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Effect of Health Educational Intervention for Mothers Regarding Food Safety for Their Children

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Abstract: *Safe food is food that is free from contaminants, and microbiological pathogens.The role of mothers, in ensuring food safety at the household level need to take many precautions to minimize contamination because they are the final lineof defense against foodborne illnesses.*

Aim*: Design implement and evaluate of health education intervention for mothers regarding food safety for their children.*

Materials and methods: *A quasi experimental design was used in this study. This study was carried out in Maternal and Child Health center at Tanta city. Random sample of mothers who attending MCH centers in Tanta and who have children age 6 months till 6 years were included in the study. Two tools were used in this study structured interview schedule and Assessment of health status of the child.*

Results*: The results of this study showed that before educational intervention, the studied mothers had low scores in knowledge and practices. whilefter educational intervention there was significant improvement in the total knowledge and practices scores in all parameters of food safety of studied mothers pre, immediate and three months after educational intervention P<0.000*

Conclusion*: it can be concluded that educational intervention was effective and improve the level of mothers 'knowledge and practices regarding food safety.*

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I. Introduction

The availability of safe food improves the health of people and is a basic human right. Safe food contributes to health and productivity and provides an effective platform for development and poverty alleviation[(1),]Young children are at higher risk than adults for foodborne illness because of their underdeveloped immune system, lower body weight, lower stomach acid production, and lack of control over their own meal preparation[(2)].

Primary food handlers who prepare meals for young children at home may place their children at high risk for foodborne illnesses because of unsafe food-handling practices**.** Food safety requires proper handling from production through consumption. The role of food handlers, usually mothers, in ensuring food safety at the household level is well accepted. Home food preparers need to take many precautions to minimize pathogenic contamination because they are the final line of defense against foodborne illnesses[(3)].

Food can serve as a medium for growing bacteria or as passive vehicle for transferring parasites or viral pathogen. Although most food borne infections are directly related to food of animal origin, food of plant origin can also be contaminated. Some of factors that bring about the multiplication and distribution of these bacteria in food are poor hygienic practices and poor preparation practices[(4)].

Foodborne diseases are one of the most common public health problems in the world these days. This indicates the importance of the home as a source of food borne diseases and therefore the role played by the knowledge, trends and practices of the consumer to prevent food borne diseases[(5)]. Community health nurse who works with family in excellent position to provide education for mothers about food handling and preparation, It's important to stress safety in all stages of food handling. An effective risk communication to inform consumers of the possible health risks of foodborne diseases and encourage safer food handling practices at home is probably the best way to ensure food safety at the consumer end of the food chain[(6)].

II. Aim Of The Study

This study aimed to design, implement and evaluate of health educationintervention for mothers regarding food safety for their children.

III. Research Hypotheses

Knowledge and practices of mothers regarding to food safety are expected to be Improved after implementation of intervention.

Study design: A quasi experimental design was used in this study. Setting:-The study was conducted in Maternal and Child Health Care Centers (MCH centers) affiliated to Ministry of Health at Tanta city. There are seven Maternal and Child Health Centers representing five districts of Tanta city.

Subjects

- The sample size 340 mothers.
- Random sample of mothers who attended MCH centers at Tanta city, for well-baby clinic and vaccination clinic according to schedules of work for each MCH services.

Tools of the study:

- Two tools were developed by the researcher to obtain necessary data depending on the review of literatures**.**
- **Tool I:Structured interview schedule:** to collect all sociodemographic characteristics it comprises (94 questions) and divided into 4 parts:Sociodemographic characteristics, housing and kitchen environment, feeding habits of child and structure interview schedule.
- **Part 1:-Sociodemographic characteristics**(10 question): such as (age – education – occupation – number of children and their ages - total number of house held members – number of bed room and income of family.
- **Part 2- Housing and kitchen environment** (16 questions) :-
  Available resources as refrigerator,cooking facilities, water management in the household, suitability of kitchen floor, walls, location, light and ventilation.
- **Part 3- Assessment of feeding habits of child** (5 questions) (pre/post- test)
  This part was used to collect data about type of food given to children and food handling practices. Using ready food or making at home- Storing of boiled milk - cooking degree of egg - specifies utensils for the child –using leftovers.
- **Part 4- Knowledge &practices related to food safety**. It was developed by the researcher after reviewing the literatures[7-10].

