

# Assessment of Mothers' Practices Regarding Management of Infantile Diarrhea

Rasha Ibrahim<sup>1,2</sup>

<sup>1</sup>Nursing Department, Fatima College of Health Sciences/Abu Dhabi, UAE

<sup>2</sup>Pediatric Nursing, Faculty of Nursing/ Damnhour University, Egypt.

---

## Abstract:

**Background:** Infantile diarrhea remains one of the most frequent diseases occurring to children, especially infants. Diarrhea can be caused in several ways, the commonest being infective. Healthy practice adopted by them helps in raising the healthy living condition, thereby lessens the morbidity and mortality of under-five children. We have selected this study to assess mothers' performance regarding infantile diarrhea.

**Materials and Methods:** In this descriptive study, 200 mothers whose ages between 20 to  $\leq 30$  years with children suffering of diarrhea constituted the study. A structured interview tool was developed by the researcher after thorough review of the related literature to collect needed data.

**Results:** It was obvious that there was statistical significance difference between mothers' total percent score of practice and their family income, where  $P = 0.037$ . On the other hand, the difference was not statistically significant between mothers' total percent score of practice and their age, education, occupation, residence, and crowding index.

**Conclusion:** The findings revealed that mothers have obtained fair score of practices regarding management of infantile diarrhea.

**Key Word:** Mothers; Infants; Diarrhea; Practices

---

Date of Submission: 08-01-2023

Date of Acceptance: 23-01-2023

---

## I. Introduction

A clear definition about diarrhea must be taken into consideration because stool frequency and consistency change frequently in young infants. It is necessary to be acquainted with the exact definition because early detection and prompt management will guard against serious hazards of diarrhea. So, diarrhea has been defined by the Infectious Disease Society of America (IDSA) as an alteration in a normal bowel movement that is characterized by an increase in water content, volume, or frequency of stools<sup>(1)</sup>. Recently, the United Nations International Children's Emergency Fund (UNICEF) and the World Health Organization (WHO) have defined diarrhea as 'having loose or watery stools at least three times per day, or more frequently than normal for an individual'<sup>(2,3)</sup>.

Diarrhea can be caused in a number of ways, the commonest being infective. In this case, diarrhea may be a beneficial physiological response to harmful material within the bowel, thus expelling the harmful pathogens and toxins from the body<sup>(4)</sup>. Most cases of diarrhea are caused by microbial organisms. Important organisms include viruses, bacteria and protozoa<sup>(5,6)</sup>.

Rotaviruses are by far the most common causative agents of severe gastroenteritis particularly in children 6 to 24 months of age. They are responsible for an estimated 16–61% of all cases<sup>(5)</sup>. Its incidence appears to be higher in winter. Other notable viral agents include Norovirus, Sapovirus, Adenovirus, and Astrovirus<sup>(7)</sup>. These viruses invade and destroy mature epithelial cells in the middle and upper villus, causing decreased absorption of sodium and water from the bowel lumen.

Bacteria are other common organisms causing diarrhea. Bacterial infections are often caused by poor hygiene and ingesting foods contaminated with bacteria. Their incidence is higher in summer<sup>(8)</sup>. Salmonella, Shigella and Campylobacter organisms are the most commonly isolated bacterial pathogens producing diarrhea. Escherichia Coli is also a leading cause of diarrhea. Usually, it is caused by enterotoxin production, which results in watery diarrhea<sup>(9)</sup>. Protozoal infections are uncommon causative pathogens. They include Entamoeba Histolytica, Isospora belli, Giardia, and Cryptosporidium<sup>(10)</sup>. The latter two are the most common parasitic causes of diarrhea in developed countries, while Entamoeba Histolytica is more common in the developing nations<sup>(11)</sup>.

Infections outside the alimentary system may also cause diarrhea. Such infections include otitis media, pneumonia, meningitis, and urinary tract infections<sup>(5)</sup>. This could probably happen due to an associated

intestinal infection. Other non-infectious factors particularly those related to infants' feeding are usually accompanied by increased incidence of diarrhea.

Insufficient breast-feeding and/or failure to breast feed exclusively in the first six months may deprive infants from essential antibodies that give them protection. Thus, they are highly susceptible to infectious diarrhea<sup>(12)</sup>. Bottle fed infants are also at risk because over feeding, over concentrated formula as well as high fat content formula may cause intestinal upset and loose stools or diarrhea. Besides, feeding bottles become easily contaminated with bacteria and are difficult to clean<sup>(13)</sup>.

Weaning is a hazardous period during which diarrhea reaches its peak among infants aging 6-11 months<sup>(14)</sup>. This is because infants may not receive food of adequate nutritional value and food and drinks provided may be contaminated with pathogenic microbes, including those that cause diarrhea<sup>(15)</sup>. Early introduction of solid food, excess sugar in diet and allergy to certain type of food are other reasons responsible for diarrhea<sup>(16)</sup>.

Some specific problems associated with weaning that can lead to diarrhea are preparing and storing weaning foods in unhygienic way that leads definitely to bacterial contamination<sup>(17)</sup>. In other words, diarrhea occurs with greater frequency where there are poor facilities for preparation and refrigeration of poor and generally inadequate health care education<sup>(18)</sup>. Besides, poor sanitation, lack of access to clean water, inadequate personal hygiene including inadequate hand washing and inadequate disposal of child's stools are frequently cited as the key factors underlying the occurrence and spread of diarrhea<sup>(10)</sup>.

It is well known that abusing antibiotic is frequently associated with diarrhea because antibiotics alter the normal intestinal flora, resulting in an overgrowth of harmful bacteria such as *Clostridium Difficile*<sup>(10)</sup>. Several antibiotics can cause diarrhea in children such as Ampicillin, Amoxicillin and Cefaclor<sup>(19)</sup>. In addition, the surreptitious abuse of laxatives is another common cause of severe chronic diarrhea<sup>(20)</sup>. Teething is considered by mothers and /or caregivers as one of the main causes of diarrhea<sup>(18)</sup>. Actually, it is not a cause and diarrhea is not a sign of teething. Diarrhea that occurs during this period is usually caused by an intestinal infection or disease that needs to be referred for investigation and care<sup>(21)</sup>.

There are four clinical presentations of diarrhea namely acute watery diarrhea, persistent diarrhea, chronic diarrhea and acute bloody diarrhea (dysentery)<sup>(22)</sup>. Some episodes are self-limited and require simple intervention, while specific treatment is required particularly for those accompanied by dehydration<sup>(9)</sup>.

