

Educational Intervention for Mothers Having Underweight Infants

Reda Ibrahim Ali Mohammed⁽¹⁾, Hanaa Abd El Hakim Ahmed⁽²⁾,
Nadia Hamed Farahat⁽³⁾

Manger of technical nursing institution –Master of Community Health Nursing⁽¹⁾,

Professor and Head of Family & Community Health Nursing⁽²⁾,

Professor of Family & Community Health Nursing⁽³⁾,

Faculty of Nursing- Ain Shams University

Corresponding Author: Reda Ibrahim Ali Mohammed

Published Date: 15-April-2022

Abstract: Educational intervention has been played a major role in improving underweight-related knowledge and practices of mothers having underweight infants, which in turn motivating and provision of infant's growth Aim: Assess knowledge and practices of mothers regarding their underweight infants, assessing physical assessment of infants, Design, implement and evaluate of educational intervention program for mothers regarding their underweight infants. Design:A quasi experimental design was used in this study. Setting :This study was carried out in Maternal and Child Health centers at south Giza script. Sampling: A purposive sample of mothers who attending MCH centers and who have underweight infants. Tools: Three tools were used in this study structured interview schedule, check list and physical Assessment of the infants. The results of this study showed that 98% of the study sample were having unsatisfactory total knowledge about underweight pre-program while, 71.5% of them were having satisfactory knowledge about underweight post program with highly significant statistical difference between pre and post program implementation at $X^2 = 243.3$ at $p=0.0000$. 97.5% of the study sample were having poor total practices pre educational intervention program while 52.0% of them were having good practices post educational intervention program with highly significant statistical difference between pre and post program with $X^2 = 19.53$ at $p=0.0000$. finally, mean's weight of underweight infants were 6.44 at pre educational intervention while mean's weight of underweight infants increased post educational intervention where mean=8.14 with a highly significant statistical difference between pre and post program at $p=0.0000$. Conclusion: Educational intervention was well designed, planned and implemented based on well assessment for gaps of knowledge and practices, can do more effects on mothers' behavior and infants' growth Recommendation: Further researches related to educational intervention about infants' underweight are needed in other area especially urban area which characterized different lifestyle.

Keywords: Educational intervention, Underweight, infant, breast feeding, weaning.

1. INTRODUCTION

Educational intervention is defined as instruction or training intended to acquired underweight -related knowledge and practices which provided in individual in order that infants be well-nourished, infants need access to sufficient, safe and good quality food, so educational intervention change mothers 'behavior and motivating appropriate feeding practices through breast feeding and weaning period (McNulty, 2017; Meena,2019).

During infancy and childhood, infants gain weight and grow more rapidly than at any other time in life (Kathleen et al., 2020). Balanced and sufficient nutritional intake is most essential for infants to promote optimal growth and development, to protect and maintain health (Datta, 2018).

Underweight is gaining weight at a slower rate than other infants who are the same age and sex. "Normal" ranges for weight are based upon the weight of thousands of infants. Standard growth charts are published by the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO); (*Kathleen et al., 2020*).

Underweight remains one of the most common causes of morbidity and mortality among children throughout the world. Globally, about 104 million children were under-weight in 2010, and the majority of these lived in sub-Saharan Africa and South Asia, (*Fekadu et al., 2015; Nigatu et al., 2018*).

Multiple factors related to both mother and children contribute to underweight, it is the result of a combination of inadequate dietary intake and infection. Especially in low income settings, mothers' level of education as more distal cause could lead to underweight among the children. The other major causes are maternal marital status, having a family size of five or above, children who were breast feed for less than 12 months, who had frequent diarrhea illness, and minimum dietary diversity (*Miskir, et al., 2017; Sigdel et al., 2020*).

In Egypt, is associated with poor access to a balanced diet among the poorest sections of society, as well as poor dietary habits, lifestyle and lack of nutritional awareness across the population, (*UNICEF, (2020)*).

One important aspect of nutritional education is providing families with sources of additional information and behavioral change tools either handout of government agencies or website which interested in infants' issues. The first step of nutritional education are nutritional status assessments, primarily done through growth monitoring and dietary intake assessment, after understanding the infant's usual diet, existing or anticipated nutritional problems should be addressed due to lack of knowledge which need nutritional education (*Kliegman et al., 2020*).

The important responsibility of community health nurse is to provide information and guidance to the parents with the goal of achieving optimum nutrition throughout the year of growth and development. Information and guidance should be provided in all stages of growth and development considering the feeding patterns, dietary habits, food fads, culture, religion, availability of food, educational level, and socioeconomic status of family (*Datta, 2018*).

Significance of study:

According to Global Nutrition Report, Egypt has made no progress toward achieving the target of maternal, infant and young child toward underweight with 9.5% of children under 5 years, direct causes of underweight are poor infant and young child feeding practices where there is decline of exclusive breastfeeding rate from 34% to 29% and also food insecurity, poor access to balanced diet among poorest sections of society and lack of awareness (*UNICEF, 2021*).

