WORLD JOURNAL OF PHARMACY AND PHARMACEUTICAL SCIENCES
SJIF Impact Factor 7.421
Volume 7, Issue 12, 10-39 Research Article ISSN 2278 – 4357

RELATIONSHIP BETWEEN BREASTFEEDING DURATION AND ACUTE RESPIRATORY INFECTIONS IN INFANTS: A CROSS SECTIONAL STUDY IN THE CHILD CENTRAL TEACHING HOSPITAL

***Dr. Sura Qais Al-Maroof and Dr. Sajwa Qais Mahmood**

Department of Pediatrics-College of Medicine al-Mustansyria University 2008.

Article Received on
30 Sept. 2018,

Revised on 20 October 2018,
Accepted on 10 Nov. 2018

DOI: 10.20959/wjpps201812-12700

***Corresponding Author**
Dr. Sura Qais Al-Maroof
Department of Pediatrics-College of Medicine al-Mustansyria University 2008.

ABSTRACT

Background: Human milk is the ideal and uniquely superior food for infants for the first year of life and as the sole source of nutrition for the first six months. Breast l'eeding is beneficial for both babies and mothers in rich and poor countries. Besides being ideal for babies, it helps to prevent sepsis in new born babies. It protects gut, chest, ear, and urinary tract from infections in young children, and is valuable in management of diarrhea. **Objectives:** To study the relationship of breastfeeding duration on the frequency of respiratory tract infections in infant during the first two years of life. **Patients and methods:** A cross sectional study performed in the central teaching hospital for pediatric involving a sample of one hundred forty one cases, which was conveniently collected from the word and the out patient clinic in the period from 1511) of Dec. 2007 to 15th of June 2008. One hundred of the collected sample was found to be breastfeed infants, while the other, forty one, were not breastfeed infants. The sample was analyzed for different related factors and frequencies of respiratory infections. Results were analyzed by computing the percentages of age, sex, duration of lactation, duration of pregnancy, mode of delivery, child rank, upper and lower respiratory tract infections, number of siblings, state of the house, and the socioeconomic status. Furthermore; Chi-square test has been used to find out the statistical significant relation between the variables and the respiratory tract infections. **Results:** We found out that: Infants with no breastfeeding account for 41 (29. I%) of the studied sample, while those who were breastleed account for 100 (70.9%). The incidence of otitis media, pneumonia, bronchiolitis were higher in those who were not breastfeed infants, while the risk decreases in those who breastfeed more than 6

months. Most infants develop one attack of respiratory tract infections 48.9%. The number of attacks per each infant regardim!, upper respiratory tract infections appears to be (0.8), while those of lower respiratory tract infections appears to be (0.9). So the end result is (1.6) attack per each infant. In the other band bottle fed infants develop one attack in 17.1% of cases. Therefore; number of attack per each infant regarding upper respiratory tract infections appears to be (0.9), while those of lower respiratory tract infections appears to be (1.2). So the end result is (2.1) attack per each infant regarding the total respiratory tract infections. **Conclusions:** The lactation duration has an important relation to the frequency of respiratory infections in infancy. Every effort should be made to encourage and support longer duration of breast-feeding.

KEYWORDS:

INTRODUCTION

Anatomy of the breast

The breast consists partly of glandular tissue & partly of supporting tissue & fat. The gland tissue makes the milk, which then goes along small tubes or ducts toward the nipple. Before they reach the nipple, the ducts become much wider & form lactiferous sinuses in which milk collects. About 10-20 fine ducts lead from the lactiferous sinuses to the outside, through the tip of the nipple. The nipple contains many sensory nerves so it is very sensitive. This is important for the reflexes which help milk to draw. Around the nipple there is a circle of dark skin called the areola. On the areola we can see small swellings. These are glands that produce an oily fluid. The oil helps to keep the nipple skin soft and in good condition. Beneath the areola are the lactiferous sinuses.[1]