Dehydration is the main health concerns associated with diarrheal diseases<sup>(23)</sup>. It occurs when large amounts of fluids and electrolytes are lost in watery stools<sup>(24)</sup>. If left untreated, severe dehydration can result in electrolyte imbalance, organ failure and death. Infants are at greatest risk of rapid deterioration because of the dehydration brought on by acute diarrhea<sup>(25)</sup>. Caregivers should closely monitor any infant with diarrhea to guard against dehydration<sup>(5)</sup>. Dehydration is classified into three categories on the basis of osmolarity and depends primarily on the serum sodium concentration. These categories are isotonic, hypotonic and hypertonic dehydration<sup>(19)</sup>.

Diarrheal episodes particularly recurrent or prolonged ones increase the risk of malnutrition, as individuals are less likely to consume and absorb enough nutrients<sup>(26)</sup>. On the other hand, malnutrition can make an infant more susceptible to infection, and infection contributes to malnutrition<sup>(27)</sup>. This gives rise to a vicious cycle between both disorders<sup>(28)</sup>. Nutritional decline during diarrhea results from reduced food intake due to anorexia and vomiting. Damage of the villi and lactose deficiency are responsible for decreased absorption of nutrients. Moreover, rapid passage of food through the gut leads to insufficient time for complete digestion and absorption<sup>(29)</sup>. Withholding foods or fasting will also deteriorate the gut mucosa. Hence, disaccharides are decreased, and nutrient absorption is reduced. Negative nitrogen balance and weight loss are also serious consequences of fasting during diarrheal episodes<sup>(13)</sup>. An inadequate dietary intake may also impair infants' growth and development and lower his immunity<sup>(10)</sup>. This makes him highly vulnerable to pathogens invasion. In addition, fever associating diarrheal attacks increases both energy and micronutrient requirements<sup>(30)</sup>.

Appropriate nourishment is critical during times of infection, when the body requires adequate nutrients to eliminate the infectious agents successfully<sup>(31)</sup>. Continuing feeding during diarrhea helps preserve body weight and sustain growth, thus maintaining strength and avoiding low resistance with subsequent infections<sup>(13)</sup>. Food stuffs contacting the gut mucosa will protect its absorptive capacity and stimulates production of digestive enzymes<sup>(32)</sup>. Offered food may facilitate salt and water absorption by providing organic molecules. Actually, it was found that continued feeding hastens recovery from diarrheal episodes<sup>(30,31)</sup>.

The revised recommendations formulated by the WHO and the UNICEF, in collaboration with the United States Agency for International Development (USAID), CDC and AAP are based on fluid replacement and zinc treatment to prevent dehydration<sup>(23)</sup>. New elements of this approach include low osmolarity ORS, which are more effective at replacing fluids than the previous ORS formulation and zinc supplementation, which decreases diarrhea severity and duration<sup>(33)</sup>. Important additional components of the management are continued feeding including breastfeeding during the episode and use of appropriate fluids available at home if ORS are not available<sup>(34)</sup>.

Infantile diarrhea can be prevented if causes or factors leading to this disorder are known<sup>(35)</sup>. According to the WHO and the UNICEF diarrhea can best be prevented through Rotavirus vaccination, vitamin A supplementation, breast feeding, proper weaning practices, improvement of water supply, promotion of hand washing, use of latrines, safe disposal of stools as well as providing health education concerning diarrhea and dehydration<sup>(36)</sup>.

Usually, mothers in their families occupy a pivotal role. If they are educated and have significant health awareness, they will take the responsibility of providing adequate care for every family member. Their awareness about health, diseases, and preventive services is a barometer by which we can measure the progress of the family, the community, and the country at large<sup>(37)</sup>. Healthy practice adopted by them helps in raising the healthy living condition, thereby lessens the morbidity and mortality of under-five children<sup>(20,30)</sup>. On the other hand, lack of awareness may lead to improper health practices and improper utilization of health services as well. Therefore, it was necessary to study mothers' performance regarding infantile diarrhea.

## **II. Material And Methods**

This descriptive study was carried out on mothers having infants suffering from diarrhea at the Outpatient Department of El-Ramel Children's Hospital in Alexandria. A total 200 mothers of aged 20 to  $\leq 30$  years recruited were for in this study.

**Study Design:** A cross sectional, descriptive, quantitative study.

**Study Location:** the study was done at. El-Ramel Children's Hospital in Alexandria outpatient department.

**Sample size:** 200 participants.

**Subjects & selection method:** A convenient sample of 200 mothers having infants suffering from diarrhea constituted the subject. Infants' age ranged from one month to one year.

**Instrument:** Mothers' practices regarding infantile diarrhea structured interview tool was developed by the researcher after thorough review of the related literature to assess mothers' practices regarding management of infantile diarrhea. It consisted of two parts:

### **Part I: Socio-demographic characteristics of mothers and their infants with diarrhea:**

- Mothers' demographic variables.
- Infants' demographic variables.

### **Part II: Mothers' practices regarding management of infantile diarrhea.**

It involved the following items:

- Mothers' practices regarding rehydrating their infants with diarrheal attacks such as giving oral fluids, amount of water used for dissolving oral rehydration solution packet, methods of administering ORS, seeking medical help when the infant is not responding to ORS.
- Mothers' practices regarding nutrition of infants with diarrheal attacks such as continuing breast and/or bottle feeding, withholding feeding, type of food and fluids given during attacks and giving extra meal after attacks.
- Mothers' practices regarding infant's hygienic care during diarrheal attacks such as cleaning diaper area after every defecation, method of cleaning diaper area, types of local applications used following buttocks care and washing hands after diapering.
- Mothers' practices regarding prevention of diarrhea such as personal hygiene, providing proper nutrition, continuation of breast feeding and food cleanliness.

### **Procedure methodology**

- Official letter was directed to the responsible authority of El-Ramel Children's Hospital in Alexandria to obtain their approval to collect the data after explaining the purpose of the study.
- The developed tool was submitted to a jury of five experts in the pediatric nursing field to determine its applicability and content validity.
- The reliability of the tool was done by measuring the internal consistency of its items using Cronbach Coefficient Alpha Test where  $r = 0.802$
- A pilot study was carried out on twenty mothers attending the previously mentioned setting to ascertain the clarity and applicability of the tool. Accordingly, some modifications were done. Those mothers were excluded from the study subject.
- Every mother was interviewed retrospectively while attending the outpatient department individually after her infant has been diagnosed.
- The duration of each interview lasted 15-20 minutes.
- Data were collected over a period of four months starting from the beginning of September to the end of December 2013.

**Ethical consideration:**

- Written informed consent was obtained from every mother after explaining the aim of the study.
- Confidentiality and privacy were ascertained to each mother.
- Mothers have the right to withdraw from the study at any time.

