Prevalence of Nutritional Stunting and its Associated Factors among Children Under two Years at Sohag Governorate

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Abstract

Stunting is a key marker of chronic under-nutrition with vast prevalence across all developing regions. **Aim:** To determine the prevalence of nutritional stunting and its associated factors among children under two years at Sohag Governorate. **Methods:** Cross sectional study. **Research design:** Descriptive research design. **Setting**: Maternal and Child Health centers at Sohag Governorate. **Sample**: Involved 350 children under two years. **Tools: Tool (1): Part (1):** Socio-demographic characteristics; **Part (2):** Medical and obstetrical history of mothers; **Part (3):** Medical history of the child. **Part (4):** Mothers' knowledge about nutritional stunting. **Tool (2):** Included anthropometric measurements of children. **Tool (3):** Was included child feeding practices as reported by their mothers. **Results:** Showed that18.6%, 16.3% and 26.6%of children were stunted, underweight and wasted respectively. Logistic regression analysis model showed that significant predictors of stunting among the included children were gender, mothers' occupation and duration of exclusive breastfeeding. **Conclusion:** A sizable portion of children under two years at Sohag are stunted and wasted. **Recommendations:** Health education program about nutritional stunting and its hazards is to be constructed and recommended to increase awareness of mothers.

Keywords: Anthropometric measurements, Children under two years, Mothers, Prevalence, Risk factors & Stunting.

Introduction

Under-nutrition in children begins in the first 1000 days post-conception to two years of age and influences child's early growth and development, it continues to be a problem in low-and middle-income countries and affects child survival. Stunting is a key marker of chronic under-nutrition and it is at the top of discussion because of its vast prevalence across all developing regions and its important consequences for health and development (**Behrman et al, 2019, Chungkham et al, 2020 & Prabhu et al, 2020)**.

Globally, 151 million under-five children were stunted; of which Africa and Asia account for 39.1% and 57.6%, respectively. Significant rate of stunting among Egyptian children; 29 % of children under 5 years of age were stunted and 14 % were severely stunted (the largest number of stunted children in the Middle East and North Africa (MENA) region). National incidence of Stunting is: Menya 26.2 %, Asyut 32.6% and Sohag 25.8% (**United Nations Children's Fund (UNICEF), 2019ₐ and Egyptian Demographic and Health Survey (EDHS), 2019 &UNICEF, 2019_b)**.

Stunting is a global problem with chronic malnutrition caused by lack of nutritional intake in the past and conditions of failure to achieve physical development as measured by height for age, children who are stunted are vulnerable to morbidity and mortality during childhood and have much higher risk of developing deficits in later-life, including adult height, cognitive and intellectual ability and as a consequence, on schooling attainment, productivity and learning (**Luluket et al, 2020)**.

Maternal under-nutrition during pregnancy accounts for 20% of childhood stunting by causing intrauterine growth restriction. The foundation for brain development and future growth is being formed during these critical days. In addition, the childhood period particularly the first five years is the special time for future optimal development, growth and health of a child. Unfortunately, micronutrient deficiencies (iodine and iron) are prevalent during this period (**Solomon et al, 2021)**.

Health and well-being of pregnant and lactating woman is directly connected to the growth and health of the infant. The right nutrition for the mother and for the child during this time can have a profound impact on the child's growth and development to reduce disease risk, as well as protect mother's health (**UNICEF/World Health Organization (WHO) /World Bank, 2020)**.

Community health nurse should direct specific intervention or activity towards the first 1000 days of children life. In general, these activities are carried out by the health sector, such as immunization, supplementary feeding for pregnant women and infants, monitoring the growth of infants, supplementation of iron-folate tablets for pregnant women, promotion of exclusive breast feeding and supplementary feeding **(Fanzo et al, 2020)**.

Every child at birth must be given the best food according to the recommendations of the infant and young child feeding by UNICEF /WHO. The important variables in this phase are Early Initiation of Breastfeeding (EIB), colostrum, exclusive breast feeding, complementary feeding and continued breast feeding for up to 2 years **(Sirajuddin et al, 2020)**.

Promoting optimal breast feeding practices for infants 0–6 months at community and facility level through individual and group counseling, appropriate feeding and dietary practices, prevent and control micronutrient deficiencies, detect and manage acute malnutrition and common childhood infections, conduct monthly growth monitoring and build the capacity of service providers on complementary feeding initiatives that have been implemented for the last decades to end childhood under-nutrition **(WHO, 2018, WHO, 2019, Januarti & Hidayathilla, 2020 & National Nutrition Program, 2020)**.