(a) **Knowledge about Food Safety**: **Cleaning of kitchen,** the best way to clean kitchen, type of cutting board. **Storage of food,** indication of food spoilage and,Pasteurization of milk. **Preparation and cooking**: cookingeggs until both the yolk and white are firm will kill harmful, safely use of dishcloth to wipe up liquid from meat or chicken, Pasteurization of milk and fruit juice helps prevent foodborne illness. foods which can cause severe foodborne illness. **Personal hygiene and child health** diseases transmitted by food handlers. preparing food for others in the family in presence of diarrhea.

Scoring systems of mothers 'knowledge was done as follow:

The correct answer was awarded 1 point, in multiple choice the correct and incomplete answer (more than half choices are correct) awarded I point, (less than half choices are correct) awarded zero, don't know awarded zero. The total score amounted 26 points from the question related to knowledge, the following rating was applied:

-A score from 0-< 60 %(0-15) correct answer will indicates poor knowledge.

-A score from 60-< 70% (16-18)correct answer will indicates fair knowledge.

-A score from 70-< 100% (19-26) correct answer will indicates good knowledge.

b)**Practices about Food Safety:Cleaning of kitchen,** (washing method of utensils, such as cups, bowls, and spoons, keeping kitchen surfaces clean. **Storage of food,** time of refrigeration and freezing of food **Preparation and cooking,** washing vegetables and fruits, separation of raw food and cooked food, using separate cutting boards or knives for raw or cooked food and arrangement of refrigerator to avoid contamination, using suitable time and temperature for food types –reheating of food, cooking of eggs, meat and chicken and preparing formula for baby – thawing of food –keeping leftovers. **Personal hygiene:** hand-washing before food preparation.

Scoring systems of mothers 'practices was done as follow:

The correct answer was awarded 1 point, in multiple choice the correct and incomplete answer (more than half choices are correct) awarded I point, (less than half choices are correct) awarded zero, don't know awarded zero. The total score amounted 47 points from the question related to practices, the following rating was applied:

-A score from 0-< 65% (0-30) correct answer will indicates unsatisfied practices.
-A score above 66% (31- 47) correct answer will indicates satisfied practices.
Tool II:**Assessment of health status of the child**: this part was used to assess physical condition of children. Past history of gastroenteritis or food borne illness.Physical assessment of the child weight-height using weighing scale and measuring tape. Assessment of signs of dehydration (dryness of skin –diarrhea-vomiting-shrinking of skin and any other complains.

IV. Methods

1-**Official permission** to conduct the study was obtained from Faculty of Nursing – Tanta University and directed to the responsible authorities of Maternal and Child Health care centers.The directors of MCH centers was informed about the study objectives to take their permission to collect the data from settings.

2- Preparation of the study tools:

The study tools were developed by the researcher after reviewing relevant literatures

3- Ethical consideration:

Oral consent was obtained from every mother included in the study after explanation of the aim of the study and assuring them of confidentiality of collected data and explaining that it will only be used for study purpose.The right to abstain or terminate participation at any time was respected.

4- Developing the educational program:-

A- General objective of the intervention plan was to increase the mother's awareness about safe food and improve their practices regarding handling of food for their children.

