

Comparison between breastfeeding and artificial feeding among infants with acute gastroenteritis in Al-Azizyia General Hospital

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Abstract

A cross-sectional study was performed in Al-Azizyia general hospital in Wasit province for a sample of one hundred ten cases which was conveniently collected from the words and the outpatient clinic throughout July, August, and September 2020. All mothers were chosen and aged from 18 to 41 years old. 110 cases of infants of both sexes were included, their ages range from 1 to 12 months. By using the questionnaire data concerning, acute gastroenteritis, age of the infants, the sex of the infant, residency, type of feeding, level of education of mother, mother age, the job of father, and the job of mother. We found that 85 (77.2 %) of the collected sample were found to be non-beast-fed infants, while the rest of the sample 25 (22.7 %), breast-fed infants. Most of our patients were from rural areas 60(54.5 %) and the rest from urban areas 50 (45.4 %). Most of our patients were male 71 (64.5 %) and the rest were females (35.5 %). The infants below six months of age 61 (55.4 %) are more than those above six months 49 (44.5 %). The age of mothers between 20, and 30 years old 73 (66.36 %) is more than that of mothers aged above 30 to 37 years (25.45 %) which is more than that of mothers aged below 20 to 9 (8.18 %). Most of the mothers were housewives 105 (95.4 %) and the rest were workers 5 (4.6 %). Most of the fathers were unemployed 87 (79.1 %) and the rest were employed 23 (20.9 %). Mothers with a primary level of education are 80 (72.7 %) are more than the mothers with a secondary level 24 (21.8 %) which is more than those with a higher level 6 (5.4 %).

Key words: breastfeeding, artificial feeding, human milk, acute gastroenteritis.

1. Introduction

Human milk is the optimal nutrition for normal newborn infants, but inappropriately in several western communities its benefits are not totally practiced. Although these benefits are undoubtedly associated, nursing has benefits for both mother and infant. Human milk in the early months may be lifesaving for babies in developing countries [1].

1.1 Human Milk Production

With pregnancy progression, there is the proliferation of breast ductules and acini because of hormones. In the last trimester prolactin from the pituitary stimulates the glandular tissue with the production of small quantities of colostrum. After birth milk flow is regulated by the let-down reflex. Nipple sucking stimulates afferent impulses to the posterior pituitary to produce oxytocin-made smooth muscle fibers surrounding the alveoli to eject the milk into the large ducts, after delivery prolactin levels increase, which regulates milk synthesis [2]. Milk synthesis is regulated by intrinsic

(maternal) and extrinsic (baby) components:

- a) Intrinsic: During the first weeks, prolactin production is stimulated by feeding to control milk synthesis.
- b) Extrinsic: Milk quantity is related to successful and repeated suckling by the baby.

1.2 Nutritional contents

Human milk is produced to meet the requirement of infants, with lesser protein amounts and minerals correlated with other mammals. The energy produced by human milk (67 kcal/100 mL) is provided by fat (54 %), carbohydrate (40 %) and protein (6 %). Human milk has a very low protein content of only 0.9 g/100mL, with a whey casein ratio of 0.7, Human milk contains more unsaturated fatty acids and less saturated fatty acids than cow's milk. Compared to cow's milk, human milk contains more vitamins A, C, and E as well as nicotinic acid, but lesser vitamins B1, B2, B6, B12, and K. Table 1 [3] demonstrates human milk composition regarding formula and cow milk. A higher percentage of the

nitrogen in human milk is derived from non-protein components correlated to cows' milk.

Human milk has double the amount of lactalbumin compared to cows' milk which is immunologically different, but no lactoglobulin, which is a significant proportion of the protein content of cows' milk. Table 2 demonstrates the significant protein variations between human and cow's milk [4]. The amounts of amino acids such as taurine, aspartic acid, glutamic acid, and asparagine are high. Human milk fat is more well digested than that of a cow due to the small size of the emulsified fat globules and the presence of lipase in human milk [5]. Moreover, flavours and odours of food transmission occur through breast milk [6].