Significance of the study:

In Egypt stunting is a foremost threat to the public health, affecting 2.1 million Egyptian children in 2019. One in every five Egyptian children under the age of five is stunted. A detected decline of 2-3% of Gross Domestic Product (GDP) in Egypt revealed the combined economic, health and social costs associated with childhood stunting **(EDHS, 2019, UNICEF, 2019 ᵦ & United States Agency for International Development (USAID), 2019)**.

Nutritional stunting is related to many indices of functional impairment, including cognitive and physical development, metabolic disorders that carry an increased risk of degenerative diseases and socio-emotional development. These serious health problems contribute to high health care costs of a country; therefore, effective prevention is needed to reduce the prevalence of stunting **(Alam et al., 2020)**.

Aim of the study:

To determine the prevalence of nutritional stunting and its associated factors among children under two years at Sohag Governorate.

Research questions:

- What is the prevalence of nutritional stunting among children under two years at Sohag Governorate?

- What are the associated risk factors of nutritional stunting among children under two-years at Sohag Governorate?
- What are the relations between nutritional stunting and associated factors among children under two-years at Sohag Governorate?

Subjects and Method:

Research design: Descriptive research design.

Setting: This study performed in the Maternal and Child Health Centers (MCH), which serving large number of population from Sohag Governorate and providing all health services to mothers and their children. Total number of MCH Centers are11 (3 at North, 3 at East, 3 at South, 1 at West, and one Centre at Sohag city). The study conducted in (40%) of the total number of (MCH) that represented 5 Centers (one center from each side); at north Tahta, at south El Monshaa, at east Sakaltta, at west Gehynaa and Sohag city which were selected randomly through closed envelope method; 11 pieces of paper representing Sohag MCH centers which placed in 5 envelopes; one piece in each envelope, which placed in a box, then one envelope was chosen without any bias.

	District	MCH	Flow rate2020	No. (n=350)	%
1	North	Tahta	1343	49	14%
2	South	EL Monshaa	2468	88	25.1%
3	East	Sakoltta	1861	65	18.6%
4	West	Gehynaa	861	26	7.4%
5	Sohag city	Sohag	3175	122	34.9%
	Total		9708	350	100%

Sampling and sample size calculation: Systematic random sampling with probability proportionate to size used to select the participating children who attended MCH with their mothers. The number of children that took from each MCH centers was calculated by the number of follow rate in this MCH (total of follow rate during 6 months divided on 6); which divided by the total number of mothers' follow rate at MCH centers which was (9708) mothers and then multiplied by the estimated sample size. According to the following equation:

$$\frac{\text{The number of pregnant women in each MCH}}{\text{Total number of mothers in the selected MCH}} \times \text{estimated sample size by EPI/info}$$

Sample size: Calculated using Epi info (ver.7). The used parameters to estimate the minimum required sample size included prevalence of stunting among children in Egypt 29 % according to **(EDHS and Ministry of Health, 2017)** margin of error 5% and 95% confidence interval. The minimum required sample was 316 children, 10% added to compensate

dropout and refusals. A total number of 350 children with their mothers were selected in this study.

Inclusion criteria:

All children under two years who were free from any medical diseases or disabilities that attend to MCH centers and their mothers accept to participate in the study.

Tools of the study:

An interview questionnaire designed by the researchers after reviewing writings to collect needed data which composed of three tools: **Tool (1): Part (I):** Socio-demographic characteristics as, age, sex, residence, marital status, income, occupation, level of education and social level **(Abdel El-twab scale, 2012)**. **Part (II):** Mothers' medical and obstetrical history such as: Hypertension, diabetes, anemia, thyroid dysfunctions, cardiovascular diseases, number of previous pregnancy, pregnancy spacing, still birth, low birth weight and height. **Part (III):** Child data as: Age, sex, history of (diarrhea, cough, fever, otitis media, kidney diseases, heart diseases, food allergy, teeth problem, any growth and development retardation, immunization and hospitalization).

Part (IV): Questions to assess mothers' knowledge regarding nutritional stunting, nutrition during pregnancy and lactation; which included (28) questions with total knowledge scores (114) grades.

Knowledge scoring system (114 grades): Each correct answer took one grade and wrong answer or didn't know zero grades. The total score of knowledge categorized as follow: less than 50% was graded poor, 50% to less than 75% graded fair and greater than or equal 75% of total scores graded good **(Ibrahim & Abd El-Maksoud, 2018)**.