B-Preparing and organizing the program content:

- **Assessment phase:**The data was collected by previously mentioned tools (I-II) 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 health education program was developed by the researcher. The content of educational program were organized in 5 sessions as follow:

-Session 1: Importance of food safety: Orientation about Importance of food safety, adverse effect of spoiled or contaminated food and expectation of each session of program. (time 45 minutes).
-Session2: Food safety guideline throughout food service operation: Explanation of the importance of hand washing and factors affecting food safety that is a critical control points for reducing their chance for food borne illness. (time 45 minutes).
- Session 3: Principles of food safety: Orientation of the mother about principles of food safety. (time 45 minutes).
-Session 4: Personal hygiene guideline: Explanation of personal behaviors and personal hygiene of food handler. (time 45 minutes).
-Session 5: Rules for handling food safely : Discuss the role of mothers for safe handling of food and identifying the risky habits that make food unsafe. (time 45 minutes).

C- selecting teaching strategies:

1- **Teaching methods:**The following methods were used:-
-Lectures
-Group discussion: It helped the researcher to offer practices in verbal expression, quick thinking and also helped learners to talk freely about their problem and encourage understanding and feedback

2- **Audiovisual aids**:
- Using power point to clarify knowledge and illustrate practices.
- Posters, pictures and booklets were used as teaching aids.

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 food safety 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 on providing safe food for their children**.**

Seven hours of teaching were implemented for mothers one hour each week for two months. Three assessment were done to the mothers in order to test their knowledge, practices and personal behavior related to food safety served to child. First time, before implementation of the program using tool I,(part 1, part 2 and part 3)and tool II, second time, immediately after implementation of the program using tool I part three. The third time, three months after implementation of the program using tool I part 3 and tool II.

V. Results

Table (1): Distribution of studied mothers regarding to socio-demographic characteristics.

Variables	The studied mothers attending Tanta MCH centers (n=340)	
	N	%
Age years:		
20-<25	77	22.6
25-<30	119	35.0
30-<35	89	26.2
≥35	55	16.2
Education level:		
Illiterate	16	4.7
Preparatory educ.	77	22.6
Secondary educ.	121	35.6
Bachelor or above	126	37.1
Husband education level:		
Illiterate	5	1.5
Preparatory educ.	65	19.1
Secondary educ.	129	37.9
Bachelor or above	141	41.5
Mother job:		
Work	196	57.6
Not work	144	42.4
Husband job:		
Worker	65	19.1
Clerks	112	32.9
Free work	163	47.9
Number of children:		
One	65	19.1
Two	112	32.9
Three	118	34.7
Four	34	10.0
Five	11	3.2
Family income/month:		
Not enough	92	27.1
Enough	231	67.9
Enough and spare	17	5.0

Part (1) Table 1: Socio-demographic data of the studied mothers:

The table (1) represented the distribution of studied mothers according to their socio demographic data. It showed that more than one third (35%) of studied mother were ranged between 25-30 years and the same percent were secondary educated. About one fifth (22.6%) of study sample had preparatory education. The table also shows that more than half of studied mothers (57.6%) were working mothers. More than one third of studied mothers(34.7%) having 3 children with mean of age 1.88±2.90 . while (78.8%)of mothers reported that two persons per room. Regarding to numbers of family, more than half (53.8%) of studied mothers had 3-4 family members and more than two thirds (67.9 %) of studied mothers enough income.

Table (2): Distribution of studied mothers according to levels of knowledge subitems about food safety before and after implementation of health education program (n=340)

Levels of knowledge subitems about food safety	The studied mothers attending Tanta MCH centers (n=340)						χ^2	P
	Before intervention		Immediate after intervention		3 months after intervention			
	N	%	n	%	n	%		
(a) knowledge about cleaning of kitchen:								
Poor	91	26.8	1	0.3	3	0.9	673.835	0.0001*
Fair	200	58.8	15	4.4	17	5.0		
Good	49	14.4	324	95.3	320	94.1		
(b) knowledge about storage of food:								
Poor	106	31.2	1	0.3	1	0.3	866.906	0.0001*
Fair	218	64.1	4	1.2	14	4.1		
Good	16	4.7	335	98.5	325	95.6		
(c) knowledge about preparing & cooking food:								
Poor	272	80.0	1	0.3	0	0	887.620	0.0001*
Fair	44	12.9	4	1.2	2	0.6		
Good	24	7.1	335	98.5	338	99.4		
(d) knowledge about personal								

hygiene &child health:								
Poor	65	19.1	0	0	0	0	710.974	0.0001*
Fair	257	75.6	29	8.5	35	10.3		
Good	18	5.3	311	91.5	305	89.7		