AIM OF THE STUDY

1. Assessing mothers' knowledge about underweight, breastfeeding and weaning.
2. Assessing mothers' practices about hygiene, breastfeeding and weaning.
3. Assessing physical assessment of infants as weight, height, head and chest circumference
4. Designing and implementing educational intervention program of mothers having underweight infants for improving growth and development of infants.
5. Evaluating the effectiveness of designed educational intervention program on knowledge and practices of mothers resulting in improvement of infants 'health status

Research Hypotheses

Knowledge and practices of mothers regarding to underweight are expected to be improved after implementation of educational intervention program.

Study design: A quasi-experimental research design (Pre/Post test) was used in the current study. Quasi – experimental is an empirical study used to estimate the causal impact of an intervention on it's target population without random assignment and is carried out when no comparative group is available, when the baseline is the characteristic to be compared with the result (before and after study).. The design according to the study by *Usadolo, (2016)* can be used to examine the relation between an independent (cause) and a dependent (effect) variables. Therefore, the design is most

appropriate to investigate the effect of educational intervention program on mothers having underweight infants at rural area in south Giza script.

Setting: It included 90 mother and child health centers (MCH) and distributed as follow Essaf included 28 MCH, Atfeh included 30 MCH and Alaiat included 32 MCH choose the numbers of MCH after every ten MCH as follow, from Esaff were taken three MCH were namely Shorfa village, Dicmy village and Esaff MCH. Atfeh were taken three MCH were Atfeh MCH, Ekebabat MCH and korimat MCH. Alaiat were taken three.

MCH were Alaiat MCH, Kafer EIRafaai MCH and EIRika MCH, where 9 MCH compromise this study.

2. SUBJECTS AND METHODS

Research Subjects:

- **Type of the sample:**

Non- probability (purposive) sample was used in the current study.

- **Sample Size:**

A purposive sample were used in this study where primary health sector statistics stated that total numbers of under - weight infants at 2018 annual reports at Esaff were 260 underweight infants, Atfeh were 300 underweight infants, and alaiat were 760 underweight infants where total numbers of underweight infants were 1320. The sample size was calculated using the following equation:

$$n = \left(\frac{Z_{1-\alpha/2} + Z_{1-\beta}}{ES} \right)^2$$

$Z\alpha$ = Standard normal deviate for $\alpha = 1.9600$.

$Z\beta$ = Standard normal deviate for $\beta = 0.8416$.

$B = (Z\alpha + Z\beta)^2 = 7.8489$.

$C = (E/S\Delta)^2 = 0.0400$.

$N = B/C = 196.2218$.

$n = \left(\frac{1.96+0.84}{0.0400} \right)^2 = 196.2218. \approx 196$ mothers

Sample size will be 196 mothers to achieve a power of 95% and a level of significance of 5% (two sided), assuming improvement 20% (Rosner, 2016).

The sample size was 200 mothers having underweight infants who their age were from two month to 12 months, full term, breastfeeding, and their weight were about 3.5 Kg to 8.5 Kg, willing to participate in the study. 5% (10) of the subjects were excluded in a pilot study

Tools of the study

- Three tools were developed by the researcher to obtain necessary data depending on the review of literatures.
- **Tool I: Structured interview schedule:** to collect all socio-demographic characteristics and mothers 'knowledge it comprises (38questions) and divided into 2 parts: Sociodemographic characteristics and mothers 'knowledge
- **Part 1:** Sociodemographic characteristics (12 question) about infants and their mothers: such as (age – gender- number of infant at family - education – job– numbers of work's hours, Place of infants during work, Infant's nutrition during work, Numbers of *siblings*, *Month's income of family*, and *The marital status*
- **Part 2: Assessing mothers 'knowledge(26)**, covered the following items

a. **Knowledge regarding underweight.** It was composed of 12 items (Q13 to Q24) such as definition of underweight, normal weight of infant at birth, normal weight of infant at 6 months, normal weight of infant at 12 months, follow up infant’s weight continuously, period of follow up infant’s weight, place of follow up, factors of underweight, signs of underweight, complication of underweight and prevention of underweight.

b. **Knowledge regarding breast feeding.** It was composed 10items (Q25 to Q34) such as definition of breast feeding, advantages of breastfeeding, numbers of breastfeeding daily, satisfaction, periods of breast feeding without any addition, *causes of artificial* feeding, artificial feeding order, and determining the required amount of artificial feeding.

c. **Knowledge regarding weaning.** It was composed 4items(Q35 to Q38)

Such as definition, *foods of infant during weaning, the principals of weaning, and causes of early weaning.*

Scoring system of mothers 'knowledge was done as follow: :

Each correct answer was scored by one grade and each wrong or ‘don’t know “answer was scored by zero, a total scoring of knowledge divided into two categories

- 50% and above were considered satisfactory
- Less than 50% were considered unsatisfactory

The second tool: Check lists for assessing mothers’ practices

It is composed of three items (Q39 to Q41) where check list were used to determine practices of mother about personal hygiene, breast feeding practices, and so weaning.

Scoring system:

The score of each item range from 0-2; zero for NO, One for sometimes, and Two for always where total scoring of practices divided into three categories.

The total practices (3 statements) were divided to poor, average, and good

- < 50% was graded as incorrect answer (poor)
- 50% to < 70% was graded as moderate answer (average).
- ≥ 70% was graded as high answer (good).

The third Tool: Physical assessment of underweight infants.