Tool (II): Anthropometric measurements variable (height, weight, body mass index of children) to assess the degree of stunting. Data obtained by measuring weight of child by using specific scale for infants and early childhood age group. Child was with minimum clothing and no shoes and in recumbent or sitting position of this scale without any support of child and read weight to the nearest kilo grams. The child (6–23 months) length measured by non-stretchable tap as the following:

1. Child lies in recumbent position on stiff or hard surface.
2. Hold child head then fully extended the child leg.
3. Put a no stretchable tap a long side child body extending from crown of the child head to the heel of the child foot then read length measurement to the nearest 0.1cm centimeter, then converted these measurements to weight for age, length for age and weight for length using WHO standard growth charts of weight for age, length for age and weight for length of boys and girls specific for

this age group and calculating the z-score to assess the degree of stunting.

4. Calculate body mass index=weight (kg)/height (m²).
5. Compare measurements with reference curve of the (WHO) growth standard **(WHO, 2006)**.

Tool (III): Child feeding practices as reported by their mothers; included (38) questions with the total practices scores (85grades). **Scoring system for reported feeding practices (85) grades**: Each correct answer took one grade and wrong answer or don't know zero grades. The total score of reported feeding practices categorized as: < 50% of the total score considered poor, from 50% to less than 75% considered fair and from 75% and more considered good **(Ibrahim & Abd El-Maksoud, 2018)**.

Reliability: Testing reliability of the study tools was done by Cronbach′s Alpha test it was **0.78** for knowledge and for reported feeding practice was **0.805**.

Validity: Tools evaluated by five experts from Community Health Nursing Department and Pediatric Nursing Department, Faculty of Nursing, Assiut University, then the required modifications were done.

Pilot study:

It was conducted before beginning of data collection on 35 children which represented (10%) who were included in the study because there weren't modifications in the sheet.

Method:

Administrative phase: An official letter approval obtained from the Dean of the Faculty of Nursing, Assiut University to the Undersecretary Ministry of Health at Sohag Governorate to conduct the study after full explanation of aim. The letter involved agreement to perform the study at MCH centers at Sohag Governorate.

Ethical considerations: The Ethical Committee at the Faculty of Nursing Assuit University has accepted the plan for study. There was no risk to the participants during the applications. Mothers were had right to withdraw from the research at any time. Confidentiality and anonymity was assured.

Data collection phase: The researchers started data collection from the first of July, 2020 until the end of September, 2020 (3months). Data were collected 3days/week). An explanation of the purpose of the study was done to MCH centers mangers and mothers. Average number of participated children with their mothers met per day was (10) child. Total number of children was 350 child /3 months. Mothers with selected children were personally interviewed to obtain information on socio demographic data, health condition, nutrition related issues and child related data as age, birth weight, birth height, child feeding practices and assess degree of stunting by using

anthropometric measurements. The form filled by researchers; each interview took about (20:30) minutes then distribution of brochure about how to promote and protect child health from nutritional stunting.

Statistical analysis:

The data obtained have been reviewed, prepared for computer entry, coded, analyzed and tabulated using Excel 2010. Descriptive statistics (i.e., frequencies and mean, standard deviation, etc.) was done using computer program SPSS version 19. Chi-square test used to compare differences in the distribution of frequencies among different groups. It considered significant when P-values were less than 0.05.

Results

Table (1): Distribution of the studied mothers according their socio-demographic characteristics at Sohag Governorate, 2020

Items	No. (350)	%
Age (years):		
< 25	115	32.9%
25 - < 30	111	31.7%
≥ 30	124	35.4%
Mean ± SD (Range)	27.63 ± 5.32 (19.0-45.0)	
Mothers' education:		
Illiterate	9	2.6%
Read & write	11	3.1%
Primary	13	3.7%
Preparatory	42	12.0%
Secondary	201	57.4%
University	74	21.1%
Mothers' occupation:		
Working	49	14.0%
House wife	301	86.0%
Unskilled worker	32	9.1%
Residence:		
Rural	178	50.9%
Urban	172	49.1%
Social class:		
Low	168	48.0%
Middle	107	30.6%
High	75	21.4%

Table (2): Distribution of the studied children regarding to personal data at Sohag Governorate, 2020