**Statistical analysis**

- Collected data were revised, coded and transferred into a specially designed format to be suitable for computer feeding. Following data entry, checking and verification processes were carried out to avoid any error during data entry.
- Data were analyzed using personal computer with Statistical Package for Social Sciences (SPSS) version 20.
- Descriptive measures used involved numbers, percentage, minimum, maximum, mean and standard-deviation (SD).

**Analytical statistics**

1. **Independent sample t-test:** This parametric statistical test was used to compare the mean for two independent groups for numeric data and following normal distribution.
2. **One Way ANOVA:** This parametric statistical test was used to compare the mean for more than two independent groups for numeric data and following normal distribution. It was used to compare mean percent score with sample characteristics.
3. **Correlation analysis:** correlation was used to test the nature and strength of relation between two quantitative / ordinal variables. The spearman correlation coefficient (rho) is expressed as the Pearson coefficient. The sign of the coefficient indicates the nature of relation (positive / negative) , while the value indicates the strength of relation as follow: weak correlation for rho less than 0.25, intermediate correlation for rho of value between 0.25-0.74 and strong correlation for values between 0.75-0.99.
4. The 0.05 and 0.001 levels were used as the cut off values for statistical significance (e.g.< 0.05 or p< 0.001).

**1) Scoring system of mothers' practices:**

- a. Mothers' practices consisted of 24 items. Correct practice item was scored one while incorrect one or do not know were scored zero.
- b. For each area of practice, the scores of the items were summed-up and the total was divided by the number of the items, giving a mean score for the part. These scores were converted into a percent score .Means and standard deviation were then computed.
- c. The practice was considered good if the percent score was  $\geq 60\%$  , fair if the percent score was  $50\% < 60\%$  and poor if the percent score was  $\leq 50\%$  .

**III. Result**

Table no 1 shows the sociodemographic characteristics of mothers and their infants with diarrhea. The table clarified that nearly half of the mothers (45.5%) were 25 to less than 30 years old, while slightly more than one quarter of them (26.5%) were 20 to less than 25 years old. Older mothers i.e 30 years old or more constituted 28.0% of the studied subjects .Their mean age was  $26.6 \pm 3.9$  years.

Regarding mothers' education, the same table clarified that 57.0% and 20.0% of the mothers were through with their secondary and university education, respectively. Those who were illiterate constituted 4.5% of the mothers. According to their occupation, it was obvious that more than three quarters of the mothers (79.5%) were housewives, while 20.5% of them were working mothers. The same table showed that 68.5% of the mothers lived in urban areas, while the rest of them (31.5%) lived in rural areas. Crowding index of 55.5% of the mothers was less than two persons per room.

**Table no 1:**Socio-demographic characteristics of mothers and their infants with diarrhea (n=200).

Mothers' Characteristics	Frequency	Percentage
<b>Age in years</b>		
20-	53	26.5
25-	91	45.5
30 or more	56	28.0
Mean $\pm$ SD	$26.6 \pm 3.9$	
<b>Education</b>		
Illiterate	9	4.50

Primary and preparatory education	34	17.0
Secondary education	114	57.0
University education	40	20.0
Higher education	3	1.5
<b>Occupation</b>		
Housewives	159	79.5
Working mothers	41	20.5
<b>Residence</b>		
Urban	137	68.5
Rural	63	31.5
<b>Crowding index</b>		
<2	111	55.5
2-	51	25.5
3-5	38	19.0

Characteristics of infants with diarrhea are presented in **Table (2)**. It was clear that 58.5% of infants were 5 to less than 10 months old and slightly more than one third of them (34.0%) were 10 to 12 months old with a mean age of  $8.0 \pm 2.5$  months. About two thirds of infants (62.5%) suffered from previous diarrheal attacks, while the rest of them (37.5%) were exposed to the first attack. Fifty two percent of the studied infants experienced less than three diarrheal attacks, while 36.0% of them suffered from three to less than seven diarrheal attacks.

**Table no2:**Demographic characteristics of infants with diarrhea(n=200).

Infants' Characteristics	Frequency	Percentage
<b>Infant's age in months</b>		
▪ <5	15	7.5
▪ 5-	117	58.5
▪ 10-12	68	34.0
Mean $\pm$ SD	8.0 $\pm$ 2.5	
<b>Previous attacks of diarrhea</b>		
▪ Yes	125	62.5
▪ No	75	37.5
<b>Number of previous attacks</b>	<b>n=125</b>	
▪ < 3	65	52.0
▪ 3-	45	36.0
▪ 7 or more	15	12.0

Table no3 shows mothers' initial response to diarrheal attacks affecting their infants. It was clear that 51.5% of the mothers gave the available medication at home, while 42.0% of them consulted a pediatrician. The same table portrayed that 78.0% of the mothers' increased fluid intake during diarrheal attacks. Nearly three quarters of them (71.8%) gave just plain water, whereas more than one third of them (40.4%) added juices to their infants' fluid intake such as lemon juice. Soft drinks (e.g., 7-up) were another choice of 21.2% of them.

**Table no3:**Mothers' initial response to diarrheal attacks affecting their infants(n=200).

Mothers' response	Frequency	Percentage
<b>Initial response *</b>		
▪ Give available medication at home	103	51.5
▪ Consult pediatrician	84	42.0
▪ Give rehydration solution	9	4.5
▪ Do nothing	4	2.0
<b>Increase fluid intake</b>		
▪ Yes	156	78.0
▪ No	44	22.0
<b>Type of fluids given during diarrheal attack *</b>	<b>(n=156)</b>	
▪ Plain water	112	71.8
▪ Juices (lemon juice)	63	40.4

*Assessment of Mothers' Practices Regarding Management of Infantile Diarrhea*

▪ Soft drinks (7-up)	33	21.2
▪ Anise	20	12.8
* Multiple responses were given		

Table no4 shows mothers' practices regarding administration of oral rehydration solution to their infants with diarrhea. The table portrayed that 46.0% of the mothers dissolved the small packet of ORS components in 200ml of water i.e. using a cup especially designed for dilution. Others either dissolved it in half a cup of water or used any cup for dilution (43.5% and 10.5% respectively).

It was also found that more than half of the mothers (56.5%) boiled the water before diluting ORS, while 29.0% of them used tap water. Moreover, 96.5% of the mothers did not add sugar to the solution compared to only 3.5% of them who added sugar.

The same table illustrated that administrating ORS using syringes was followed by 45.0% of the mothers, while cup and spoon were used by more than one quarter of them (29.0%). It was also clear that 51.5% of the mothers administrated ORS rapidly. However, 36.5% of them administrated the solution slowly.