Table 1: Composition of Breast milk compared with Standard formula and Cow milk.

| Energy and contents | Breast milk | Standard formula | Cow milk |
|---------------------|-------------|------------------|----------|
| Energy,kJ | 270-290 | 280-290 | 270 |
| Energy,kcal | 67 | 67 | 65 |
| whey/casein | 80/20 | 60/40,18/82 | 20/80 |
| Protein(g) | 0.9 | 1.2-1.8 | 3.4 |
| Fat(g) | 3.5 | 3.8 | 3.5 |
| Carbohydrate (g) | 6.7 | 7-8 | 4.4 |
| Ca (mg) | 20-25 | 42 | 116 |
| Phosphorus (mg) | 12-14 | 21 | 93 |
| Sodium (mg) | 12-25 | 16 | 45 |
| Potassium(mg) | 40-55 | 55 | 144 |
| Iron (mg) | 0.03 - 0.09 | 0.4-0.7 | 0.09 |
| Zinc (mg) | 0.1-0.3 | 0.4 | 0.42 |
| Vitamin D (µg) | 0.03 | 1.0 | 0.1 |
| Vitamin A (µg) | 30-60 | 50 | 29 |
| Vitamin C (µg) | 10 | 7-9 | 1.2 |
| Vitamin K (µg) | 0.2-0.5 | 2.8 | 1.6 |
| Folic acid (µg) | 80-140 | 6.5 | 11 |
| Osmolality(mOsm/l) | 253 | 270 | 308 |
| renal solute | 75 | 100-126 | 230 |

Table 2: Proteins in human milk and cows' milk (g/100 ml).

| Contents | Human | Cow |
|-----------------|-------|-------|
| Total protein | 0.89 | 3.30 |
| Caseins | 0.25 | 2.60 |
| Total whey | 0.64 | 0.70 |
| a-Lactalbumin | 0.26 | 0.12 |
| a-Lactoglobulin | - | 0.30 |
| Lactoferrin | 0.17 | Trace |
| Serum albumin | 0.05 | 0.03 |
| Lysozyme | 0.05 | Trace |
| IgA | 0.10 | 0.003 |
| IgG | 0.003 | 0.06 |
| IgM | 0.002 | 0.003 |
| Others | 0.07 | 0.15 |

1.3 Advantages for the baby

The nutritional source that changes with the baby's changing metabolic needs, human milk has many beneficial properties compared with milk formula as it's anti-infective due to protection against various illnesses (e.g., gastroenteritis) table 3 [7]. It's antiallergic by avoidance of foreign proteins in formula feeds reduces the risk of asthma and eczema in infants predisposed to these conditions. Although apparent protection against SIDS (sudden infant death syndrome) probably relates to maternal education, socioeconomic status, and birth weight, rather than to breastfeeding per se. Breastfeeding is best for babies with special needs. (Very small or sick, premature babies) [8]. Numerous studies conducted in developing countries have delineated the protection offers of breastfeeding [9]. It also reduces the likelihood and severity of cows' milk protein allergy and decreases the incidence of infant obesity and subsequently type II diabetes, hypertension, and hyperlipidemia. Breast milk cholesterol is essential for CNS development [10]. Gastric emptying is faster after the ingestion of human milk [11].

Table 3: Beneficial properties of human milk compared with milk formula.

| Factor | Action |
|--|---|
| Antibacterial Factors | |
| Secretory IgA | Specific antigen-targeted anti-infective action |
| Lactoferrin | Immunomodulation, iron chelation, antimicrobial action, antiadhesive, trophic for intestinal growth |
| Casein | Antiadhesive, bacterial flora |
| Oligosaccharides | Prevention of bacterial attachment |
| Cytokines | Anti-inflammatory, epithelial barrier function |
| Growth Factors | |
| Epidermal growth factor | Luminal surveillance, repair of intestine |
| Transforming growth factor (TGF) | Promotes epithelial cell growth (TGF- β) Suppresses lymphocyte function (TGF- β) |
| Nerve growth factor | Promotes neuronal growth |
| Enzymes | |
| Platelets activating factor (PAF)_acetyl hydrolase | Blocks action of PAF |
| Glutathione peroxidase | Prevents lipid oxidation |
| Nucleotides | Enhance antibody responses, bacterial flora |