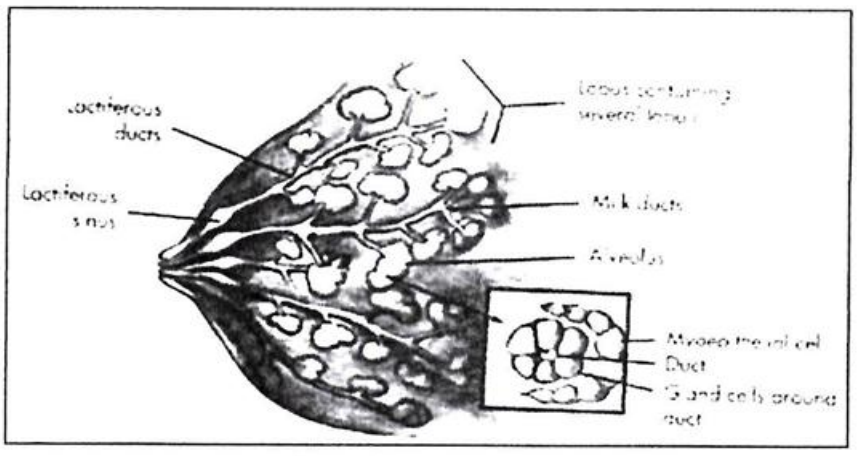

Figure 1: Shows the anatomy of the breast.[2]

Physiology of lactation

Lactation is a normal process that begins via an interplay of various hormones following delivery of the infant, before the onset of labor there is a rise serum level of oxytocin, this hormone is important in uterine contraction during labor.[2]

Prolactin is responsible for milk synthesis, while oxytocin is involved with milk ejection from the breast. An infant is allowed to suckle after birth, a nerve impulse is sent to the hypothalamus, and this stimulates the anterior pituitary to secrete prolactin which then stimulates milk production in the alveolar cells.[5]

The infant suckling stimulus also initiates the release of oxytocin from the posterior pituitary gland. The flood of oxytocin into the breast tissue causes the myoepithelial cells around the gland to contract, there by ejecting milk into the infant's mouth, this is called the letdown reflex or the milk ejection reflex, many women report that they feel a tingling sensation in their breast when the letdown occurs, additionally if the mother hears her baby's cry or sees another baby, she may also experience a letdown accompanied by rash of milk ejecting from her breast.[2]

Inhibitors to the letdown reflex may include fatigue, stress, alcohol, smoking, and some medication. Milk production is a supply and demand mechanism, the more the baby is allowed to nurse, the more nerve stimulation there will be, resulting in a rise in prolactin levels followed by increase milk production, there should be no restriction on the number of time an infant nurse per day.[4]

Definition of breast feeding

Human milk is the ideal and uniquely superior food for infants for the first year of life and as the sole source of nutrition for the first six months.[10]

Breast feeding is a cultural role for women in Middle Eastern societies. It was universally practiced until a few decades back when it started to decline. Breast feeding is beneficial for both babies and mother in rich and poor countries. Besides being ideal for babies, it helps to prevent sepsis in new born babies. It protects gut, chest, ear, and urinary tract from infections in young children, and is valuable in management of diarrhea.[6]

Benefits of breastfeeding

Breastfeeding (BF) is beneficial for infant, mother & society.

Benefits of breastfeeding for infants

1- **Species specificities:** Breast milk is more than just good nutrition. Human breast milk is specific for the needs of he human infants, just as the milk of thousands of other mammalian species is specifically designed for their offspring.[3]
2- **Nutritional benefits:** The unique composition of breast milk provides the ideal nutrients for human brain growth in the first year of life. Cholesterol, desoxyhexanoic acid, and taurine are particularly important.[8]
3- **Infection protection:** Leukocytes, specific antibodies, and other antimicrobial factors protect the breastfed infants against many common infections.[9]
4- Human milk protects against childhood carcinoma.[11]
5- Human milk enhances vaccine responses.[12]