Concerning stoppage of ORS in case of vomiting, it was clear that 44.0% of the mother's continued administration of ORS when the infant vomits compared to 56.0% of those who stopped it. Furthermore, it was apparent that more than two thirds of the mothers (68.8%) stopped administration of ORS until cessation of vomiting, while 19.6% discontinued it for 5 minutes and the rest of them (11.6%) stopped it for a period of 5-10 minutes.

The table also highlighted that more than half of the mothers (55.0%) administrated anti diarrheal drugs to manage diarrhea. More than two thirds of them (68.2%) gave antinal and more than one third of them (36.4%) gave smecta. Only 13.6% of the mothers reported giving kapect for their infant to treat diarrhea.

It was obvious that, nearly equal percent of the mothers' seeked medical help when diarrhea is prolonged and also when the infant suffers from fever (64.0% and 63.5% respectively). Other reasons for seeking medical help were loss of consciousness, vomiting and refusal to eat (34.5%, 32.5% and 32.0% respectively).

**Table no 4:** Mothers' practices regarding administration of oral rehydration solution to their infants with diarrhea(n=200).

Administration of ORS	Frequency	Percentage
<b>Dissolving small packets of ORS</b>		
▪ ORS special cup ( 200 ml of water )	92	46.0
▪ Half a cup of water	87	43.5
▪ Any cup	21	10.5
<b>Type of water used for dilution</b>		
▪ Previously boiled water	113	56.5
▪ Tap water	58	29.0
▪ Mineral water	29	14.5
<b>Adding sugar to ORS</b>		
▪ Yes	7	3.5
▪ No	193	96.5
<b>Methods of ORS administration</b>		
▪ Using syringe	90	45.0
▪ Cup and spoon	58	29.0
▪ Directly from a cup	33	16.5
▪ Infant's bottle	19	9.5
<b>Speed of administration</b>		
▪ Rapidly	103	51.5
▪ Slowly	73	36.5
▪ According to infant's desire	24	12.0
<b>Stopping ORS in case of vomiting</b>		
▪ Yes	112	56.0
▪ No	88	44.0
<b>Duration of stopping ORS administration</b>		
▪ Until vomiting stops	(n =112) 77	68.8
▪ 5 min	22	19.6
▪ 5-10 min	13	11.6
<b>Anti-diarrheal drugs given</b>		
▪ Yes	110	55.0
▪ No	90	45.0
<b>Types of anti-diarrheal drugs administrated*</b>		
▪ Antinal	(n=110) 75	68.2

*Assessment of Mothers' Practices Regarding Management of Infantile Diarrhea*

▪ Smecta	40	36.4
▪ Kapect	15	13.6
▪ Flagyl	10	9.1
<b>Reasons for seeking medical consultation if ORS fails *</b>		
▪ Prolonged diarrhea	128	64.0
▪ Fever	127	63.5
▪ Loss of consciousness	69	34.5
▪ Vomiting	65	32.5
▪ Refusal to eat	64	32.0
▪ Blood in stool	50	25.0
▪ Colic	33	16.5
*Multiple responses were given		

Table no 5 Shows illustrates mothers' practices regarding feeding infants' with diarrhea. The table showed that 73.5% of infants received weaning food and 16.5% of them were breast-feeding. Only 10.0% of them were bottle-feeding. All mothers (100.0%) continued bottle-feeding during attacks, whereas weaning food was served to infants with diarrhea by 77.6% of the mothers. Moreover, mothers who did not stop breast-feeding during diarrheal attacks constituted 75.8% of the subject. Concerning reasons for stopping breast-feeding / weaning foods, it was clear that 56.1% of the mothers reported that they stopped the previously mentioned types because they may increase severity of diarrhea, while 17.1% of them supported the issue of reducing the infection rate. It was also clear that rice water as well as fruits / vegetables were given by 77.2% and 76.3% of the mothers respectively. Fruit juice and water with sugar were the other choices (55.3% and 54.4% respectively). Extra meals after diarrheal attacks were ignored by 53.0% of the mothers. On the other hand, 47.0% of the mothers were keen to serve extra meals to replace loss resulting from diarrheal attack.

**Table no 5: Mothers' practices regarding feeding infants' with diarrhea (n=200).**

Infants' feeding	Frequency	Percentage
<b>Type of infants' feeding</b>		
▪ Weaning	147	73.5
▪ Breast feeding	33	16.5
▪ Artificial feeding	20	10.0
<b>Breast feeding during diarrheal attack</b>	<b>(n=33)</b>	
▪ Stopped	8	24.2
▪ Not stopped	25	75.8
<b>Bottle feeding during diarrheal attack</b>	<b>(n=20)</b>	
▪ Stopped	0	0.0
▪ Not stopped	20	100
<b>Weaning food during diarrheal attack</b>	<b>(n=147)</b>	
▪ Stopped	33	22.4
▪ Not stopped	114	77.6
<b>Reasons for stopping breast feeding /weaning food</b>	<b>(n=41)</b>	
▪ It increases diarrhea severity	23	56.1
▪ Reduces infection rate	7	17.1
▪ Both	11	26.8
<b>Type of food given during diarrheal attack *</b>	<b>(n=114)</b>	
▪ Rice water	88	77.2
▪ Fruits and vegetables	87	76.3
▪ Fruit juice	63	55.3
▪ Water with sugar	62	54.4
▪ Tea	34	29.8
▪ Biscuits	31	27.2
▪ Bread& rice	23	20.2
▪ Meat , chicken	12	10.5
▪ Cow or buffalo milk	11	9.6
▪ Cheese	10	8.7
<b>Extra meals given after diarrheal attack</b>		
▪ Given	94	47.0
▪ Not given	106	53.0
*Multiple responses were given		

Table no 6 illustrates mothers' practices regarding diapering infants during diarrheal attacks. It was found that all mothers (100%) changed their infant's diaper immediately after each loose motion. The majority of them (87.5%) used soap and water for cleaning diaper area. It was also clear that almost half of them (48.0%) did not use any local application after loose motions. Twenty four percent of them applied powder after cleaning the diaper area, while 21.0% of them used oil as local applicants. The table also showed that more than two thirds of the mothers (67.5%) were keen to wash their hands after diapering.

**Table no 6:**Mothers' practices regarding diapering infants during diarrheal attacks (n=200).

Diapering infants	Frequency	Percentage
<b>Method of cleaning diaper area</b>		
▪ Water & soap	175	87.5
▪ Water only	19	9.5
▪ Using wipes	6	3.0
<b>Types of local applications used after cleaning</b>		
▪ Nothing	96	48.0
▪ Powder	48	24.0
▪ Oil	42	21.0
▪ Cream	14	7.0
<b>Hand washing after diapering</b>		
▪ Yes	135	67.5
▪ No	65	32.5
*Multiple responses were given		

Table no 7 presents mothers' practices regarding prevention of diarrheal attacks. It was noticed that practicing proper personal hygiene and providing proper weaning food were the core of prevention as mentioned by the mothers (65.0% and 62.0% respectively). Cleaning infants' food, mothers/infant hand washing, maintaining breast feeding and boiling water for safe use were other ways of prevention as mentioned by 55.0%, 39.0%, 32.5% and 30.0% of the mothers, respectively.