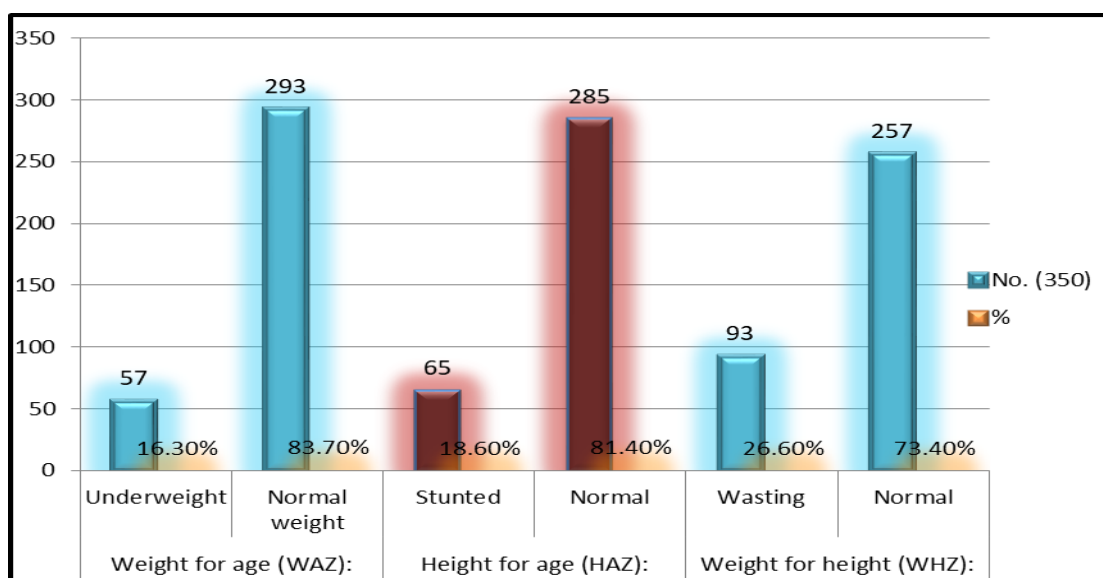| Items	No. (350)	%
Child age (months):		
< 18	184	52.6%
18 - < 24	166	47.4%
Child sex:		
Boy	185	52.9%
Girl	165	47.1%
Child birth order:		
First	120	34.3%
Second	137	39.1%
Third	67	19.1%
Fourth	26	7.4%
Number of brothers and sisters:		
One	169	48.3%
Two	108	30.9%
Three	46	13.1%
Four or more	27	7.7%
Birth weight :		
< 2.500 kg	46	13.1%
> 2.500 kg	203	58.0%
= 2.500 kg	101	28.9%
birth height :		
< 50 cm	51	14.6%
> 50 cm	271	77.4%
= 50 cm	28	8.0%
# Child suffered from one or more of the following diseases:		
Don't know	55	15.7%
Diarrhea	205	58.6%
Kidney disease	6	1.7%
Fever	73	20.9%
Asthma and shortness of breath	27	7.7%
Heart disease	55	15.7%
Delaying in the teething	8	2.3%
Worms	28	8.0%
Allergic of a particular food	19	5.4%

Figure (1): Anthropometric measurements (z-score) of studied children under 2 years at Sohag Governorate, 2020

Table (3): Distribution of the studied mothers regarding to medical and obstetrical history at Sohag Governorate, 2020

Items	No. (350)	%
Number of previous pregnancies:		
One	115	32.9%
Two	130	37.1%
Three or more	105	30.0%
Diseases during previous pregnancies:		
No	308	88.0%
Diabetes	4	1.1%
Eclampsia	11	3.1%
Anemia	27	7.7%
Labor place:		
Home	44	12.6%
Hospital	99	28.3%
Health unit	5	1.4%
Clinic	202	57.7%
Mode of delivery:		
Normal	164	46.9%
Cesarean section	186	53.1%
Pregnancy spacing months:		
< 18	266	76.0%
18 - < 24	84	24.0%
Regular follow-up during present pregnancy:		
Yes	313	89.4%
No	37	10.6%
Taking any medication during present pregnancy:		
Yes	269	76.9%
No	81	23.1%
# If yes , type of medications:		
Vitamins	249	92.6%
Chronic disease medications	5	1.9%
Analgesic	11	4.1%
Anti-emetic medication	115	42.8%
Antibiotic	3	1.1%
Suffer from thyroid diseases :		
Yes	12	3.4%
No	338	96.6%
Folic acid during the present pregnancy:		
Yes	281	80.3%
No	69	19.7%

Table (4): Relation between anthropometric measurements (z-score) and data related to children under 2 years at Sohag Governorate, 2020