Benefits of breastfeeding for mothers

1- Exclusive nursing delay the return of menstrual cycle.[13]
2- Breast milk decrease risk for postpartum hemorrhage.[3]
3- Breastfeeding requires no shopping, preparing, cleaning up or sterilization.[13]
4- Breastfeeding reduces the risk of ovarian and pre-menopausal breast cancer.[10]
5- Breastfeeding makes the mother able to bind closely with the infant.[13]
6- Breastfeeding reduces the risk of osteoporosis.[14]
7- Breastfeeding provides anti-stress effects, it empower the women.[13]

Benefits of breastfeeding for society

1- Breastfeeding reduces health care costs owing to lower incidence of illness in breastfed infants.
2- Breastfeeding reduces employee absenteeism for care attributable to infant's illness.[10]

Composition of breast milk

In defining the constituents of human milk, it is important to recognize that the composition varies with the stage of lactation, the time of day, the sampling time during a given feeding, maternal nutrition, and individual variation. The consistently identifiable stages of human milk are colostrum, transitional milk, and. mature milk, and their relative contents are significant for newborns and their physiologic adaptation to extra uterine life.[3]

Colostrum

It is a thick, yellowish mammary secretion that is characteristic of first postpartum week; it is higher in phospholipids, cholesterol, fat soluble vitamin, sodium, potassium, chloride and protein concentration and lower in lactose and total fat composition than mature milk.[16]

In addition human milk is rich in antibodies especially IgA, which provides protection against the bacteria and viruses that are present in the 'birth canal and associated with other human contact. Colostrum also contains vitamin E antioxidants, which may function as traps for neutrophil-generated reactive oxygen metabolites in protecting the lung tissues.[17]

Colostrum has high level of iron binding protein lactoferrin which is known to have a bacteriostatic action on many microorganisms. Colostrum also facilitates the passage of meconium, its yellow color results from b-carotene; it also facilitates the establishment of lactobacillus bifidus bacteria in the digestive tract.[3]

Table 1: Shows the composition of human colostrum.[5]

Content		Colostrum
Energy Kcal/dl	•	67
Specific gravity		1.040-1.060
Protein gm/dl		2.3
CHO gm/dl		5.3
Fat gm/dI		2
Ca mg/di -		39
Fe Mg/dl		70

Transitional milk

The milk produced between the colostrum and mature milk stages is transitional milk; its content gradually changes. The transitional phase is approximately from 7-10 days post-partum. The concentration of immunoglobulin and total protein decreases, where as the lactose, fat, and total caloric content increases. The water soluble vitamins increase and the fat soluble vitamin decrease to the levels of mature milk.[3]

Mature milk

In almost all mammalian milks, water is the constituent in the largest quantity. All other constituents are dissolved, dispersed, or suspended in water.[3]

For infant breast milk provides the majority of fluid requirement approximately 89% water, additional water that is produced from oxidation of the ingested milk results in approximately 95% of the volume consumed being available as free water.[18]

The composition of breast milk changes during a feed. Foremilk comes at the beginning of the feed. It looks grey and watery. It is rich in protein, lactose, vitamins, minerals and water. The hind milk comes at the end of a feed. It looks whiter than foremilk because it contains more fat. The fat makes the hind milk rich in energy. A baby needs both of them for growth and development.[1]

The fat constituent of mature milk composed of triglyceride which comprises to 98% of total milk fat; while the remaining 2% represented by monoglyceride, free fatty acid, phospholipids, glycolipids.[16]

Fat provides a good source of energy for the infant. Lipids constitute 50% of calories and about 3-5% of total milk composition. Total fat continue to increase during feeding and the stage of lactation. Also it is affected by the mother's diet, parity, day time, and gestational age.[3]

The unsaturated fatty acid and monoglyceride inactivate lipid envelop of viruses such as herpes and influenza virus.[3]

Linoleic and linolenic, arachidonic, and docosahexaenoic acid are free fatty acids which are vital for normal brain development, myelination, Mature milk:

In almost all mammalian milks, water is the constituent in the largest quantity. All other constituents are dissolved, dispersed, or suspended in water.[3]

For infant breast milk provides the majority of fluid requirement approximately 89% water, additional water that is produced from oxidation of the ingested milk results in approximately 95% of the volume consumed being available as free water.[18]

The composition of breast milk changes during a feed. Foremilk comes at the beginning of the feed. It looks grey and watery. It is rich in protein, lactose, vitamins, minerals and water. The hind milk comes at the end of a feed. It looks whiter than foremilk because it contains

more fat. The fat makes the hind milk rich in energy. A baby needs both of them for growth and development.[1]

The fat constituent of mature milk composed of triglyceride which comprises to 98% of total milk fat; while the remaining 2% represented by monoglyceride, free fatty acid, phospholipids, glycolipids.[16]

Fat provides a good source of energy for the infant. Lipids constitute 50% of calories and about 3-5% of total milk composition. Total fat continue to increase during feeding and the stage of lactation. Also it is affected by the mother's diet, parity, day time, and gestational age.[3]

The unsaturated fatty acid and monoglyceride inactivate lipid envelop of viruses such as herpes and influenza virus.[3]

Linoleic and linolenic, arachidonic, and docosahexaenoic acid are free fatty acids which are vital for normal brain development, myelination, Whey protein contains water, electrolytes and protein. The protein content of whey includes alpha lactalbumin and lactoferrin while cow milk contains beta lactglobulin. Lactoferrin is an iron binding protein. It inhibits the growth of certain iron dependant bacteria in the GIT.[19]

IgA is the principle immunoglobulin in milk; it provides protection against infection by preventing attachment of viruses and bacterial toxins to the epithelial cells.[22]

Lysozyme is specific protein present in high concentration in human milk and low concentration in cow milk. It has a bacteriolytic action against enterobacter and gram positive bacteria.[23]

Nucleotides present in human milk and absent in cow's milk. It has a key role in biochemical processes within the cell acting as metabolic regulator and altering enzyme activity.[3]

The predominant carbohydrate in human milk is represented by lactose. Other carbohydrates present in milk are mono-saccharides, oligosaccharides and peptides.[3]

Carbohydrates enhance calcium absorption from the gut, promote the growth of lactobacilli, and may help creating a favorable gut flora that protect against gastroenteritis.[24]

All major minerals are present in higher concentration in cow milk. Total ash content of milk is species specific and parallels the growth rate and body structure of the offspring. Sodium, Potassium, calcium, and magnesium are the major cations. Phosphate, chloride, and citrate are the major anions.[3]

Zinc concentration in mature human milk is less than those in cow's milk, though, it's absorption is higher in human milk , it participate in the enzyme structure and act as enzyme activator where as the reverse in copper, cow's milk has greater magnesium level. Copper, iron, and zinc are present in higher concentration in colostrum than in later milk.[25]

Human milk provide 100mg1100m1 iron which doesn't meet the requirement just given, however breast fed infant haven't been anemic, iron show better absorption from human milk because of high level of lactose which promote iron absorption, and low level of phosphate which may interfere with iron absorption.[3]

Vitamin K level is low in breast milk though it is high in colostrum. This low concentration of vitamin K might lead to hemorrhage in newborn who fed on breast milk, thus it is recommended that every newborn should receive vitamin K at birth.[26]

Breast milk provides only 10 IU of vitamin D daily in winter and 20 IU in summer. Water soluble vitamin D is present in trace amount that have negligible activity, healthy exclusive breastfed infants have adequate bone mineralization in the first 16 week of life and a satisfactory level of 25-hydroxyvitamin D3, thus supplementation in this period is not indicated.[27]

It would be reasonable to give vitamin D 400IU/day to those who are unable to benefit from the effect of sun light such as dark skin infant.[28]