1.4 Advantages for the mother

Having a successful breastfeeding relationship makes mothers feel proud of

themselves, fostering a deep mother-baby bond that gives the child security, warmth, and comfort. Also, it is convenient with no need to prepare formula, easily express it, store it, and feed it to the infant others. By postponing ovulation, lactation amenorrhea continues to be the most effective contraception in the world. The hormones make mothers' bodies more efficient. Additionally, there is some defense against osteoporosis, ovarian cancer, and premenopausal breast cancer. Breastfeeding helps mothers lose pregnancy weight more quickly, allowing them to regain their pre-pregnancy weight [12].

Human milk contains minerals that result in a low renal solute burden for the developing kidney. Though there are higher percentages of calcium and phosphate in cow's milk than in humans, their absorption is substantially lower. Maternal diet in breast-fed infants e.g., excessive chocolate, Coca-Cola, etc. should be considered when an infant is having loose frequent stool [13].

1.5 Variations of breast milk

Early human milk has higher sodium and protein than milk produced in later months. The high sodium content in early milk reflects the young infant's inability fully to conserve sodium by the kidneys, a

mechanism that matures in the weeks following birth. Lactose concentration in human milk rises progressively with age because the intestinal disaccharidase enzyme becomes fully grown. Within the first four minutes of feeding, up to 90 % of the breast's milk is removed. However, in bottle feeding, less than 40 % of the milk is taken in the first 5 minutes. It is now known that the compositions of breast milk from females who gave birth preterm and those who gave birth full term differ. Compared to term milk, pre-term milk contains higher levels of protein and sodium, so the suggestion is that pre-term milk is better suited to premature infants than milk from established breastfeeding mothers. In addition, Pre-term milk is significantly higher in immunoglobulin (IgA), other immune components, and protection from necrotizing enterocolitis than term milk. Secretory IgA in human milk does not harm normal gastrointestinal flora [14]. Although the composition of pre-term human milk dramatically varies, there is a gradual decrease in energy, lactose, and fat over time. Feeding with energy- and fat-rich "hind milk" for moms whose supply of breast milk does not fulfil pre-term baby requirements improves weight gain and growth. If the

baby is breastfeeding only, no additional water is required [15].

1.6 Breast milk has Anti-microbial properties.

It is an active process of defense from infection while the immunity of infants is evolving as breast milk contains immunoglobulins, cells, lysozyme, lactoferrin, antiviral properties and probiotics (Bifidus factor and lactobacilli) [16]. Breastfed infants are less likely to develop gastroenteritis [17].

1.7 Acute Gastroenteritis

A disease that has a sudden onset, lasts fewer than ten days, and is accompanied by fever, diarrhoea, and/or vomiting, the symptoms cannot be explained by any other known cause. More than 3 watery or loose stools per day indicate acute diarrhoea [18]. This definition implies that the diagnosis is often one of exclusion. The exclusions are very important as they include some of the most serious surgical emergencies which occur in children. The immature gut of the young child seems more susceptible to enteric infection, particularly in children who are malnourished or who have not been breastfed [19]. In Third World countries acute gastroenteritis constitutes a major

health problem, causing enormous morbidity and mortality. Acute diarrhoea causes more than 10 million deaths per year in developing countries [20]. Remember that often diarrhoea is over diagnosed in newborns and infants who are entirely on breastfeeding [21].

1.8 Aetiology

Any cause of diarrhoea may produce fatality secondary to dehydration [22]. Rotavirus is the commonest cause of acute diarrhoea in children under five years old in developed nations and is identified in 40-50 % of cases admitted to hospital. Rotavirus diarrhoea is said to smell like freshly mowing hay [23]. It is probably also responsible for a higher percentage of acute gastroenteritis cases in children below one year in developing countries than any other causative agent and is associated with severe disease than most other agents. Viral pathogens tend to cause injury to the proximal small intestine [24]. The viral infection itself resolves in seven to ten days without specific therapy but diarrhoea may persist [25]. Rotaviruses occur in all age groups, with the peak occurrences of severe illness in children from six to twenty-four months of age [26].