***Significant (P<0.05)**

Table (2): Distribution of studied mothers according to levels of knowledge sub items about food safety before and after implementation of health education program. The table showed that, there was significant improvement in the total knowledge score of studied mothers before, immediate and after implementation of health education program. As regards to knowledge about cleaning of kitchen there was increased in good total knowledge score from (14.4%) of mothers before implementation of health education program to (94.1%) after three months from implementation of health education program. In relation to knowledge about storage of food there increased in good total knowledge score from (4.7%) of mothers before implementation of health education program to (98.5%) immediate post program implementation and (95.6%) three months after implementation of health education

Regarding to knowledge about preparing & cooking food ofincreased in good total knowledge score from (7.1%) of mothers before implementation of health education program to (99.4%) three months after implementation of health education program. while in knowledge about personal hygiene & child health there increased in total knowledge score from (5.3%) of mothers before implementation of health education program to (89.7%) three months after implementation of health education program. Statistical significant difference between knowledge of studied mothers pre, immediate and three months after implementation of health education program was present. (P<0.0001).

Table (3): Distribution of studied mothers according to levels of practice subitems about food safety before and after implementation of health education program

Levels of practice subitems about food safety	**The studied mothers attending Tanta MCH centers (n=340)**						**χ^2**	**P**
	Before implementation		**Immediate after implementation**		**3 months after implementation**			
	n	**%**	**n**	**%**	**N**	**%**		
(a) Practice of cleaning of kitchen: (0-4)								
Satisfied	275	80.8	40	11.7	49	14.4	493.897	0.0001*
Unsatisfied	65	19.2	300	88.3	291	85.6		
(b) Practices of food storage:(0-11)								
Satisfied	120	35.3	0	0	4	1.2	426.244	0.0001*
Unsatisfied	220	64,7	340	100	336	98.8		
(c) Practices of preparing and cooking food: (0-25)								
Satisfied	300	88.3	0	0	3	0.9	959.010	0.0001*
Unsatisfied	40	11.7	340	100	337	99.1		
(d) Practices of personal hygiene &child health: (0-7)								
Satisfied	244	71.8	5	1.5	4	1.2	631.413	0.0001*
Unsatisfied	96	28.2	335	98.5	336	98.8		

***Significant (P<0.05)**

Table (3): Distribution of studies mothers according to levels of practice subitems about food safety before, immediate and after implementation of health education program. The table showed that there was a significant improvement in levels of practices sub items about food safety as regards to practices of cleaning of kitchen , practices of food storage, practices of preparing and cooking food and practices of personal hygiene & child health $X^2 = 493.89$, $X^2 = 426.24$, $X^2 = 959.01$ and $X^2 = 631.41$ respectively. The table also revealed that there was statistically significance between all food safety sub items pre, immediate and after program implementation as F value was 449.110, 719.224, 688.590 and 607.214.

Table (4): Correlation between total knowledge and practice scores about food safety among the studied mothers before and after implementation of health education program.

Total practice scores about food safety	**Total knowledge scores among the studied mothers attending Tanta MCH centers (n=340)**					
	Before implementation		**Immediate after implementation**		**3 months after implementation**	
	R	**P**	**R**	**P**	**r**	**P**
Before implementation	0.521	0.0001*				
Immediate after implementation			0.101	0.064		
3 months after implementation					0.298	0.0001*

***Significant (P<0.05)**
r=Correlation Coefficient

Table (4): Correlation between total knowledge and practice scores about food safety among the studied mothers before, immediate and after implementation of health education program. The table revealed that there was a significant positive correlation between knowledge & practices before program implementation and three months after program implementation (P<0.01), while there was a negative correlation between knowledge & practices immediately after program implementation (P = 0.064).