Breast milk populated with macrophages, polymorph nuclear cells, and T and B lymphocytes. It has been calculated that breastfed infant ingest many viable leukocytes each feeding. Breast milk contains many hormones like thyroxine, gonadotropin, prolactin, ovarian hormones LHRH, TRH, TSH, ACTH, Erythopoietin, calcitonin, prostaglandin, and epidermal growth factor.[3]

Table 2: Shows the composition of human milk.[15]

Contents	Human milk		Formula milk		Cow's milk
	Term	Preterm	Term	Preterm	
Energy Cal/di •	70	74	66	80	67
CHO gm/di	7.4	6.4	7.2	7	4.6
Fat gm/dl	4.2	3.1	3.6	4.5	3.9
PTN gm/dl	1.1	2.7	1.5	2	3.4
Casein: lactalbumin	2:3	2:3	2:2	2:3	4:1
Minerals					
Na mmol/l	6.4	17	7.6	20	23
K mmo1/1	15	17	15	20	40
ca mg	35	29	40	70	124
Phosphate mg	15	13	30	40	98
Ferrous ion mg	0.08	0.15	0.65	0.65	0.05
Vitamins					
A Mg/dl	60		80	96	28
D Mgidl	0.01		1	1.3	0.02
E Mg/di	350		700	1.5	90
Folinicacid Mg/id	5.2		5.3	10	3.7

Contraindications to breastfeeding

1- Infectious diseases; high risk of maternal HIV positivity is a major reason in the practice. In addition infections with human T-C leukemia virus type I.
2- Drugs abusers except alcohol and cigarettes smoking.
3- Maternal therapy with antimetabolites.
4- Radiopharmaceuticals: in therapeutic dose.[7]

History of breast feeding

Early writings on infant care in the 1800s and early 1900s pointed out the hazards of serious infection in bottle fed infants. Mortality chart were clear in the difference in risk of death between breastfed and bottle fed infants.[27,28]

Only in recent years have the reason for this phenomenon been identified in terms comparable to those used to define other anti-infectious properties. The identifications of specific immunoglobulins and specific influences of the PH and flora in the intestine of the breastfed infants are examples. It became clear that the infants receives systemic protection transpla Centally and local intestinal tract protection orally via the colostrums. It has been further identified that the intestinal tract environment of a breastfed infant continues to afford protection against infection by influencing the bacterial flora until the infant is weaned. Breastfed infants also have fewer respiratory infections (Ruth, 1989).

Urbanization and technological advances have affected social, medical and dietary trends throughout the world. The social influences include the changing pattern of family life—smaller, isolated families that are separated from the. previous generation. In medicine, the emphasis has been on disease and its treatment, especially as it relates to laboratory study and hospital care. The science of nutrition has developed a reliance on measurements and technology, which has led to the conclusion that prepared food are superior because the can be measured and calculated to meet precise dietary requirement.

Respiratory tract infections

Respiratory tract infection (RTIs) can be divided into upper and lower respiratory infection.

1- Upper respiratory tract infection include: rhinitis, sinusitis, tonsillitis, pharyngitis, epiglottitis, Laryngotreachiobronchitis (croup), otitis media, and treachitis.
2- Lower respiratory tract infection include: bronchitis, bronchiolitis, and pneumonia.[29]
3- **Rhinitis and sinusitis:** They are terms referred to inflammatory conditions of the nose and Paranasal sinuses. Small children suffer from 6-8 colds/year, of which 50% result from rhino virus, 20% from influenza virus, 20% from corona viruses and RSV; the remainders are caused by other viruses including enteroviruses. Patient presented with feeling of dryness, itching, and heat in the nose followed by dry cough, sore throat, sneezing, and watery discharge from the nose. Resolution of symptoms occurs after 5-10 day.[30]
4- Sinusitis characterized by facial pain unilateral or bilateral with overlying tenderness and erythema of skin, there is usually fever, toxemia may occur.[31]
5- **Tonsillitis and pharyngitis:** Patients present with sore throat and pain radiates to the ear with dysphagia, irritability, refusal to feed, and febrile convulsion might occur.[32]
6- Tonsillitis caused by adenovirus, rhinovirus, group A beta hemolytic streptococcus.[33]
7- While in Pharyngitis the cause depends on the age, in the first few years viruses are the most common cause, where as, during the school age group A streptococcus are the most frequently identified agent with a peak incidence of 5-10 years. Patients present with sore throat, cervical lymph adenopathy, fever, and malaise.[30]
8- **Otitis media:** Otitis. media (OM) is a suppurative infection of the middle ear cavity. The common bacterial pathogens are S. pneumoniae, non typable Jr infruenzae, !M. catarrhal-is, and less frequently group A streptococcus, and less commonly OM caused by rhinoviruses, RSV, and influenza viruses. The peak incidence of acute OM is in the