Transmission in rotavirus is by the feco-oral route. Bacteria cause fewer

episodes than viruses. The most prevalent cause of bacterial diarrhoea in children is salmonella, with infants under six months of age having the greatest attack rates [27]. *Campylobacter jejuni* may account for about 5 to 10 % of cases in developed countries. *Shigella* spp., different forms of *Escherichia coli*, and *Salmonella* spp. each make up a little portion of the total. In developed nations, only a small proportion of individuals have *E. coli*. *E. coli* (enterotoxigenic, enteropathogenic, and enter invasive) and *Shigella* are particularly important in developing nations because they cause chronic, incapacitating sickness and because antibiotic-resistant variants are evolving. In *E. coli*, specific testing must be requested when the 0157:H7 strain is suspected [28]. Bacteremia is more likely in infants under three months of age with bacterial enterocolitis [29]. Stool PMNS is more reliable as indicates bacterial aetiology than a positive guaiac test for blood [30]. High-volume diarrhoea without blood in previously healthy children is likely to be viral, and low-volume diarrhoea with blood may be bacterial [31]. Parasitic causes due to *Giardia lamblia* and *Cryptosporidium*; encountered in some cases of infants admitted to hospital. Determining the cause of diarrhoea is much less important than

managing fluid losses, dehydration, and electrolyte abnormalities [32].

1.9 Clinical features

The presenting symptoms include poor feeding, vomiting and fever followed rapidly by diarrhoea. Vomiting and/or fever may not always be present. Stools are often watery, frequent (10-20 times per day) and of large volume in viral diarrhoea. Blood, mucus, and frequent small motions associated with abdominal pain and tenesmus suggest a bacterial cause. Watery diarrhoea results from the involvement of the small bowel while, inflammatory diarrhoea results from infection of the colon [33]. With increasing anorexia, vomiting and diarrhoea, the infant becomes lethargic, and has signs of dehydration, with accompanying metabolic acidosis. Because of their higher surface area-to-weight ratio, infants are especially at risk for dehydration. Inability to gain access to fluids when thirsty [34].

1.10 post-gastroenteritis syndrome

Temporary lactose intolerance may have developed. Lactose intolerance is seen in approximately 50 % of infants suffering rotavirus infection and may last for several weeks [35]. Give zinc supplements from 10 to 14 days [36].

1.11 Prevention

Providing clean, uncontaminated water and practising good hygiene when cultivating, gathering, and preparing food are the two most crucial ways to avoid childhood diarrhoea [37]. With thorough hand washing and barrier nursing, prevent cross infection in cases of acute diarrhoea [38]. There has been increasing interest in the use of probiotic lactobacillus strain is the treatment and prevention of acute diarrhoea [39]. Prevention of rotavirus infection is mainly by good hygiene and prevention of Fecal oral contamination [40]. In rotavirus asymptomatic re-infection, several times each year maintains immunity throughout life, although the mild disease can occur in older children and adults [41]. By educating caregivers and enhancing home food storage, the risk of contaminating supplemental foods may be decreased [42]. Breastfeeding helps to prevent infantile diarrhoea and other gastrointestinal infection [43]. Furthermore, the current study was performed to evaluate the role of breastfeeding practice in acute diarrhoea in infants in comparison to artificial feeding.

2. Patients and methods

A cross-sectional study was performed in Al-Azizyia General Hospital in

Wasit Province for a sample of one hundred ten cases which was conveniently collected from the ward and-the outpatient clinic through July, August, and September 2020. All patients of the sample chosen are less than one year and free from any congenital abnormalities. All mothers were chosen and aged from 18 to 41 years old. Using the questionnaire data concerning, acute gastroenteritis, age of the infants, the sex of the infant, residency, type of feeding, water supply, level of education of mother, mother age, number of previous admissions, the job of father, the job of mother. The sample is analyzed by using descriptive statistics and the Chi-square test to identify frequencies and relationships between different variables of a given sample. All patients were examined regarding nutritional and hydration status and weight then plotted on a growth chart clinical assessments used for gastroenteritis depend mainly on history and examination in reaching the diagnosis. The sample was analyzed for different related factors and frequencies of acute gastroenteritis.