It is composed of four items (Q42 to Q 45) was used to determine underweight by taking weight, height, head circumference, and chest circumference.

Validity and reliability:

- To achieve the criteria of trust worthiness of the data collection tools in this study, tools were tested and evaluated for content validity by three experts in community health nursing. They were from different academic categories, i.e, professor and assistant professor from faculty of nursing in Ain shams university to ascertain relevance, clarity, applicability, and completeness of the tools. Based on experts comments were recommendations, minor modifications were made such rephrasing and rearrangements of some sentences.
- The internal consistency measured to identify the extent to which the items of the tool measure the same concept and correlate with each other through means of their internal consistency by Cronbachs Alpha Coefficient test as the following for mothers’ knowledge and practices to control underweight.

Tools	Numbers of items	Cronbach Alpha Coefficient
Mothers’ knowledge	26	0.704
Mothers’ practice	26	0.811

Operational Design:

The operational design includes preparatory phase, ethical consideration, pilot study and fieldwork phase.

- **Preparatory phase:**

It included reviewing of literature and different studies related to educational intervention for mothers having underweight 's infants by using books, articles, periodicals, and internet, after reviewing of text, current, national, and international related literature in various aspects of the problem, the study tools were designed and translated into Arabic language. Outlining all area included in educational intervention program done through extensive review of the literature and available resources.

- **Pilot Study:**

A pilot study was carried out on 5% (10) mothers having underweight infants to test the study tools for clarity, feasibility, applicability, and estimated the time required to fill out questionnaires. The necessary modifications were done through omission of unneeded or repeated questions and improvements were made prior to data collection according to the pilot study results. The sample of the mothers who participated in the pilot study was excluded from the main study sample.

- **Field work:**

Approvals were obtained from administrator of primary health at south Giza Script. An informed written consent was taken from each mother who agreed to participate in the study after explaining the objective, assuring that it hasn't any harmful effects on them and the information given will be treated confidentiality. They were informed that they can leave the study at any time without giving any reason

The researcher attended maternal and child health centers three days per week (Sunday, Tuesday & Thursday) from 10.00 a.m to 12.00p.m. The study lasted over six months from the beginning of December 2018 to the end of May 2019.

After obtaining a permit, the researcher met director of MCH and head nurse and explained the aim and program content, then the researcher interviewed each mother individually and briefly explained the nature and the purposes of the study, the mothers were interviewed to assess their socio-demographic data, their knowledge regarding (underweight, breastfeeding and weaning) and their practices regarding (personal hygiene, breastfeeding and weaning).

Explanations and clarifications were provided according to mothers' questions. The mothers filled the written questionnaire in the presence of the researcher or it was filled by the research for illiterate mother, the researcher ensured that all information pertaining to the sheet was complete. The average time needed to fill out the questionnaires was 30 minutes. A number of interviewed mothers per week ranged from 4 – 5 mothers/day. It lasted 10 weeks to be fulfilled before implementation of educational intervention program. The program was designed by the researcher based on data obtained from pre assessment tools

- **Developing the educational program:-**

A- **General objective** of the intervention plan was to increase the mother's knowledge and practices about underweight and improve their infants' growth.

B-Preparing and organizing the program content:

- ♣ Assessment phase: The data was collected by previously mentioned tools were used to get baseline assessment for mothers knowledges and practices prior to development of program.

- ♣ Planning phase: Based on results obtained from the interviewing sheet, as well as literature review, the educational intervention program was developed by the researcher. The content of educational program were organized in 12 sessions as follow: -

-**Session 1&2:** orientation about the program and its purposes was given. It was agreed at the time of the sessions with mothers. (time:hrs).

International Journal of Novel Research in Healthcare and Nursing

Vol. 9, Issue 1, pp: (331-344), Month: January - April 2022, Available at: www.noveltyjournals.com

- **Session 3&4:** Define underweight, enumerate signs of underweight, underst and complications of underweight, treatment and prevention of underweight (time2 hrs).
- **Session 5&6:** Define breast feeding, enumerate characteristics of breast feeding and, identify regulation of breast feeding (time2hrs).
- **Session 7:** Define weaning period. explain complementary diet and explain schedule of complementary diet and breast feeding meals.. (time2hrs).
- **Session 8:** Summary about the previous 4 session and answer about any explanation (time 2hrs).
- **Session 9:** Practices personal hygiene, hand washing, wash utensils of infant and how to protect from contamination.(Time 2 hrs)
- Session 10&11;** Demonstrate & re-demonstrate technique of breast feeding, ensure right position of infant, how to assess feeding satisfaction.and position of sleeping after feeding (Time: 4hrs).
- Session 12: apply practices related to weaning, prepare complementary feeds quantity and quality (Time: 2 hrs).

C- Selecting teaching strategies:

- 1- Teaching methods: The following methods were used -Lectures, -Group discussion:
- 2- Audiovisual aids: Using power point, - Posters, pictures and booklets

D-Implementing phase: - Each mother was educated individually or in group according to the number of mothers, the most of mothers had educated individually according to her education, economic and cultural level to ensure understanding of knowledge and applying of practices. - Every mother was informed about purpose and benefits of the study at the beginning of interview and before starting to fill structure interview schedule in order to gain their approval, cooperation and confidence. - Booklet about educational program was distributed to all participants to use it as future reference.