second six months of life, it is more common in boys and in patient of lower socioeconomic status.[10]

The patients present with symptoms of upper respiratory tract infection, ear rubbing, fever, irritability, feeding problems, and otalgia.[34]

Examination of the ear in viral infection reveals a leash of dilated blood vessels around the circumference of the ear drum and handle of the mallius, while in bacterial infection there is a tense, red, with loss of the cone of light of the tympanic membrane which may perforates lead to pus discharge.[28]

The major risk factors for OM are young age, bottle feeding, and presence of a sibling in the home with ear infection, and increased exposure to infectious agents (day care).[10]

Acute bronchitis: It is anon specific bronchial inflammation associated with number of childhood conditions, acute bronchitis is a syndrome usually viral in origin, with cough as a predominant feature. It is more common in winter, the child presents with non specific symptoms like rhinitis which last for 3-4 days followed by a dry hacking cough, which then progress into productive cough with thick sputum, many children swallow their sputum and produce emesis, the mucous gradually become thin within 5-10 days then cough abate, the entire episodes usually last about two weeks.[29]

Bronchiolitis: is an inflammation of the smaller bronchioles with airway obstruction. Airway obstruction is gradual and usually caused by inflammation, edema, and accumulation of secretions.[35]

Bronchiolitis is more common in males aged less than IS months, in those who are not breastfed, and in those who livid in crowded houses.[36]

Patients presented with cough, sore throat, runny nose, and noisy laboured breathing with feeding difficulty due to nasal obstruction & dyspnea.[37]

Pneumonic': Lower respiratory tract in lections are common cause of morbidity among children in developed countries and a major cause of mortality in developing countries.[38]

Pneumonia occurs more commonly in winter & fall. The cause of pneumonia in an individual patient is often difficult to determine because direct culture of lung tissue is invasive and

rarely performed. Bacterial and viral causes can be identified in 40-80% of children with community acquired pneumonia.[29]

The most common bacterial pathogens are streptococcus pneumoniae, followed by Chlamydia pneumoniae, and mycoplasma pneumonia, group A streptococcus, and staphylococcus aureus. Streptococcus pneumoniae, H. influenzae, staphylococcus aureus are the major causes of hospitalizations and death from pneumonia among children in developing countries. Viral pathogens are prominent cause of lower respiratory tract infections in infants and children less than 5years of age. Viruses are responsible for 45% of episodes of pneumonia identified in hospitalized children, the peak incidence of viral pneumonia occur between the ages of 2-3 years. The most common viruses are ityruenza, RSV, (Para-influenza, adenovirus, rhinovirus, and metapneumovirus.[39]

2-3 years. The most common viruses are itfluenza, RSV, Para-influenza, adenovirus, rliinovirus, and metapneumovirus.[39]

The patient presents with fever, tachypnea, cough, and difficulty in feeding, these symptoms are preceded by minor upper respiratory tract infection with coryza and low grade fever. It is difficult to distinguish those children with viral pneumonia from bacterial pneumonia.[38]

In addition patient developed signs of respiratory distress, cyanosis, and respiratory failure may occur. Physical findings depend on the stage of pneumonia, early in the course of illness diminished breath sound, scattered crackles and rhonchi are commonly heard over the affected lung field.[38]