Items	Weight for age (WAZ)				P-value	Height for age (HAZ)				P-value	Weight for height (WHZ)				P-value
	Underweight (n= 57)		Normal (n= 293)			Stunted (n= 65)		Normal (n= 285)			Wasting (n= 93)		Normal (n=257)		
	No.	%	No.	%		No.	%	No.	%		No.	%	No.	%	
Child sex:															
Boy	35	18.9	150	81.1	0.158	49	26.5	136	73.5	**0.000***	52	28.1	133	71.9	0.491
Girl	22	13.3	143	86.7		16	9.7	149	90.3		41	24.8	124	75.2	
Mode of delivery:															
Normal	32	19.4	133	80.6	0.137	30	18.2	135	81.8	0.859	46	27.9	119	72.1	0.601
C.S.	25	13.5	160	86.5		35	18.9	150	81.1		47	25.4	138	74.6	
Pregnancy spacing:															
< 18	53	19.9	213	80.1	0.001*	45	16.9	221	83.1	0.157	86	32.3	180	67.7	0.000*
18 - < 24	4	4.8	80	95.2		20	23.8	64	76.2		7	8.3	77	91.7	
Breastfeeding initiation:															
Immediately after Delivery	16	13.1	106	86.9	0.240	16	13.1	106	86.9	0.055	39	32.0	83	68.0	0.095
One hour or more after delivery	41	18.0	187	82.0		49	21.5	179	78.5		54	23.7	174	76.3	
Birth weight for child:															
< 2.500 kg	6	10.5	40	13.7		6	9.2	40	14.0		6	6.5	40	15.6	
> 2.500 kg	39	68.4	164	56.0	0.216	37	56.9	166	58.2	0.442	75	80.6	128	49.8	0.000*
= 2.500 kg	12	21.1	89	30.4		22	33.8	79	27.7		12	12.9	89	34.6	
Child height at birth:															
< 50 cm	4	7.0	47	16.0		7	10.8	44	15.4		2	2.2	49	19.1	
> 50 cm	49	86.0	222	75.8	0.184	53	81.5	218	76.5	0.614	82	88.2	189	73.5	0.000*
= 50 cm	4	7.0	24	8.2		5	7.7	23	8.1		9	9.7	19	7.4	
Child suffered from one of the following diseases:															
Don't know	9	15.8	46	15.7	0.986	18	27.7	37	13.0	**0.003***	8	8.6	47	18.3	0.028*
Diarrhea	33	57.9	172	58.7	0.910	28	43.1	177	62.1	**0.005***	45	48.4	160	62.3	0.020*
Kidney disease	0	0.0	6	2.0	0.595	2	3.1	4	1.4	0.309	0	0.0	6	2.3	0.348
Fever	9	15.8	64	21.8	0.303	13	20.0	60	21.1	0.850	12	12.9	61	23.7	0.028*
Asthma and shortness of breath	3	5.3	24	8.2	0.593	3	4.6	24	8.4	0.299	3	3.2	24	9.3	0.058
Heart disease	7	12.3	48	16.4	0.436	5	7.7	50	17.5	**0.049***	20	21.5	35	13.6	0.073
Problems in the teeth	1	1.8	7	2.4	1.000	5	7.7	3	1.1	**0.007***	0	0.0	8	3.1	0.116
Worms	4	7.0	24	8.2	1.000	6	9.2	22	7.7	0.685	11	11.8	17	6.6	0.112
Allergic of a particular food	3	5.3	16	5.5	1.000	0	0.0	19	6.7	**0.031***	13	14.0	6	2.3	0.000*

Statistically significant difference at P. value <0.05

Table (5): Multiple logistic regression analysis of factors associated with stunting among the studied children attended MCH centers at Sohag Governorate, 2020

Items	P-value	OR	95% C.I.	
			Lower	Upper
Gender (Boys)	0.000*	3.657	1.867	7.164
Mother occupation (Working)	0.066	2.080	0.952	4.542
Duration of exclusive BF (<6 months)	0.017*	11.741	1.563	88.219
Constant	0.000*	0.005		

Statistically significant difference at P. value <0.05
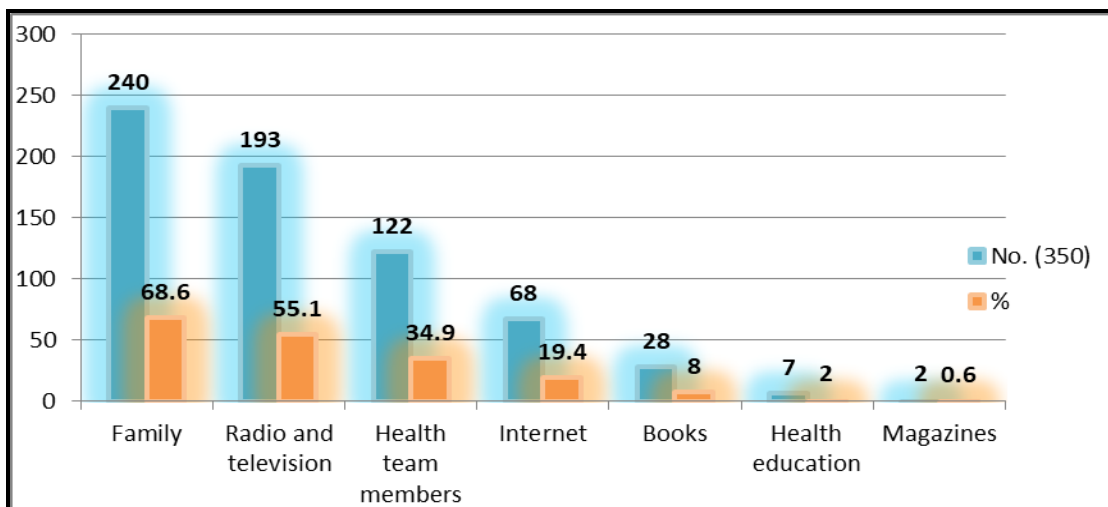
Figure (2): Sources of mothers' knowledge about nutritional stunting, nutrition during pregnancy and lactation at Sohag Governorate, 2020