Table (5): Mean change of scores of total knowledge and practice 3 months after implementation of health education program among the studied mothers in relation to their scores socio-demographic data.

Variables	Mean change of total knowledge and practice scores among the studied mothers 3 months after program implementation (n=340)			
	Total knowledge scores		Total practice scores	
	Mean±SD	t-test or F value P	Mean±SD	t-test or F value P
Age years:				
20-<25	13.35±3.42	6.552	17.13±4.21	7.905
25-<30	11.90±3.81	0.0001*	17.11±5.43	0.0001*
30-<35	10.73±4.36		15.54±5.05	
≥35	11.14±4.41		13.53±5.01	
Education level:				
Illiterate	15.19±3.19	13.615	18.69±3.53	7.247
Preparatory educ.	12.93±3.48	0.0001*	17.48±5.14	0.0001*
Secondary educ.	12.25±3.89		16.49±5.61	
Bachelor or above	10.25±4.13		14.62±4.47	
Husband education level:				
Illiterate	12.20±8.20	10.619	14.40±2.88	13.472
Preparatory educ.	13.54±3.28	0.0001*	18.20±4.74	0.0001*
Secondary educ.	12.36±3.70		17.23±5.20	
Bachelor or above	10.47±4.18		14.21±4.71	
Mother job:				
Work	12.84±3.58	5.748	17.06±4.57	3.973
Not work	10.38±4.29	0.0001*	14.85±5.64	0.0001*
Husband job:				
Worker	12.77±3.61	5.770	17.81±4.91	10.784
Clerks	10.80±4.12	0.0001*	14.44±4.86	0.0001*
Free work	12.10±4.11		16.61±5.16	
Number of children:				
One	13.00±3.01	4.107	17.11±3.96	4.708
Two	11.99±4.02	0.003*	17.28±4.96	0.0001*
Three	10.87±4.10		14.75±5.46	
Four	11.35±3.90		15.00±5.05	
Five	14.09±7.29		16.73±6.86	
No. of family members:				
1-2	11.20±10.32	1.290	14.88±14.00	5.906
3-4	12.20±3.70	0.278	16.88±4.54	0.001*
5-7	11.33±4.14		15.41±5.14	
>7	11.50±10.61		5.00±1.41	
Crowding index (No. of individuals/room):				
One	10.17±9.49	0.712	14.67±13.41	1.815
Two	11.81±3.95	0.584	15.87±5.00	0.125
Three	11.87±3.833		17.34±4.57	
Four	15.50±9.19		21.00±1.41	
Five	10.67±2.52		13.33±2.31	
Family income/month:				
Not enough	13.65±3.51	14.078	18.11±5.12	10.739
Enough	11.14±4.01	0.0001*	15.49±5.06	0.0001*
Enough and spare	10.76±4.89		13.94±3.47	

***Significant (P<0.05)**

Table (5): Mean change of total knowledge and practice scores three months after implementation of health education program among the studied mothers in relation to their scores socio-demographic data. Regarding age the table revealed that mean change of studied mothers increased in mothers aging from 20-25 in knowledge &practices to be 13.35±3.42 and 17.13±4.21 respectively. In relation to education level the most improvement

observed in knowledge & practices was at illiterate level with mean change 15.19±3.19 and 18.69±3.53respectively.

As regards to mothers job , it was observed more development of knowledge & practices for working mothers with mean change 12.84±3.58 and 17.06±4.57 respectively, number of children also affect changing knowledge with mean change 14.09±7.2912 in mothers with 5 children, while in practices more change was observed in mothers with two children 17.28±4.96.Regarding family income change in knowledge & practices was observed in mothers had not enough income ,the mean change was 13.65±3.51and 18.11±5.12 respectively There were statistical significances difference at all parameters of knowledge & practices with sociodemographic data (P<0.01).