**Table no 7:**Mothers' practices regarding prevention of diarrheal attacks (n=200).

Prevention *	Frequency	Percentage
▪ Practicing proper personal hygiene	130	65.0
▪ Providing proper weaning food	124	62.0
▪ Cleaning infants' food	110	55.0
▪ Mothers/infant hand washing	78	39.0
▪ Maintaining breast feeding	65	32.5
▪ Boiling water for safe use	60	30.0
▪ Following proper diaper disposal	57	28.5
▪ Toilet cleaning	40	20.0
▪ Complete obligatory vaccination	17	8.5
*Multiple responses were given		

Table no 8 portray distribution of mothers according to their percent score of practices regarding management of infantile diarrhea. It was observed that more than half of the mothers (58.0%) obtained poor score regarding their prevention of diarrheal attacks with a mean score  $3.5 \pm 1.5$ . It was apparent that score of practices about rehydration and nutrition was fair among 74.0% and 81.0% of the mothers respectively, whereas good score of practices was recorded among 25.0% and 5.0% respectively. Mothers' mean score of practices regarding the previously mentioned items was  $8.3 \pm 1.8$  and  $3.9 \pm 1.3$ . The same table also clarified that good score of practice regarding diapering infants was obtained by 88.5% of the mothers with a mean score of  $1.3 \pm 0.6$ .

**Table no 8:**Distribution of mothers according to their percent score of practices regarding management of infantile diarrhea.

Items	Mothers' percent score of practices				
	score	No	%	Min –Max	Mean $\pm$ SD
<b>Rehydration</b>	Good	50	25.0		
	Fair	148	74.0	4-13	$8.3 \pm 1.8$



*Assessment of Mothers' Practices Regarding Management of Infantile Diarrhea*

	poor	2	1.0		
<b>Nutrition</b>	Good	10	5.0		
	Fair	162	81.0	0-6	3.9±1.3
	poor	28	14.0		
<b>Diapering</b>	Good	177	88.5		
	Fair	21	10.5	1-4	3.1±0.6
	poor	2	1.0		
<b>Prevention of diarrheal attacks</b>	Good	8	4.0		
	Fair	76	38.0	0-8	3.5±1.5
	poor	11	5.5		

Table no 9 illustrate mothers' total percent score of practices regarding management of infantile diarrhea. It was obvious that the total percent score of mothers' practices about infantile diarrhea was fair among 88.5% of them. Few mothers got either good or poor score (6.0% and 5.5% respectively) with a mean score of  $49.0 \pm 9.1$ .

**Table no 9:** Mothers' total percent score of practices regarding management of infantile diarrhea.

Score of practice	Mothers' score of practice (n=200)			
	No	%	Min -Max	Mean ±SD
Good	12	6.0%	28.9 -73.7	49.0 ± 9.1
Fair	177	88.5%		
Poor	11	5.5%		

Table no 10 portrays the relationships between mothers' total mean percent score of practices and their sociodemographic characteristics. It was obvious that there was statistical significance difference between mothers' total percent score of practice and their family income, where  $P = 0.037$ . On the other hand, the difference was not statistically significant between mothers' total percent score of practice and their age, education, occupation, residence, and crowding index.

**Table no 10:** The relationships between mothers' total mean percent score of practices and their socio-demographic characteristics.

Mothers' characteristics	Mean percent score of practice		F	P
	Mean	SD		
<b>Age in years</b>			0.82	0.444
▪ 20-	50.0	9.7		
▪ 25-	49.1	8.5		
▪ 30-36	47.8	9.6		
<b>Education</b>			1.9	0.109
▪ Illiterate	47.4	8.0		
▪ Primary and preparatory education	49.5	9.8		
▪ Secondary education	48.0	8.3		
▪ University education	52.2	10.7		
▪ Higher education	43.9	1.5		
<b>Occupation</b>			t=1.3	0.147
▪ Working mothers	50.8	10.3		
▪ Housewives	48.5	8.8		
<b>Residence</b>			t=0.46	0.639
▪ Urban	49.2	9.2		
▪ Rural	48.5	9.1		
<b>Crowding index</b>			0.16	0.851
▪ < 2	49.3	9.2		
▪ 2-	48.7	9.2		
▪ 3-5	48.5	9.3		

#### IV. Discussion

Till today childhood diarrhea have been reported as one of the worldwide health problems. Healthy practice adopted by mothers helps in raising the healthy living condition, thereby lessens the morbidity and mortality of under-five children<sup>(38)</sup>. On the other hand, lack of awareness may lead to improper health practices and improper utilization of health services as well.

Oral rehydration solution has been proven to be effective in reducing diarrhea mortality. Its early use at home decreases the number of outpatient visits, hospital admission and the overall medical costs. Results of the current study revealed that the majority of the mothers were aware of ORS. These findings could be attributed to the fact that oral rehydration solution has achieved its full potentials of preventing diarrheal deaths. Findings related to Zahid et.al (2014)<sup>(39)</sup>, Saurabh et.al (2014)<sup>(40)</sup>, Khalili et.al (2013)<sup>(41)</sup> and Ukegbu et.al (2010)<sup>(42)</sup> are congruent with findings of the present study. On the contrary, Adimora (2011)<sup>(43)</sup> reported that only one quarter of mothers knew about ORS

The present study showed that a very small percentage of mothers gave correct complete answer about the components of ORS. These findings could be explained in light of the facts that these are medically related topics that are difficult to be recognized by the mothers especially those with limited educational levels. Although educated, mothers may not be keen to read the component printed on the ORS packets. The same findings were reported by Al-Atrushi et.al (2012)<sup>(44)</sup>. On the contrary, the findings of Olakunle et .al (2012)<sup>(45)</sup> reported that almost all of mothers were aware of components ORS.

Regarding methods of ORS administration, the IMCI in collaboration with the WHO, the UNICEF and the CDC emphasized that ORS packet should be given slowly after being mixed in 200 ml of water<sup>(36)</sup>. It was also recommended that boiled or chlorinated water should be used to prepare ORS. Furthermore, it is important that the water should be left to cool before use. This is necessary to avoid decomposition of the tri-sodium citrate by hot water<sup>(28,29)</sup>. If it is not possible to boil water, the IMCI (2005)<sup>(46)</sup> recommended to use the cleanest drinking water available to make up this solution. In general, the present study showed that approximately three quarters of the mothers obtained fair score regarding ORS administration. In particular, slightly less than half of the mothers dissolved ORS in 200ml of water.