E- Evaluation phase: The aim of this phase is to evaluate the impact of educational program in knowledge and practices. Two assessment were done to the mothers in order to test their knowledge, practices. First time, before implementation of the program using pre- test through tool I,(part 1, part 2 and part 3)and tool II, second time, immediately after implementation of the program using post- test

Ethical consideration:

Informed consent was taken from the mothers to participate in the study after the aim of the study and the component of tool were explained to the mothers before to start the interview in order to get their approval to participate in the study. Anonymity and confidentiality were assured. Ethics, values culture and beliefs was respected, and mothers were informed that they allowed to choose withdrawing from the study at any times.

Administrative Design:

Before starting the field work for conducting this study a formal letter was issued from faculty of nursing –Ain Shams University to authority of Primary health (Maternal and Child Centers) in south Giza script where the proposed study were conducted. After obtaining the approvals from the director of these setting for conducting the proposed study, the researcher was start to communicate with the study subjects and explain the aim of the study.

Statistical Design:

Data were revised, coded, analyzed, and tabulated using the number and percentage distribution and carried out in the computer using appropriate statistical methods.

The statistical analysis include:

Percentages%, value, meam, standard deviation (SD), Chi- square (x²), T paired and proportion probability (P- value) were used for quantitative continuous variation

Significance of results;

- NOT significant (NS) $P > 0.05$
- Significance (S) $P \leq 0.05$
- Highly significant(HS) $P < 0.01$

3. RESULTS

Table (1): Distribution of underweight infants according to their Socio demographic characteristics (N=200)

Items	N	%
Age		
<4 months	22	11
<6 months	52	26
<8 months	42	21
<10 months	30	15
<12 months	54	27
Gender		
Male	72	36.0
Female	128	64.0
Infant's number at family		
The first	4	2.0
The second	9	4.5
The third	24	12
The fourth	67	33.5
The fifth	60	30.5
The sixth	34	17.0
The seventh	1	0.5
The eighth	1	0.5

This table shows that 26% and 27% of underweight infants' age were about 6 months and 12 months, 64.0% were female and 33.5% were the fourth number at their family.

Table (2): Distribution of mothers according to their Socio demographic characteristics (N=200)

Items	N	%
Level of education.		
High education	45	22.5
Read and write	52	26.0
Illiterate	103	51.5
Job.		
Work	125	62.5
Not work	75	37.5
Numbers of work's hour.		
6 hour	119	95.2
12 hour	6	4.8
Place of infant during work		
Nursery	19	15.2
Home	106	84.8
Infant's nutrition during work.		
Complementary foods	65	52.0
Artificial feeding	60	48.0

Items	N	%
Numbers of siblings.		
-2	36	18
-4	129	64.5
>6	35	17.5
Month's income of family.		
-1200	138	69.0
-1400	45	22.5
>1600	17	8.5
Marital status.		
Married	197	98.5
Divorce	2	1.0
Single mother	1	0.5

This table shows that 51.5% of underweight infants' mothers were illiterate, 62.5% were work and 95.2% worked about 6 hours daily, while 84.8% leaved their underweight infants at their home, and 52.0% complementary foods were infants' nutrition during their work, 64.5% of underweight infants had from 3 or 4siblings, 69.0% of month's family income was about 1200 and 98.5% of underweight infants' mothers were married.

Figure (1): Distribution of mothers having underweight infants according to their mean of total knowledge pre and post educational intervention program (n=200).

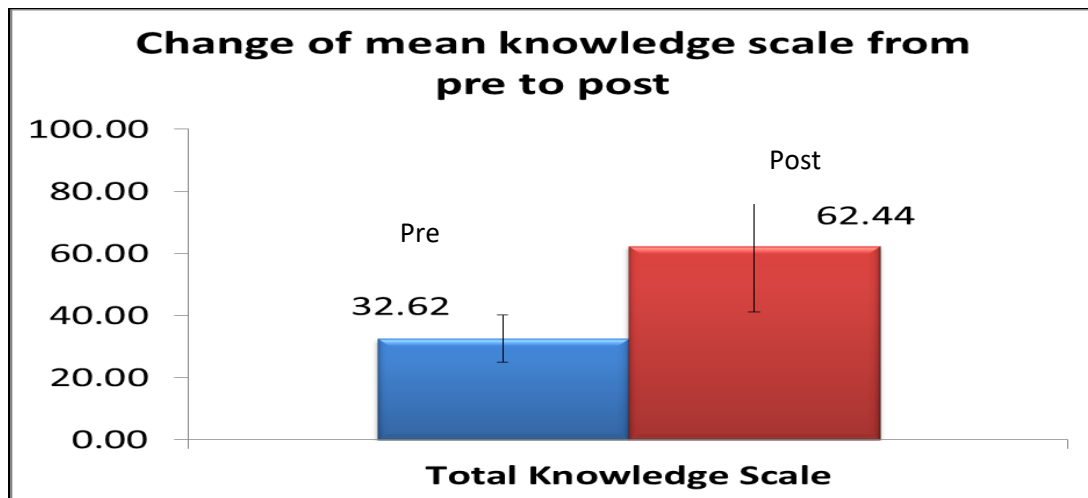


Figure (1): Illustrates that there are highly statistically significant differences related to mean knowledge where was 32.62 : 62.44 between pre and post educational intervention program where $p < 0.001$.