Table (6): Total knowledge and practice scores among the studied mothers' children before implementation of health education program in relation to their main complaints

Complaints of children	Total knowledge and practice scores among the studied mothers attending Tanta MCH centers before program implementation (n=340)			
	Total knowledge scores		Total practice scores	
	Mean±SD	t-test or F value P	Mean±SD	t-test or F value P
Vomiting:				
No	11.77±3.98	2.139	16.53±5.07	1.649
Yes	10.04±4.64	0.033*	14.85±4.99	0.100
Nausea:				
No	11.69±4.01	1.773	16.47±5.00	1.706
Yes	9.12±5.36	0.077	13.37±7.31	0.089
Diarrhea:				
No	11.62±3.91	0.095	16.52±4.97	1.502
Yes	11.70±5.41	0.924	15.07±6.02	0.134
Fatigue:				
No	11.70±3.98	1.639	16.49±4.97	1.901
Yes	9.75±5.63	0.102	13.67±7.19	0.058
Abdominal pain:				
No	11.51±3.97	0.927	16.42±5.09	0.150
Yes	11.97±4.30	0.355	16.33±5.07	0.881
Others:				
No	11.65±4.20	0.189	16.49±3.07	0.830
Yes	11.53±3.14	0.850	15.84±5.16	0.407

***Significant (P<0.05)**

Table (6): Correlation between total knowledge and practice scores of the studied mothers before health education program in relation to their children past medical history, The table revealed that there was statistical significance between knowledge & practices scores in relation to vomiting, diarrhea, and fatigue .Mean of total knowledge score was the highest in relation to vomiting,abdominal pain and diarrhea as it was 11.97±3.69, 11.56±4.01 and 9.53±4.98 respectively. Mean of total practices score was the highest in relation to vomiting, abdominal pain and diarrhea as it was 16.98±4.49, 16.31±5.07and 13.36±6.32respectively.

VI. Discussion

Home food preparers need to take many precautions to minimize pathogenic contamination of home-prepared foods because they are the final line of defense against food borne illnesses. As **Ellen et al., (2016**), reported that argue, awareness, knowledge and judgement on foods can be affected by the habits and other perceptions that result from social, cultural, and economic influences[(11)].

Over all The result of present study showed that the food safety program used successfully in educating studied mothers, participants showed significant improvement in food safety knowledge & practices in all food safety parameters. The post test result showed that the participant were still using proper food safety practices for 3 months following the program implementation (table 2). The participant seemed to be interested in presentation of program to develop their knowledge and enrich their practices in food safety to prevent food borne illness, safe their family and maintaining food from hazards of contamination or spoilage. This result was supported by **Kennedy, et al., (2015)** who found that the curriculum was used successfully in training the food handler with significant improvement and the food safety practices delayed survey result showed the participants were still using proper food safety practices for 3-6 months following the food safety training [(12)] .

The present study also revealed that the studied mothers who had good total knowledge score in food preparation and cooking were increased from 7.1% before program implementation to 99.4% after 3 months of program implementation. Furthermore mothers who had satisfied practices score were increased from 11.7% before program implementation to 99.1% after 3 months of program implementation. It also revealed that there was a significant improvement in mean score of knowledge& practices of studied mothers from 5.85±2.78 and 13.15±2.10 before program implementation to 12.78±0.86 and 22.48±1.48 respectively after 3 months of

program implementation (table 1 and 2). This finding was supported with **Fawzi M et al., (2009)**, who reported that the mean score percentages of food safety practices in two food safety parameters; preparation and cooking (69.0 and 77.5; respectively) were higher than their corresponding knowledge (59.8 and 70.0). This indicates that some women used to do the right practices although their knowledge was deficient. The explanation is that women may be taught the right preparation and cooking practices from their mothers or other relatives without having the correct knowledge[13]. Otherwise **Rebecca Meysenburg et al., (2014)**, found that the mean score percentage of safe preparation practices was higher among women than their knowledge score (69 and 59.8; respectively) with a significant differences among different jobs in their practices[14].