Results of the current study revealed that more than half of the mothers supported that previously boiled water is the best water to prepare ORS, while less one third of them reported the possibility of using tap water for dissolving oral rehydration packets. This could be related to health education that might have been provided to mothers. Besides mothers may believe that drinking water is contaminated and it could be the source of infant's infection.

It was also apparent that less than one third of the mothers administered ORS by a cup and spoon and nearly half of them used the syringe. Performance of these practices could be due to information gained from either pediatrician or the nurse. Findings of Mahor (2013)<sup>(47)</sup> were not in the same line with findings of the present study where he stated that only 39% of mothers knew the correct method of ORS preparation and its use.

In case of vomiting, emphasis was put on withholding ORS for 10 minutes then resume giving it in a more slower rate as recommended by the IMCI<sup>(46)</sup>. This is inconsistent with the results of the current study where more than two thirds of the mothers discontinued ORS administration until vomiting disappears. This happens because mothers may believe that giving ORS in the presence of vomiting may worsen their infants' condition. Saurabh et.al (2014)<sup>(40)</sup> supported the same issue as they stated that half of the mothers had a wrong impression that ORS needs to be discontinued if diarrhea persists or when vomiting develops.

Self-medication was found common as shown in findings of the current study, where more than half of the mothers treated infantile diarrhea using available medication at home without seeking medical consultation. Unavailability of costs or medical services oblige them to opt for alternative medicines. In addition, the fact that most mothers would wait until the condition worsens before seeking medical care. It was obvious in the present study where nearly two thirds of the mothers stated that they seek medical help in case of ORS failure, when diarrhea persists or when the attack is associated with fever. Zahid et.al (2014)<sup>(39)</sup> and Mawambete et al 2010<sup>(48)</sup> were not in line with the results of the current study.

Although drugs are not recommended in managing diarrheal attacks, the current study revealed that almost two thirds of the mothers administered antinal as an intestinal antiseptic. It also showed that more than one third of those mothers administered smecta as an anti-diarrheal drug without prescription. This occurs because some pediatricians keep on prescribing those drugs to manage infantile diarrhea. In addition, many mothers are concerned with quick stoppage of diarrheal attacks besides rehydrating their infants.

Providing appropriate diet during diarrhea is very important because maintaining optimal feeding helps prevent more than 10 percent of deaths from diarrhea<sup>(49,50)</sup>. Mothers in the present study supported this fact where more than half of them mentioned that proper nutrition decreases diarrheal attacks. Those mothers are

probably convinced that proper nutrition during diarrheal attacks strengthen their infants' immunity and help them restore their weight loss. This approach was also reflected on their practices, where more than three quarters of them continued feeding during diarrheal attacks.

The current study supported the previously mentioned results where two thirds of the mothers obtained fair score regarding knowledge about nutrition during diarrheal attacks and more than three quarters of them got the same score regarding their practices concerning nutrition. This could be closely related to the healthy effect of breast-feeding particularly if it is exclusive on infants' nutrition. Moreover, exclusively breastfed infants up to the age of 6 months are provided with a high level of immunity. Nevertheless, depriving them from exclusive breast-feeding and resorting to early introduction of liquids and solid food will increase the risk of diarrheal disease. Mothers in the current study supported this issue. The same findings were reported by Haroun et al (2014)<sup>(51)</sup> and Mondal et. al (2011)<sup>(52)</sup>. Previous experience of those mothers and their strong belief that exclusive breast-feeding reduces incidence of many diseases including diarrhea may interpret their support for the golden role of breast milk. This is documented in the present study where three quarters of the mothers continued breast-feeding during diarrheal attacks. This is congruent with the findings of Zahid et.al (2014)<sup>(39)</sup>.

Withholding food from infant who has diarrhea can cause malnutrition or make existing malnutrition worse<sup>(27)</sup>. Mothers may withhold food, or be advised to do so, as they may believe that this will decrease frequency of loose motion. However, food does not make diarrhea worse. It gives the child the nutrients needed to stay strong. This is the best way that helps infants resist illness better. Unfortunately, the idea of withholding feeding during diarrhea was practiced by nearly one quarter of the mothers. This could be attributed to the belief that resting the gut during diarrhea will facilitate recovery. Such practice is also based on the concept that feeding could enhance the passage of frequent watery stools, thus increasing the severity and prolonging the duration of diarrhea. The findings of Olakunle et.al (2012)<sup>(45)</sup> are incongruent with these findings.

Feeding of the infant should be continued, particularly with plenty of nutritious food, to prevent any decline in growth necessary during and after the episode of diarrhea<sup>(20)</sup>. The findings of the current study also revealed that during convalescence period after diarrheal attacks, nearly half of mothers reported giving extra meals after diarrheal attacks for their infants. This happens because mothers want to provide strength for their infants and helps them regain their lost body weight as soon as possible to raise their immunity. Zahid et.al (2014)<sup>(39)</sup> findings are in the same line with the result of the present study.

Findings of the present study showed that the majority of the mothers obtained good score in their practice regarding diapering. One of the simplest and easiest way to prevent many diseases is hand washing. Therefore, the WHO recommended effective hand washing as an important preventive measure of diarrhea. This is based on the use of soap, water, and friction to remove microorganisms<sup>(53)</sup>. Findings of the present study showed that practicing proper personal hygiene in general and hand washing were practiced by the studied mothers.

To curb the diarrhea menace, the WHO and the UNICEF (2004), set a prevention package to make a lasting reduction in the diarrhea burden in the medium to long term plan<sup>(134)</sup>. The results of the current study are not in the same line with WHO and UNICEF because their score concerning prevention of diarrhea was poor. As illustrated in the current study where less than one third of them boiled water for safe use, dispose diaper properly and cleaning toilet as preventive measure for diarrhea. Furthermore, a very small percent of the mothers reported vaccination as prevention. These findings are in accordance with the findings of Saha et al (2013)<sup>(150)</sup>.

Relating socio-demographic characteristics to their practices, the study revealed that family income was the only variable that had significant impact on their practices. This could be attributed to the fact that enough family income enables mothers to seek medical help that influences their practices.

## V. Conclusion

According to findings of the present study, we can conclude that mothers have obtained fair score of practices regarding management of infantile diarrhea.