Table (6): Relation between socio-demographic characteristics and total score of mothers' knowledge at Sohag governorate, 2020

Socio-demographic characteristics	Knowledge level						P-value
	Poor		Fair		Good		
	No.	%	No.	%	No.	%	
Age: (years)							
< 25	66	57.4	36	31.3	13	11.3	**0.419**
25 - < 30	53	47.7	45	40.5	13	11.7	
≥ 30	61	49.2	43	34.7	20	16.1	
Mother education:							
Basic education or less	50	66.7	24	32.0	1	1.3	**0.000***
Secondary	104	51.7	76	37.8	21	10.4	
University	26	35.1	24	32.4	24	32.4	
Father education:							
Basic education or less	41	51.3	30	37.5	9	11.3	**0.029***
Secondary	108	56.0	66	34.2	19	9.8	
University	31	40.3	28	36.4	18	23.4	
Mother occupation:							
Working	17	34.7	19	38.8	13	26.5	**0.004***
Not working	163	54.2	105	34.9	33	11.0	
Father occupation:							
Farmer	30	47.6	24	38.1	9	14.3	**0.032***
Free business	35	47.3	20	27.0	19	25.7	
Employee	64	55.7	44	38.3	7	6.1	
Skilled worker	36	54.5	23	34.8	7	10.6	
Unskilled worker	15	46.9	13	40.6	4	12.5	
Residence:							
Rural	91	51.1	61	34.3	26	14.6	**0.693**
Urban	89	51.7	63	36.6	20	11.6	
Social class:							
Low	96	57.1	56	33.3	16	9.5	**0.127**
Middle	52	48.6	40	37.4	15	14.0	
High	32	42.7	28	37.3	15	20.0	

*Statistically significant difference at P. value <0.05

Table (7): Relation between socio-demographic characteristics and total score of child reported feeding practices at Sohag Governorate, 2020

| Socio-demographic characteristics	Practice level						P-value
	Poor		Fair		Good		
	No.	%	No.	%	No.	%	
Age (years):							
< 25	35	30.4	41	35.7	39	33.9	
25 - < 30	33	29.7	31	27.9	47	42.3	**0.632**
≥ 30	38	30.6	43	34.7	43	34.7	
Mother education:							
Basic education or less	40	53.3	19	25.3	16	21.3	
Secondary	49	24.4	77	38.3	75	37.3	**0.000***
University	17	23.0	19	25.7	38	51.4	
Father education:							
Basic education or less	36	45.0	19	23.8	25	31.3	
Secondary	56	29.0	70	36.3	67	34.7	**0.003***
University	14	18.2	26	33.8	37	48.1	
Mother occupation:							
Working	11	22.4	20	40.8	18	36.7	**0.324**
Not working	95	31.6	95	31.6	111	36.9	
Father occupation:							
Farmer	18	28.6	24	38.1	21	33.3	
Free business	22	29.7	28	37.8	24	32.4	
Employee	44	38.3	30	26.1	41	35.7	**0.061**
Skilled worker	17	25.8	17	25.8	32	48.5	
Unskilled worker	5	15.6	16	50.0	11	34.4	
Residence:							
Rural	53	29.8	61	34.3	64	36.0	**0.847**
Urban	53	30.8	54	31.4	65	37.8	
Social class:							
Low	61	36.3	52	31.0	55	32.7	
Middle	27	25.2	39	36.4	41	38.3	**0.172**
High	18	24.0	24	32.0	33	44.0	