Table (3): Total mother's practices scale

Practices	Pre		Post		T	P value	Sig
	Mean	SD	Mean	SD			
Mothers about personal hygiene	34.25	15.75	72.33	31.27	15.38	0.00000	P < 0.001 HS
Mothers about breast feeding	18.94	10.22	69.53	33.90	20.21	0.00000	P < 0.001 HS
Mothers about weaning	24.83	7.59	71.83	31.56	20.47	0.00000	P < 0.001 HS
Total mother's practices scale	26.28	8.20	71.30	31.54	19.53	0.00000	P < 0.001 HS

This table shows that, there is increment in mother's practices about personal hygiene, breast feeding and weaning post program implementation where mean was 26.28 and SD 8.20 at pre educational intervention while mean was 71.30 And SD 31.54 at post educational intervention program with a highly significant statistical difference in sub total scale and total scale between pre and post program at $p= 0.0000$.

Table (4): Correlation between total knowledge and total practices.

Variables	Pre			Post		
	r	P value	Sig	r	P value	Sig
Total knowledge and total practices	0.51	0.00000	HS	0.94	0.00000	HS highly strong

This table illustrates that there are highly significant statistically positive correlation in pre and post intervention education program between total knowledge and total practices at $r = 0.51$ and 0.94 at $p = 0.0000$ respectively.

Table (5): Distribution of underweight infants according to Physical assessment of underweight infants (weight, height, head circumference & chest circumference) (n=200).

Physical assessment	Pre		Post		T	P value	Sig
	Mean	SD	Mean	SD			
Weight of infant	6.44	1.27	8.14	1.11	14.25	0.00000	P < 0.001 HS
Height of infant	62.91	4.87	67.64	6.16	8.53	0.00000	P < 0.001 HS
Head circumference	40.53	2.01	43.16	1.64	14.31	0.00000	P < 0.001 HS
Chest circumference	37.87	1.99	40.86	2.68	12.61	0.00000	P < 0.001 HS

This table shows that mean's weight of underweight infants were 6.44 at pre educational intervention while mean's weight of underweight infants increased post educational intervention where mean=8.14, mean's height of underweight infants were 62.91 at pre educational intervention while mean's height of underweight infants increased post educational intervention where mean= 67.64, mean's head circumference of underweight infants were 40.53 at pre educational intervention while mean's head circumference of underweight infants increased post educational intervention where mean=43.16, and mean's chest circumference of underweight infants were 37.87 at pre educational intervention while mean's chest circumference of underweight infants increased post educational intervention where mean= 40.86t with a highly significant statistical difference between pre and post program at $p=0.0000$ for all.

Table (6): Relation between total knowledge, and socio demographic characteristics among mothers' infants

Correlation		N	Knowledge			ANOVA or T-test For T	P value	Sig
			Mean	±	SD			
Age				±			0.66907	NS
Gender	Male	72	61.96	±	21.92	-0.24	0.81405	NS
	Female	128	62.71		21.16			
Job	Not working	75	57.60	±	22.49	-2.51	0.01288	S
	Working	125	65.34		20.23			
Infant's number at family				±			0.19781	NS
Mothers' educational level	Illiterate	103	29.23	±	5.34	60.78	0.00000	HS
	Read & Write	52	32.07		6.64			
	Higher Education	45	40.99		6.56			
Infant's nutrition during work	Complementary feeding	65	66.27		18.67	0.53	0.59387	NS
	Artificial feeding	60	64.33		21.92			
Numbers of siblings	2	36	30.73	±	5.29	2.51	0.08386	

	4	129	33.49		8.38			
	6	35	31.34		5.80			S
Family monthly income	1200	138	31.56	±	7.62	9.75	0.00009	HS
	1400	45	33.16		6.51			HS
	1600	17	39.73		5.87			

This table shows that there are statistically insignificant differences related to age, gender, Infant’s number at family, infant’s nutrition during work and total knowledge (P>0.05), while there are significant relation between job, numbers of siblings and total knowledge (P<0.05), and finally there are highly significant between mothers ‘educational level, family monthly income and total knowledge (P<0.001). This means that the elevation of job, numbers of siblings, mothers ‘educational level, family monthly income result in elevation of total knowledge.

Table (7): Relation between total practices and socio demographic characteristics among mothers’ infants.

Correlation	N	Practices			ANOVA or T-test For T	P value	Sig
		Mean	±	SD			
Age			±			0.09311	NS
Gender	Male	72	70.75	± 31.72	-0.19	0.84812	NS
	Female	128	71.64	31.57			
Job	Not working	75	64.63	± 32.73	-2.35	0.01980	S
	Working	125	75.33	30.24			
Infant’s number at family				±		0.10025	NS
Mothers’ educational level	Illiterate	103	53.55	± 22.55	26.82	0.00000	HS
	Read & Write	52	66.98	17.52			
	Higher Education	45	77.54	9.54			
Infant’s nutrition during work	Complementary feeding	65	75.14	± 29.68	-0.07	0.94215	NS
	Artificial feeding	60	75.54	31.09			
Numbers of siblings	2	36	56.33	± 20.89	1.97	0.14229	S
	4	129	63.29	22.25			
	6	35	65.58	17.63			
Family monthly income	1200	138	59.58	± 21.43	6.07	0.00276	HS
	1400	45	65.64	22.46			
	1600	17	77.18	6.24			

This table shows that there are statistically insignificant differences related to age, gender, infant’s number at family, infant’s nutrition during work and total practices (P>0.05), while there are significant relation between job, numbers of siblings and total practices (P<0.05),and finally there are highly significant between mothers ‘educational level, family monthly income and total practices (P<0.001). This means that the elevation of job, numbers of siblings, mothers ‘educational level, family monthly income result in elevation of total practices.