## References

- [1]. Pour TR, Koyfman A, Runyon MS. Emergency centre management of pediatric diarrhea: An overview. *African J of Emergency Medicine*. 2012 Jun 5;10 (1016): 2 - 6.
- [2]. Ansari M, Ibrahim M, Hassali M, Shankar PR, Koirala A, Thapa NJ. Mothers' beliefs and barriers about childhood diarrhea and its management in Morang district, Nepal. *BMC Research Notes* 2012; 5:576.
- [3]. Umeh C, Rhim N, Vickery M. Designing and Managing Maternal and Child Health Programs in Developing Countries. *Diarrheal Disease*. Boston University 2012. Available from: [https://bu.digication.com/IH887/Diarrheal\\_Disease11](https://bu.digication.com/IH887/Diarrheal_Disease11) Retrieved on 17/8/2012
- [4]. Kelly P. Infectious diarrhea. *J of Medicine*. 2011 Apr; 39(4):201-6.
- [5]. Braito A. Gastroenteritis and Intractable Diarrhea. Italy: University of Siena; 2012.
- [6]. Villar DG, Sautu BC, Granados A. Acute gastroenteritis. *Pediatric in Review J*. 2012 Nov; 33(11):487-95. Available from: <http://pedsinreview.aappublications.org/content/33/11/487> Retrieved on 28/4/2013
- [7]. World Health Organization (WHO). Why children are still dying and what can be done. Geneva, Switzerland: World Health Organization/United Nations Children's Fund; 2009. Available from: [http://whqlibdoc.who.int/publications/2009/9789241598415\\_eng.pdf](http://whqlibdoc.who.int/publications/2009/9789241598415_eng.pdf) [Retrieved on 25/7/ 2013].

- [8]. Hirshon JM. What cause diarrhea in the United States? Risk factors for and causes of diarrhea in selected jurisdictions in the United States. [PHD]. Baltimore: University of Maryland; 2011.
- [9]. World Gastroenterology Organisation practice guideline. Acute diarrhea.2008; Available from: <mailto:guidelines@worldgastroenterology.org> Retrieved on 20/6/2012
- [10]. Wolkoff B, Grim A, Harvey L, Marx JR. Prevention and Control of Communicable Diseases. Jefferson: Department of Health and Senior Services; 2011. Available from: [www.health.mo.gov](http://www.health.mo.gov) Retrieved on: 30/5/2013.
- [11]. Armstrong C. Guidelines on rotavirus vaccination. *Am Fam Physician J*. 2010 Feb 15; 8(4):552-3. Available from: <http://www.pediatrics.org/cgi/content/full/123/5/1412> Retrieved on 30/5/2014.
- [12]. Alam S, Afzal K, Maheshwari M, Shukla I. Controlled trial of hypo osmolar versus World Health Organization oral rehydration solution. *Indian Pediatr J* 2000 ;37: 952–60.
- [13]. Muhimbula HS, Zacharia AI. Persistent child malnutrition in Tanzania : risks associated with traditional complementary foods. *African J of Food Science*. 2010 Nov;4(11):679-92.
- [14]. Division of Public Health Services, Communicable Disease Control Section: Disease Handbook for Childcare Providers. Diarrhea (Infectious Diarrhea); 2009.
- [15]. Guerrant R.L, Oriá R.B, Moore S.R, Oriá M.O, Lima A.A. Malnutrition as an enteric infectious disease with long-term effects on child development. *Nutr Rev J*. 2008; 66: 487-505.
- [16]. Delaune SC, Ladner PK. *Fundamentals of Nursing: Standards & Practice*. 2<sup>nd</sup> edition. United States of America: Thomson Learning, Inc; 2002.
- [17]. Shetty P. Malnutrition and undernutrition. *Medicine* 2003;31:18–22.
- [18]. Whyte LA, Jenkins HR. Pathophysiology of diarrhea. *J of Paediatrics and Child Health*. 2012 Oct; 22 (10): 443-47.
- [19]. Thomas DR, Cote RT, Lawhorne L , Levenson SA, Rubenstein LZ , Smith DA , et al. Understanding clinical dehydration and its treatment .Saint Louis University School of Medicine; American Medical Directors Association; 2008.
- [20]. Begum S, Ahmed M, Sen B. Do Water and Sanitation Interventions Reduce Childhood Diarrhoea? New Evidence from Bangladesh. *Bangladesh Development Studies*. 2011 sep; XXXIV (3):3-5.
- [21]. Villar DG, Sautu BC, Granados A. Acute gastroenteritis. *Pediatric in Review J*. 2012 Nov; 33(11):487-95. Available from: <http://pedsinreview.aappublications.org/content/33/11/487> Retrieved on 28/4/2013
- [22]. Alam S, Mushtaq M. Antibiotic associated diarrhoea in children. *Indian Pediatr J* 2009;46(6):491–6.
- [23]. U.S. Agency for International Development (USAID), World Health Organization ,UNICEF. Diarrhea treatment guidelines including new recommendations for the use of ORS and zinc supplementation for clinic- based health care workers; 2005.p 10-13. Available from <http://www.mostproject.org> Retrieved on 19/7/2013
- [24]. Davila EP, Trepka MJ, Newman FL, Huffman FG, Dixon Z. Diarrheal illness among women, infants, and children (WIC) program participants in miami, florida: implications for nutrition education. *J of Nutrition Education and Behavior*. 2009 Nov; 41(6):420-24.
- [25]. Standardised care process (SCP): Dehydration. Melbourne: Victorian Government; 2013 Aug. Available from: [http://www.health.vic.gov.au/agedcare/downloads/score/dehydration\\_scp.pdf](http://www.health.vic.gov.au/agedcare/downloads/score/dehydration_scp.pdf) Retrieved on 17/7/2013
- [26]. Yilgwan CS, Okolo SN. Prevalence of diarrhea disease and risk factors in University Teaching Hospital, Nigeria. *Ann Afr Med J*. 2012;11(4):217-21.
- [27]. Bellieni C. Rehydration after diarrhea. *A Practical Approach to Neonatal Diseases*. Springer-Verlag: Italia; 2012.
- [28]. World Health Organization. Global task force on cholera control; 2004. Available from : <http://www.who.int/cholera> Retrieved on 5/2/2013.
- [29]. World Health Organization. The Management and prevention of diarrhoea: practical guidelines. 3<sup>rd</sup> ed. 1993. 2-20.
- [30]. Malnutrition and gastrointestinal and respiratory infections in children: a public health problem. *International J of Environmental Research and Public Health* .2011 Apr;(8):1174-93. doi:10.3390/ijerph8041174. Available from : [www.mdpi.com/journal/ijerph](http://www.mdpi.com/journal/ijerph) Retrieved on :14/4/2013.
- [31]. Kovac M. Reducing Malnutrition in Hagadera & Kakuma Camps. London: International Rescue Committee Kenya; 2011 Mar.
- [32]. Gregorio GV, Dans LF, Silvestre MA. Early versus delayed refeeding for children with acute diarrhoea. *Cochrane Database Syst Rev* 2011(7);CD007296.
- [33]. World Health Organization. Implementing the new recommendations on the clinical management of diarrhoea: guidelines for policy makers and programm managers; 2006. Available from: [http://whqlibdoc.who.int/publications/2006/9241594217\\_eng.pdf](http://whqlibdoc.who.int/publications/2006/9241594217_eng.pdf) Retrieved on 19/7/2013
- [34]. Matthai J. Chronic and persistent diarrhea in infants and young children: status statement. *Indian Pediatrics J*. 2011 Jan; 48(17):37-42.
- [35]. Mahathumnuchock S, Acute Infantile Diarrhea and Related Factors in Municipal Communities Thung Song District, Nakhon Si Thammarat Province [M.P.H]. Bangkok Thailand : Chulalongkorn University; 2004 . Available from [http://library.cph.chula.ac.th/available%20materials/2005/Sep\\_2005.pdf](http://library.cph.chula.ac.th/available%20materials/2005/Sep_2005.pdf) Retrieved on 20/1/2013
- [36]. World Health Organization. The treatment of diarrhea: a manual for physicians and other senior health workers. Geneva, Switzerland: World Health Organization; 2005. Available from: [http://www.who.int/maternal\\_child\\_adolescent/documents/9241593180/en/](http://www.who.int/maternal_child_adolescent/documents/9241593180/en/). Retrieved on 29/2/2013.
- [37]. Roushdy R, Sieverding M, Radwan H. The Impact of water supply and sanitation on child health: Evidence from Egypt . The Population Council, Inc. 2012; New York, USA
- [38]. Fischer Walker CL, Fontaine O, Young MW, Black RE .Zinc and low osmolarity oral rehydration salts for diarrhoea: a renewed call to action. *Bull World Health Organ*. 2009; (87):780–6.
- [39]. Zahid SS, Zehra N, Ullah S, Khan N, Javed MH, Khan M. Mother's Awareness and Practices Regarding Home Management of Childhood Diarrhea in a Squatter Settlement of Karachi. *Pak J Med Dent* 2014; 3(2).
- [40]. Saurabh S, Shidam UG, Sinnakirouchenan M, Subair M, Hou LG, Roy G. Knowledge and Practice Regarding Oral Rehydration Therapy for Acute Diarrhoea among Mothers of Under-Five Children in an Urban Area of Puducherry, India. *Natl J Community Med* 2014; 5(1): 100- 4.
- [41]. Khalili M, Mirshahi M, Zarghami A, Rajabnia M, Farahmand F. Maternal Knowledge and Practice Regarding Childhood Diarrhea and Diet in Zahedan, Iran. *Health Scope J*. 2013; 2(1): 19-24.
- [42]. Ukegbu AUD, Ukegbu PO. Mothers' knowledge, Perceptions and practices of Home based management of Childhood Diarrhea in a Rural Community in Anambra State, Nigeria. *Niger J Nutr Sci* 2010. [online] [cited 2013 Jan 20]. Available from: URL: <http://dx.doi.org/10.4314/njns.v3i12.63907> Retrieved on : 4/10/2014.

