those in the highest socioeconomic level.

Hagag et al. (7) reported that, social level was a predictor of being underweight, where children of lower social level were 1.1 times more likely to be underweight. This could be explained by the purchasing power of family to obtain nutritious food in adequate quantities. Besides, Hemoglobin (Hb) level was significantly associated with underweight, where children with lower HB levels were 2.6 times more likely to be underweight.

In our study, there was no statistically significant difference between Stunted group and Non stunted group regarding Sewage disposal.

In our study, there was statistically significant difference between Stunted group and Non stunted group regarding Weight measurement. Obese and overweight were more prevalent among stunting group compared to Non stunted group.

El-Shafie et al. (27) reported that about 21.8% of the children were overweight and obese, it is much close to the global prevalence which has risen dramatically from just 4% in 1975 to over 18% in 2016 (28). El-Shafie et al. (27) reported that children from families with sufficient income and higher Socioeconomic Status (SES) have significantly more positive deviation from mean Body Mass Index (BMI) for age Z-score compared with other children. This phenomenon was found also in developing countries, where fatness of children is related to wealth and poor children are struggling with under nutrition (29). This relation was found to be more complex as in United States and United Kingdom low SES families have higher risk of obesity and overweight (29). The high percentage of both under nutrition and overweight was explained by the nutritional scenarios of the developing countries due to socio-economic and demographic transition, dietary habits, lifestyle modification and increasing risks of non-communicable diseases (5).

Also there is a great improvement in the levels of overweight in comparison to Egypt Demographic and Health Survey 2015 which showed overweight prevalence 35 and 36.6% in males and females respectively in the same age group (30).

5. CONCLUSION

Several significant findings emerged from the study, including a higher mean age of mothers in the stunted group compared to the non-stunted group, a higher proportion of stunted children in urban areas. Other significant associations were observed with birth order, birth interval, tonsillitis, delayed growth, anemia, cardiac diseases, family history of stunting, maternal education, per-capita income, and socioeconomic status. However, child age, child sex, antenatal clinic visits, sewage disposal, refuse disposal, and weight measurement did not show significant differences between the stunted and non-stunted groups.

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