4. DISCUSSION

The burden of being underweight can be significantly reduced by focusing an education intervention for the mothers on the importance of nutrition by community health workers, also, an emphasis on empowering women and improving the knowledge and practices of parents on appropriate infant and young child care practices plays a vital role in reducing childhood underweight (John, 2018).

According to the underweight infants’ socio demographic characteristics, the present study revealed that less than one third of underweight infants ‘age ranged between 6: 12 months, more than two third of them were female and more than

one third of them were the fourth's number at family (Table 1). This result is consistency with the study (*Sigdel, et al., 2020*), (**Maternal risk factors for underweight among children under-five in a resource limited setting at Nepal**) which revealed that More than half of underweight children were female (51.6%) and also agreement with (*Masuke et al., 2021*), (**Effect of inappropriate complementary feeding practices on the nutritional status of children aged 6-24 months in urban Moshi, Northern Tanzania**) Where inclusive criteria for sample's age were 6- 24 months and sample size were 3355 children while contrast with that study (*Kumar et al., 2019*) (**Prevalence and factors associated with underweight children: a population based subnational analysis from Pakistan**) which stated that Fifty-one percent of the study participants were boys, one-third of the children were under 2years of age at the time of the study and two-thirds (65%) of the children were reported to be first-borns of their parents.

This result proved that age 6-12 is a critical where transitional stage and inserted external food that associated many challenges as time, frequency, amount, consistency of complementary feeding, any lack of knowledge and improper practice result in underweight.

According to socio demographic characteristics of the underweight infants' mothers,

The present study revealed that more than half of mothers' level of education was illiterate. This result is consistency with that study (*Nigatu et al., 2018*) which revealed that (54.7%) of the mothers were illiterate. In contrast with these results (*Encalada et al., 2019*) showed that 71.4% finished middle school. this results were inconsistency with *Ogunba, (2015)* which showed that 89.6% of mothers were worked outside the home and (61.5%) of mothers who were working outside the home were taking care at home with other care givers and higher proportion of mothers working in the offices/factories, introduced complementary foods between 3 - 6 months but offered more complementary feedings per day. more than two thirds of the study sample of underweight infants mothers had monthly family income from 1200 to 1400. This result was agreement with *Chowdhury et al., (2018)* which stated that one third of the study children belonged to households of the poorest wealth quintile (29.06%) and in contrast with *Tosheno, (2017)* Forty two percent of the respondents had less than 2000-birr average monthly income. There are factors related to mothers contributing more in occurrence of underweight between infants such as level of education, employment, and monthly income. This study illustrated that there is increasing in total knowledge at post program implementation with highly statistically significance where $p < 0.001$ (Table 2). This finding were in accordance with *Akinrinmade et al., (2019)* showed that There was a significant difference in the knowledge scores of the caregivers after the nutrition education intervention. The differences were -0.06 at baseline, at the midline it was 3.85 and 4.00 at the end line with T-test=0.545 with highly statistically significance where $p < 0.001$. This study demonstrates that, majority of the study sample were having subtotal and total poor practices regarding personal hygiene, breast feeding and weaning pre educational intervention program while more than half of them were having good practices post educational intervention program with highly significant statistical difference between pre and post program with $X^2 = 148.4, 209.9, 209.2$ and 212.9 at $p = 0.0000$ for all (table3). This finding consistency with *Sharma et al., (2021)* which revealed more positive changes were observed in infant feeding practices in the intervention group. Significantly less number of infants were receiving bottle feeding in the intervention group as compared to the infants in the control group (35.8% versus 47.6%, $p = 0.04$). A significant majority of the infants were receiving complementary feeding (92.6% versus 79.1%, $p = 0.01$) and thick consistency foods (82.1% versus 41.9%, $p < 0.01$) in the intervention group as compared to the infants in the control group. Significantly more infants in the intervention group were consuming food from four or more food groups at end-line assessment as compared to the control groups (83.7% vs. 61.8%) [$p < 0.01$] (15). This study illustrates that there are highly significant statistically positive correlation in pre and post intervention education program between total knowledge and total practices at $r = 0.51$ and 0.94 at $p = 0.0000$ respectively (table4). This finding was in accordance with *Gaber et al., (2019)* revealed that there was statistically significance and correlation coefficient between knowledge and practices as $r = 0.521$ before program implementation and $r = 0.298$ after program implementation with $P < 0.0001$, This study shows that, there is increment in weight of infant, height of infant, head circumference and chest circumference post program implementation with a highly significant statistical difference between pre and post program at $p = 0.0000$ (table5). This result is consistency with *Sharma et al., (2021)* which revealed that the mean weight and mean length of infants was calculated in both groups at baseline and end-line and effectiveness of the intervention was measured by calculating the difference in difference in mean change in weight between the intervention and control group. In the intervention group, the mean weight of infants at the end line was 8.8 ± 0.8 kg versus 8.6 ± 0.8 kg as compared to the control group ($p = 0.04$). The mean length was 75.8 ± 2.3 cm in the intervention group and 75.7 ± 2.2 cm in the control group ($p = 0.5$). The difference in mean change in