Statistically significant difference at P. value <0.05
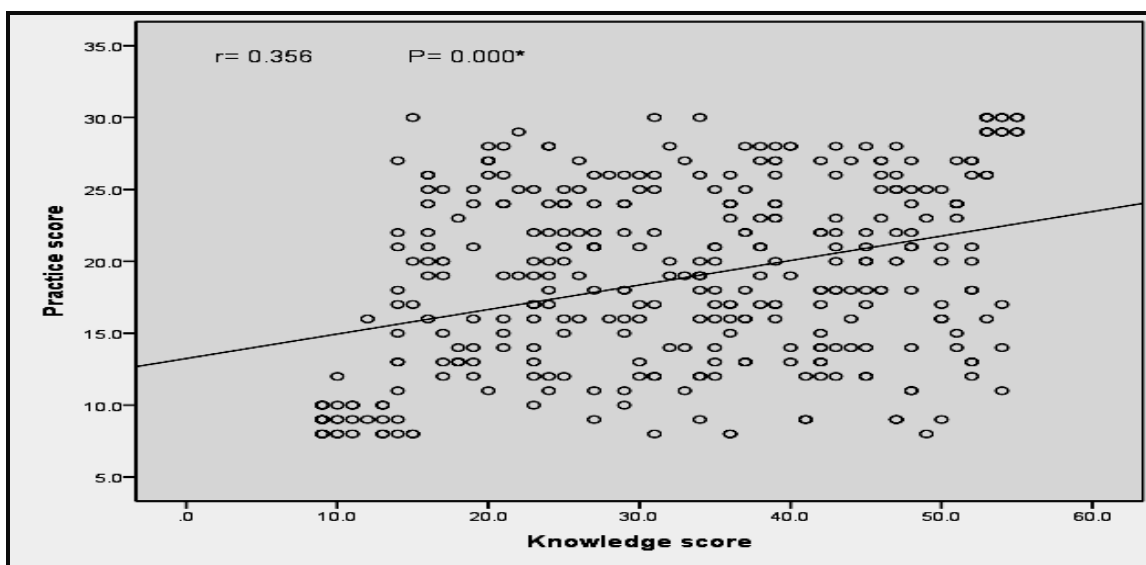
Figure (3): Correlation between mothers' total score of knowledge and total score of child reported feeding practices at Sohag Governorate, 2020

Table (1): Presents that 35.4 % of the studied mothers were aged ≥ 30 years. As well as; 57.4%, 86.0%, 50.9% and 48.0% of them had secondary education, were house wives, from rural area and in low social class respectively.

Table (2): Illustrates that 52.6% of children were aged <18 months. Also, 39.1% and 48.3% of children were boys at the second order respectively. Moreover, 58.6%, 15.7% and 5.3% of children suffered from diarrhea, heart diseases and had allergic to particular food respectively.

Figure (1): Shows that 16.3%, 18.6% and 26.6% of children had underweight, stunting and wasting respectively.

Table (3): Clears that 30.0%, 76.0% and 28.3% of the studied mothers had three or more previous pregnancies, had < 18 month pregnancy space and delivered in the hospital respectively. On other regards; 76.9%, 7.7% and 3.4% of the studied mothers toke medications during pregnancy, suffered from anemia and had thyroid dysfunction respectively.

Table (4): Shows there was highly statistical significance difference between height for age and the child gender P=0.000. Also, there was statistical significant difference between height for age with child suffered from diarrhea, heart diseases problems in teeth and suffered from allergic to particular food P= 0.005, 0.049, 0.007 and 0.031 respectively.

Table (5): Demonstrates that gender (boys), mothers occupation (working mothers) and duration of exclusive breastfeeding (<6 months) were the most significant factors influencing nutritional stunting of children.

Fig (2): Clears that 68.6 % and 55.1% of mothers reported their family and radio and television was their source of knowledge respectively.

Table (6): Reveals that there was highly significance between level of knowledge and mother education, father education, mother occupation and father occupation P= 0.000, 0.029, 0.004 and 0.032 respectively.

Table (7): Shows that there was statistical significance difference between reported feeding practices and mother education, father education with P= 0.000, 0.003 respectively.

Figure (3): Represents that there was positive correlation between total knowledge score and total reported feeding practices scores 0.000.

Discussion:

Malnutrition increases the economic burden of a society and silently destroys the future productivity of nations. Stunting is a major indicator of feeding malpractices among children and associated with poor cognitive development and school achievement anywhere in the world. In addition, cognitive development among children is affected by many nutritional factors including breastfeeding. Improved nutritional status remains a prominent modifiable determinant to improve the cognitive development of children **(Haile et al, 2019, kombi et al, 2019 and UNICEF-WHO- World Bank, 2020).**

With regard to socio-demographic characteristics of the participated mothers, the present study showed that more than one-third of the studied mothers were aged ≥30 years; this result agreed with **Titaley et al, (2021)** who performed a study entitled determinants of the stunting of children under two years old in Indonesia and found that more than one-third of the mothers were in the age group ≥ 30 years.