2.1 Statistical analyses

Statistical analysis was performed by using descriptive statistics.

- a) Descriptive statistics to evaluate acute gastroenteritis, age of the infants, the sex of the infant, residency, type of feeding, duration of lactation, water supply, level of education of mother, mother age, number of the previous admission, job of father, job of mother, general stool, urine and stool culture and the socioeconomic status in the studied sample.
- b) Chi-square test to evaluate if there is a statistically significant relationship between the incidence of acute gastroenteritis, age of the infants, the sex of the infant, residency, type of feeding, duration of lactation, water supply, level of education of mother, mother age, number of the previous admission, job of father, the job of mother, number of rooms, number of persons, general stool, urine, and stool culture and the socioeconomic status in the studied sample (p. value < 0.01 was regarded as statistically significant).

3 Results

A cross-sectional study was performed in Al-Azizya General Hospital in Wasit Province for a sample of one hundred ten cases which was conveniently collected from the word and-the outpatient clinic

through July, August, and September 2020. Eighty-five cases of the collected sample were found to be bottle-fed infants while the other twenty-five infants were breastfed.

3-1 Residency

Figure 1 shows that most of our patients were from rural area 60 (54.5 %) and the rest from urban area 50 (45.4 %).

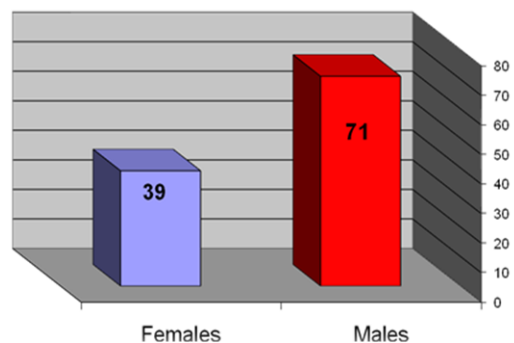


Figure 1: Role residence among patients studied (P value = 0.003).

3.2 Type of feeding

Figure 2 shows that most of our patients were bottle-fed 85 (77.3 %) and the rest were breastfed (22.7 %).

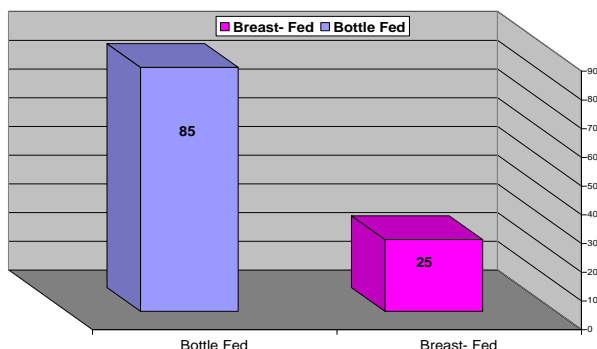


Figure 2: Breastfeeding versus bottle feeding among infants studied having Gastroenteritis.
P value=0.001

3.3 Gender of the patients

Figure 3 shows that most of our patients were male 71 (64.5 %) and the rest were females 39 (35.5 %).

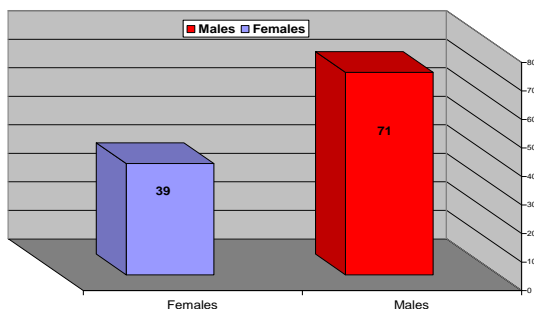


Figure 3: Role of sex in relation to gastroenteritis among patients studied (P value = 0.00).