weight between the intervention and control group was 0.27 kg which was found to be significant [$p = 0.01$]. The gain in length of the infants in the intervention group was significantly more than in the control group (0.9 cm, $p < 0.01$). There are significant relation between job, numbers of siblings and total knowledge ($P < 0.05$), and finally there are highly significant between mothers 'educational level, family monthly income and total knowledge ($P < 0.001$ (table6). This result was consistency with *Dereje et al., (2017)* which stated that educational status of mother, family size, and occupation of mothers were significantly associated with underweight. Educational status of mother had a significant association with the nutritional status of infants, i.e., infants who had uneducated mothers were 5.7 times more likely to be underweight than those mothers who had diploma and Family size was significantly associated with nutritional status of infants i.e., children who had family size greater than or equal to seven were 4.9 times more likely to be underweight than those who had less than four family members. Similarly, occupation of mother was significantly associated with nutritional status of infants. Infants from households with employed mothers were 4.5 times more likely to be underweight than those whose mothers were unemployed, there are significant relation between job, numbers of siblings and total practices ($P < 0.05$), and finally there are highly significant between mothers 'educational level, family monthly income and total practices ($P < 0.001$). This means that the elevation of job, numbers of siblings, mothers 'educational level, family monthly income result in elevation of total practices. This findings were consistent with (*Saeed et al., 2019*) this study shows that there was highly statistical significance association between moderate practice and university mother education (75%), not working mothers (75.2%), enough and more income (100%), and family size < 5 (80%).

5. CONCLUSION

Based on finding of the present study, it can be concluded that the educational program was effective and improved knowledge & practices of studied mothers. A significant improvement in all parameters of the knowledge & practices scores was observed after implementation of educational intervention program. Furthermore improvement of infants' growth.

6. RECOMMENDATIONS

Based on the result of the present study the following recommendations are suggested

- 1- Increase health education sessions at MCH during Anti natal visits about feeding and hygiene practices.
- 2- Increase supplementation of pictures and booklets for illiterate mothers as a review for them.
- 3- Increase handout of government agencies or website which interested in infants' issues.
- 4- Further researches related to educational intervention about infants' underweight are needed in other area especially urban area which characterized different lifestyle.

REFERENCES

- [1] *Kathleen, J., et al. (2020)*: Patient education: Poor weight gain in infants and children (Beyond the Basics).
- [2] *Datta, P. (2018)*: Pediatric nursing (as per INC syllabus), 4th ed, the health sciences publisher, New Delhi/ London, P: 44 to 48.
- [3] *Kathleen, J., et al. (2020)*: Patient education: Poor weight gain in infants and children (Beyond the Basics).
- [4] *Liu, L., Global, et al. (2015)*: Regional and national causes of child mortality in 2000-2013 with projections to inform post 2015 priorities- an updated systematic analysis. The Lancet, 31 January 2015; 385: 430-440. Available at Stella G., 2016: Underweight, the Less Discussed Type of Unhealthy Weight and Its Implications, American Journal of Food Science and Nutrition Research 2016; 3(5): 126-142 <http://www.openscienceonline.com/journal/fsnr> ISSN: 2381-621X (Print); ISSN: 2381-6228 (Online).
- [5] *UNICEF (2020)*: The Child Survival and Development program aims at contributing to the reduction of maternal and child mortality and morbidity, especially in the most deprived areas of Egypt <https://www.unicef.org/egypt/health>
- [6] *Kliegman, R. et al. (2020)*: Text book of pediatrics, 21th ed, Canada, P:21, 136, 15, 16, 331.