- [43]. Adimora G N, Ikefuna A N, Ilechukwu G. Home management of childhood diarrhoea: Need to intensify campaign. *Niger J Clin Pract.* 2011; 14(2): 237-41. Available from:<http://www.njceonline.com> Retrieved on 29/1/2015
- [44]. Al-AtrushiAM , Saeed SY , Yahya SM. Knowledge , attitude and practice of mothers towards oral rehydration therapy in Duhok. *ISRA MedicalJ*2012Sep;4(3):132-8. Available from: [http://www.isra.edu.pk/downloads/journal/Isra\\_Medical\\_Journal\\_Volume-IV\\_Issue-III.pdf](http://www.isra.edu.pk/downloads/journal/Isra_Medical_Journal_Volume-IV_Issue-III.pdf) Retrieved on : 4/10/2014.
- [45]. Olakunle JM, Vlentine O, KamaldeenAS,duhariAS.Assessment of mothers' knowledge of home management of childhood diarrhea in ma Nigerian setting. *IJRBS*.2012;1(4) 168-84. Available from:[www.ijprbs.com](http://www.ijprbs.com) Retrieved on 29/1/2015
- [46]. World Health Organization. Handbook: IMCI Integrated Management of Childhood illness;2005: 25-31. Available from:<http://whqlibdoc.who.int/publications/2005/9241546441.pdf>. Retrieved on 17/5/2013.
- [47]. Mahor G.R. Knowledge and attitudes of mothers regarding use of Oral Rehydration Solution in management of diarrhea. *Asian Journal of Biomedical and Pharmaceutical Sciences*.2013; 3 (22): 6-8.
- [48]. Mwambete KD, Joseph R. Knowledge and perception of mothers and caregivers on childhood diarrhoea and its management in Temeke municipality, Tanzania. *Tanzan J Health Res.* 2010; 12(1): 47-54.
- [49]. Mohammed S, Tamiru D. The Burden of Diarrheal Diseases among Children under Five Years of Age in Arba Minch District, Southern Ethiopia, and Associated Risk Factors: A Cross-Sectional Study. *International Scholarly Research Notices*.2014.1-6. Available from:<http://dx.doi.org/10.1155/2014/654901> Retrieved on 27/6/2013.
- [50]. Shah M, Ahmed A, Khalique N, AfzaS , Ansari A ,Khan Z . Home based management of acute diarrhoealdisease . *J infect Dev Ctries* 2012;6(2):137-142. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22337842>. Retrieved on 27/6/2012.
- [51]. Haroun HM, Mahfouz MS, El Mukhtar M, Salah A. Assessment of the effect of health education on mothers in Al Maki area, Gezira state, to improve homecare for children under five with diarrhea. *Family CommunityMedJ*.2010;17(3):141-6. Available from: <http://www.jfcmonline.com> Retrieved at :24/1/2015
- [52]. Mondal D, Minak J, AlamM , Dai J, Korpe P , Liu L, Haque R .Contribution of Enteric Infection, Altered Intestinal Barrier Function, and Maternal Malnutrition to Infant Malnutrition in Bangladesh. *America: Oxford University Press* on behalf of the Infectious Diseases Society ;2011 Nov. Available from: <http://cid.oxfordjournals.org/> Retrieved on 25/6/ 2013
- [53]. Sarfo LA,Peasah DA, Asamoah F.Millennium Development Goal 4 and the knowledge of mothers on the prevention of diarrhea among children under five years. *InterRes J of Med and Med Scien*.2013;1(3):80-4.