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** (table 3). Similarly **Fishbein&Ajzen (2010)**, found that the total scores of safe food-handling knowledge correlate with self-reported food handling practices in 8 of 15 reported practices ($p < 0.01$), although the correlation is weak (r 0.2)[15]. This is consistent with the general belief that knowledge is essential and sufficient for safe food-handling practices. Furthermore **Roopa R.et al**.,**(2015),**found that there werecorrelations between the mean scores of knowledge and practice(r = 0.608; p = 0.000). The findings suggested that there was positive relationship betweenknowledge and practice ($p < 0.01$) [16].This result was in contrast with **Abbot, et al., (2009), and Mullan et al.,(2013),** who reported that There is evidence that knowledge is insignificant predictor of safe food-handling practices[17,18].

The result of present study revealed that an increase in mean change of knowledge & practices among mothers aging from 20-25 to be 13.35±3.42 and 17.13±4.21 respectively (table 4). This was in contrasted with **Byrd-Bredbenner et al., (2007),** who reported that young adults had lack food safety knowledge, this may be due to recent reduction or elimination of home economic courses that teach food safety in secondary schools[19].

The present study also showed that illiterate mother had the highest mean change of total knowledge and practice scores 15.19±3.19 and 18.69±3.53 respectively (table 4). This finding may be due to lack of knowledge before program or failure to implement known food safety procedures. This result was supported with other studies which reported that those with a college degree had a significantly higher score than individuals with a high school degree[20,21].

Regarding to mother's job it was observed that more improvement of knowledge & practice was in working mothers with mean change 12.84±3.58 and 17.06±4.57 respectively. The present study showed also that mothers with small family had highly improvement in knowledge & practices with mean change 12.20±3.70 and 16.88±4.54 respectively. Similarity previous research indicates that parents of young children are more likely to change behavior when the change would benefit their children and preventing catastrophic illness or death[22].

The present study revealed that there was a statistical significance between total knowledge and practice scores among the studied mothers with child vomiting & diarrhea(table 5). This result was supported with case-control study in Viet Nam by **Takanashi Ket al.,(2009),** which reported that the prevalence of diarrhea among children was significantly higher in families where the mothers less often washed their hands before feeding children[23] .**Soemilahet al., (2013),** in an Indonesian village reported a reduction in diarrhea incidence of 89% through the promotion of hand washing in four different circumstances, including after defecation[24].

VII. Conclusion

Based on finding of the present study, it can be concluded that the educational program was effective and improved the food safety knowledge & practices of studied mothers. A significant improvement in all parameters of the knowledge & practices scores was observed from pre educational intervention, immediate and three months after educational intervention. Furthermore improvement of personal behavior regarding to food safety and prevention of hazards associated with food to avoid risk of food borne illnesses.

Recommendations

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

1- Public health sectors should establish awareness compaigns directed to general population through mass media and social media regarding application of practical measures during food purchasing, preparation, cooking and storage which would further reduce the risk of food borne illnesses.
2- The food safety educational program should be incorporated into all educational levels for girls from primary school to the university and integrated within the curriculum through academic years.
3- Establishing health education units in every MCH center to provide basic information about food safety, how food becomes unsafe at home, precautions to minimize pathogenic contamination and the possible health risks of foodborne diseases. Stressing up on what changes in environmental conditions, beliefs and behavior, and encourage safer food handling practices at home in order to reduce food hazards.

4- In service training program should be provide for mothers attending day care centers about controlling hazards in food at different stages (from farm to fork) by using posters, videos and group discussion.

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