- [7] **John, J., (2018):** Prevalence and risk factors associated with underweight among under-five children in a rural area of Puducherry. Muller J Med Sci Res [Internet]. 2018; 9(1):7. Available from: <http://www.mjmsr.net/text.asp?2018/9/1/7/223903>
- [8] **Nigatu, G., et al. (2018):** Prevalence and associated factors of underweight among children 6–59 months of age in Takusa district, Northwest Ethiopia, International Journal for Equity in Health (2018) 17:106 <https://doi.org/10.1186/s12939-018-0816-y>
- [9] **Encalada, S.S., et al. (2019):** An Educational Intervention to Mothers Improved the Nutritional Status of Mexican Children Younger Than 5 Years Old With Mild to Moderate Malnutrition, Global Pediatric Health Volume 6: 1–9 © The Author(s) 2019 Article reuse guidelines: sagepub.com/journals-permissions DOI: 10.1177/2333794X19884827 journals.sagepub.com/home/gph
- [10] **Ogunba, B.O. (2015):** Effect of Maternal Employment on Infant Feeding Practices in Southwestern Nigeria, <http://www.scirp.org/journal/fns> <http://dx.doi.org/10.4236/fns.2015.67063>
- [11] **Chowdhury, et al. (2018):** Socio-economic risk factors for early childhood underweight in Bangladesh <https://doi.org/10.1186/s12992-018-0372-7>
- [12] **Tosheno, (2017):** Risk Factors of Underweight in Children Aged 6–59 Months in Ethiopia, journal of Nutrition and Metabolism, Volume 2017, Article ID 6368746, 8 pages <https://doi.org/10.1155/2017/6368746>.
- [13] **Akinrinmade, R., et al. (2019):** Effectiveness of Nutrition Education in Improving Maternal Knowledge and Attitudes towards complementary Feeding Practices: A cluster-randomized controlled trial in Ondo State, Nigeria, R. Akinrinmade, e njogu, i ogada, O.O. Keshinro/ Korean Journal of Food & Health Convergence 5(4), pp. 1-11. 1 ISSN: 2586-7342 © 2019KFHCA. <http://www.Kjfhc.Or.Kr> doi: <http://dx.Doi.Org/10.13106/kjfhc.Vol5.No4.1>.
- [14] **Sharma, N., et al. (2021):** Effectiveness of a culturally appropriate nutrition educational intervention delivered through health services to improve growth and complementary feeding of infants: A quasi-experimental study from Chandigarh, India, PLoS ONE 15(3): e0229755. <https://doi.org/10.1371/journal.pone.0229755>.
- [15] **Gaber, et al. (2019):** Effect of health education intervention for mothers regarding food safety for their children, IOSR Journal of Nursing and Health Science (IOSR-JNHS) e-ISSN: 2320–1959. p- ISSN: 2320–1940 Volume 6, Issue 4 Ver. I, PP 00-00 www.iosrjournals.org.
- [16] **Dereje, D., et al. (2017):** Prevalence of Underweight and Associated Factors among Children Aged 6 to 59 Months in Areka Town, Wolaita Zone, Southern Ethiopia, Journal of Biology, Agriculture and Healthcare www.iiste.org ISSN 2224-3208. ISSN 2225-093X (Online) Vol. 7, No. 1, 2017.
- [17] **Saeed, D.M., et al. (2019):** Infant Weaning Knowledge and Practice among Mothers Attending Maternal and Child Healthcare Center in Tor-Sinai City, The Egyptian Journal of Hospital Medicine, Vol. 77 (3), Page 5219-5227.
- [18] **McNulty J., (2017):** Challenges and issues in nutrition education. Rome: Nutrition Education and Consumer Awareness Group, Food and Agriculture Organization of the United Nations. Available at: www.fao.org/ag/humannutrition/nutritioneducation/en. Accessed 5 July 2017. Available at, **Meena, S., et al. (2018):** Effect of nutrition education intervention on undernutrition among under five children in urban and rural areas of Bhopal district, Madhya Pradesh, International Journal of Community Medicine and Public Health, pISSN 2394-6032 | eISSN 2394-6040.
- [19] **Kumar R, et al. (2019):** Prevalence and factors associated with underweight children: a populationbased subnational analysis from Pakistan,. BMJ Open 2019;9: e028972. doi:10.1136/bmjopen-2019-028972
- [20] **Msuya, J., et al. (2016):** Food Safety of Homemade Complementary Foods In Morogoro Municipality-Tanzania, & Ohio State University, Columbus, available at **Demmelash, A.A. et al. (2020):** Hygienic Practice during Complementary Feeding and Associated Factors among Mothers of Children Aged 6–24 Months in Bahir Dar Zuria District, Northwest Ethiopia, 2019, Journal of Environmental and Public Health Volume 2020, Article ID 2075351, 7 pages <https://doi.org/10.1155/2020/2075351>.

International Journal of Novel Research in Healthcare and Nursing

Vol. 9, Issue 1, pp: (331-344), Month: January - April 2022, Available at: www.noveltyjournals.com

- [21] **Sigdel, A, et al. (2020):** Maternal risk factors for underweight among children under-five in a resource limited setting: A community based case control study, PLoS ONE 15(5): e0233060. [https:// doi.org/10. 1371/journal.pone. 0233060](https://doi.org/10.1371/journal.pone.0233060)
- [22] **Miskir, A., et al., (2017):** Determinants of Acute Malnutrition among Under-Five Children in Karat Town Public Health Facilities, Southern Ethiopia: A Case Control Study. Qual Prim Care [Internet]. 2017; 25(4):242–52. Available from: [http://search.ebscohost.com/login.aspx?direct=true&db=cin20&AN= 125191727&site=ehost-live](http://search.ebscohost.com/login.aspx?direct=true&db=cin20&AN=125191727&site=ehost-live), available at **Sigdel, A, et al., 2020:** Maternal risk factors for underweight among children under-five in a resource limited setting: A community based case control study, PLoS ONE 15(5): e0233060. [https:// doi.org/10.1371/ journal.pone.0233060](https://doi.org/10.1371/journal.pone.0233060)
- [23] **UNICEF, (2021):** Egypt- Global Nutrition Report, available at: [http // data.unicef. org/ resources/ data set/ malnutrition data.](http://data.unicef.org/resources/data-set/malnutrition-data)