3.4 Age of the infants

Figure 4 shows that the infants below six months of age 61 (55.4 %) are more than that above six months 49 (53. %)

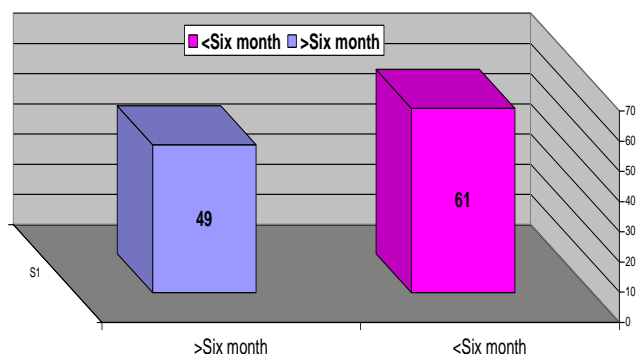


Figure 4: Age distribution among infants studied (P value = 0.032).

3.5 Age of the mothers

Figure 5 shows that the age of mothers between 20-30 years 73 (66.36 %) more than that of mothers age above 30 years (25.45 %) which is more than that of mothers age below 20 years 9 (8.18 %).

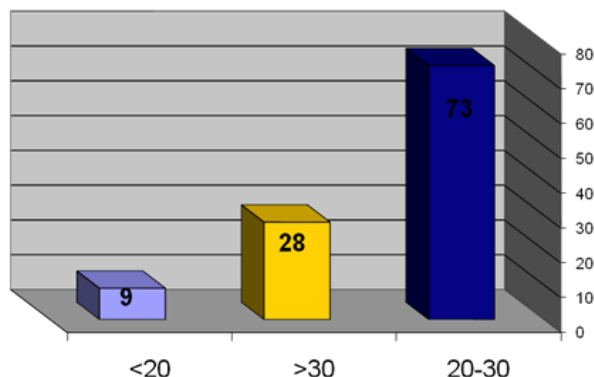


Figure 5: Age distribution of mothers studied (P value = 0.00).

3.6 Mother's job

Figure 6 shows that most mothers were housewives 105 (95.4 %) and the rest were workers 5 (4.6 %).

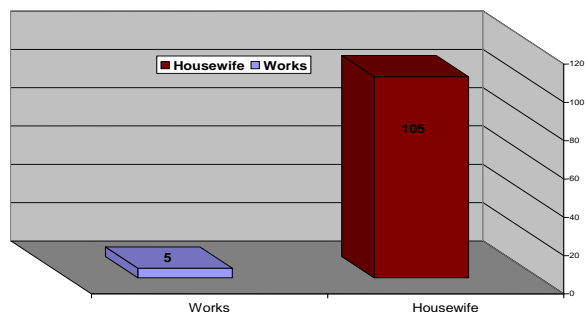


Figure 6: Correlation between mothers' jobs as Housewives or workers and Gastroenteritis among infants studied (P value=0.00).

3.7 Father's job

Figure 7 shows that most of the fathers were unemployed 87 (79.1 %) and the rest were employed 23 (20.9 %).

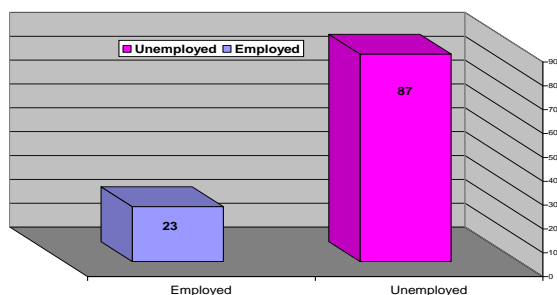


Figure 7: Relation between father's job Employed or unemployed with gastroenteritis among infants studied (P value = 0.002).

3.8 Mothers level of education

Figure 8 shows that the mothers with a primary level of education are 80 (72.7 %) are more than the mothers with a secondary level of 24 (21.8 %) which is more than those with higher level 6 (5.4 %).