In referral to gender of the participated children, it was observed that more than half of them were boys and more than two fifths were girls; this result was in congruent with **Stephen et al, (2021)** who studied child height in India: Facts and interpretations and reported that more than half of the participated children were boys and more than two-fifths were girls.

Findings of the current study showed that more than half of studied children suffered from diarrhea with highly statistical significance difference with the incidence of nutritional stunting. Similar findings were reported by **Permatasari et al, (2021)** who performed study entitled the effect of nutrition and reproductive health education of pregnant women in Indonesia noticed that the most incidence of stunting was among children who suffered from recurrent diarrheal diseases. The more recurrence of diarrhea increases loss of basic nutrient elements necessary for child growth.

In regard to anthropometric measurements of children under 2 years it was noticed that 16.3% of the studied children were underweight, 18.6% of them were stunted while more than one fifth (26.6%) were wasted. This finding was similar to **Seedhom et al, (2014)** who studied the determinants of stunting among preschool children, Minia, Egypt and found that more than one fifth of the studied children were stunted, (18%) were underweight and (20%) were wasted.

The current study revealed that there was highly statistical significance difference with incidence of nutritional stunting in relation to child gender (P= 0.000). This finding was in line with **Stephen et al, (2021)** who showed that stunting is higher among boys than girls.

In many countries, the prevalence of stunting is higher in boys than girls. Probably the main reasons are that boys have slight higher nutritional requirements than girls, younger boys have higher morbidity rates; older boys 2-5 years may be more

mobile than girls. Boys may be given special foods like breast milk substitutes and junk foods which aren't healthier.

As regards mode of delivery, the current results showed that there wasn't statistical significant difference between height for age and mode of delivery (P=.859). These results were compatible to that of **Permatasari et al, (2021)** who reported that the incidence of stunting wasn't influenced by labor pattern. However, the current results disagreed with **Mahama & Addae, (2020)** who studied the dietary supplement use and its micronutrient contribution during pregnancy and lactation in the United States and recorded an association between Cesarean Section delivery and stunting.

The present research showed that there wasn't statistical significant difference between height for age and pregnancy spacing. This observation agreed with **Dhingraa et al, (2021)** who studied determinants of stunting in children in India. On the other hand; this finding disagreed with **Islam et al, (2021)**; who conducted a study about the impact of stunting on early childhood cognitive development in Egypt and observed that birth spacing is strongly associated with stunting.

The logistic regression analysis in the current study showed that boys, their mothers who were working and duration of exclusive breastfeeding <6 months were strong risk factors for nutritional stunting. Some of these factors were also reported by **Ramli et al., (2019)** who studied the prevalence and risk factors for stunting and severe stunting among under two years in North Maluku of Indonesia.

In the present study; family was the main source of information for more than two thirds of the studied mothers, similar findings were observed by **Percheski & Hargittai, (2019)** who carried out study about nutritional stunting prevention in Indonesia and reported that some participants indicated that after consulting friends they would use the traditional media (radio and television) to verify whatever information their friends or peers gave them.

The present study reported significant association between mothers' education, father education and total score of knowledge regarding nutritional stunting, nutrition during pregnancy and lactation were in agreement with the observations of **Jesmin et al, (2019)** who studied the pre determinants of chronic malnutrition among under two years children and found this association between mothers' education, father education and total score of knowledge regarding nutritional stunting.

According to correlation between total knowledge score and total reported feeding practices among the studied sample, it was found that there was a positive correlation between knowledge and practices in pretest (r=0.356) and there was statistically significant correlation between knowledge and practices (P=0.000).This finding similar to **Javid et al., (2020)** who carried out a study entitled "Child malnutrition: trends and issues" in South Asia and reported that the presence of knowledge among the studied participants leads to increase their attention to improve their practice during the follow-up.

Conclusion:
Mothers' education and occupation affected their knowledge regarding nutritional stunting. Boys, with working mothers and duration of exclusive breastfeeding<6 months were the significant risk factors of children nutritional stunting. Thus, interventions shall effectively address these factors to alleviate the problem of nutritional stunting among risky children.

Recommendations:
1. Improve public awareness regarding maternal health, beginning with adolescent girls.
2. Health education to protect and promote exclusive breastfeeding in the first six months "secure" nutrition, diversified diets including high-caloric, nutrient-rich foods in the complementary feeding period and use of supplements when where needed.
3. Continuous health education program for mothers to protect children from the risk factors of nutritional stunting with linear growth and early detection of nutritional impairments
4. Provide MCH and out-patients clinics with posters and brochures about causes of nutritional stunting and preventive measures.
5. Provide MCH and out-patients clinics with posters and brochures about causes of nutritional stunting and preventive measures.
6. Further research on the relation between stunting and maternal-child associated factors.

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