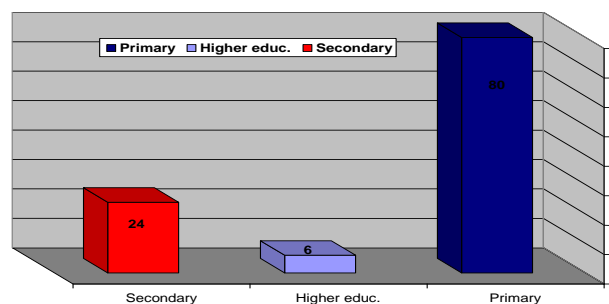


Figure 8: Relation between different Educational Levels of mothers among infants with Gastroenteric studied (P value = 0.000, P value = 0.000, and P value = 0.003).

4 Discussion

Regarding Residency, our study shows that most of the patients were from rural areas 60 (54.5 %) and the rest from the urban area 50 (45.4 %). However, the result was incompatible with a study done by Gebremeriam Woldemicael in Eritrea where the rate in rural areas was (46 %) and in an urban area (54 %) probably because of the difference in the geographic distribution of population among our population [44]. Moreover, in Iraq people are living more in rural areas. In comparison to those in Eritrea. Regarding type of feeding our study shows

that the bottle-fed were 85 (77.3 %) and the rest were breastfed 15 (22.7 %). Results were Incompatible with a study done by Dewey K. G, in USA where it was discovered that in the first year of life, the incidence of diarrheal disease among breastfed infants was half that of infants who were fed formula, this difference probably explained by the deference between educational level among mothers in our country and that in the USA [45].

Regarding the gender of the patients, our study shows that most of the patients were male 71 (64.5 %) and the rest were females 39 (35.5 %). The result was incompatible with a study done by Schmidt BJ in which the male percentage was (52.9 %) and the female percentage was (47.1 %) probably because our population pay more attention to male infants than female and so they try to admit them for access medical care [46]. Regarding the age of infants studied our study shows that 61 (55.4 %) infants were below six months of age while the remaining 49 (53.6 %) this result is compatible with a study done by Feachem RG et. al from Guatemala [47]. Regarding the age of the mothers, our study shows that the age of mothers between 20 and 30 years old 73 (66.36 %) was more than that of mothers above 30 years old, 28 (25.45 %)

and this age group were more than that of mothers below 20 years 9 (8.18 %). It is Incompatible with a study done by M. M. Hossain from Bangladesh where (75.1 %) and mothers below 20 years old were (22.4 %) this difference is probably because people in Bangladesh marry their daughters younger than 20 years in comparison to the age of married in our country [46].

Regarding Mothers' jobs our study shows that most of the mothers were housewives (95.4 %) and the rest were workers 5 (4.6 %), this result is Incompatible with the study by M. M. Hossain, M. R. Islam in Bangladesh where they found that non-working mothers were (80.1 %) while working mothers (11.9 %) [47]. Probably because Bangladesh is a poor country and the families there need working mothers than in our society.

Regarding father's jobs the current study shows that most fathers were unemployed (79.1 %) and the rest were employed (20.9 %) these results are incompatible with the study done by M. M. Hossain, M. R. Islam in Bangladesh in which the unemployed were (89.1 %) while the employed father was (10.9 %) this father difference probably because the economic level in Iraq is better than in Bangladesh [48].

Regarding the level of education in our study, 80 mothers (72.7 %) had only completed elementary school, while the remaining 6 mothers (5.4 %) had completed high school, these results are nearly compatible with a study done by M. M. Hossain, M. R. Islam in Bangladesh where they found that mothers with primary school level of education were (69.8 %) and mother with secondary school level of education were (17.1 %) and mothers with high school level of education were (13.1 %) [49].

5 Conclusion

Breastfeeding is a very important factor in decreasing the number of acute gastroenteritis in infancy. Infant gastroenteritis is more common in families with low socioeconomic levels. The increased rates of infant gastroenteritis are linked to the mother's low educational level. Infant gastroenteritis is more common when the mother is a young age group. Infant gastroenteritis is more common in boys. Infant gastroenteritis is more common in babies under six months old.

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