Investigations

1- Complete blood picture (CBP): reveals leuokocytosis in pneumonia, and normal white blood cell count or slightly elevated in the other respiratory tract infections.[39]
2- Nasopharyngeal specimens for viral culture.[29]
3- Serology; Antigens detections in sputum, blood, urine, and the pleural fluid.[38]
4- Polymerase chain reaction (PCR).[38]
5- Chest x-ray (CXR):

a- It may be normal in bronchiolitis and acute bronchitis.
b- It reveals increased lung marking in acute bronchitis, viral pneumonia.
c- It shows hyperinflation in bronchiolitis, viral pneumonia.

d- It reveals lobar consolidation typically seen with pneumococcal pneumonia.

e- It may show pleural effusion and empyema.

CXR alone is not diagnostic and clinical feature must be considered.[36,39,40]

6- Tympanometry provides objective acoustic measurements of the tympanic membrane-middle ear system by reflection or absorption of sound energy from the external ear duct as pressure in the duct is varied (just as in pneumatic otoscopy).[10]

7- Tympanogram correlates well with the presence or absence of middle ear effusion.[10]

Aim of the study

To study the effect of breastfeeding duration on the frequency of respiratory tract infections in infant during the first two years of life.

Patients and Methods

1. The Sample

A cross sectional study performed in the central teaching hospital for pediatric in Baghdad involving a sample of one hundred forty one cases. A convenient sample was collected from the word and the out patient clinic on base of questioner in the period from 15th of Dec. 2007 to 15th of June 2008.

Criteria of choosink the sample

All patients of the sample were chosen to be more than lmonth and less than or equal to 24 months, have a normal birth weight, and free from any congenital abnormalities. All mothers were chosen to be not-smokers, not-divorced, not-employed, and aged from 18-40 years.

By using the questioner data concerning acute respiratory tract infections, the duration of pregnancy, type of delivery, whether normal or cesarean, the sex of the infant, the mother's age at time of delivery, the child rank among siblings, and the duration of lactation were recorded. The duration of lactation was considered as the period during which breastfeeding was regularly practiced even with the introduction of other foods until the complete cessation of breastfeeding.

One hundred of the collected sample was found to be breastfeed infants, while the rest of the sample, forty one, were not breastfeed infants.

2. Assessment of cases

The cases were assessed in the following steps:

2.1 clinical assessments

Clinical assessments used for evaluation of upper and lower respiratory tract infections. In upper respiratory tract infection, we depend mainly on history and examination in reaching the diagnosis apart from OM where we use auroscopy.

In bronchiolitis the diagnosis is clinical, particularly in previously healthy infants presenting with a first time wheezing episodes during a community outbreak because bacterial infections, sepsis, pneumonia, meningitis) is highly unlikely, conformation of viral bronchiolitis may obviate the need for a sepsis evaluation in afebrile infant.[36]

2.2 Diagnostic assessments

Diagnostic assessments were done by using many tools which helped us a lot in reaching the diagnosis. These are as follow:

a- Assessment of upper respiratory tract: it was mainly for assessing patients with OM by using the auroscopy.

b- Assessment of lower respiratory tract: For assessing patients with lower respiratory tract infection we depend mainly on the following methods:

1- Complete blood picture • (CBP): It reveals leuokocytosis in pneumonia, and normal white blood cell count or slightly elevated in the other respiratory tract infections.[39]

2- Chest x-ray (CXR)

a- It may Normal in acute bronchitis and bronchiolitis.

b- It may reveal increased lung marking in acute bronchitis, viral pneumonia.

c- It may show hyperinflation in bronchiolitis, viral pneumonia.

d- It may reveal lobar consolidation which is typically seen with pneumococcal pneumonia.

However; CXR alone is not a diagnostic procedure and clinical feature must be taken in consideration.[36,39,40]

3. Statistical analysis

Statistical analysis was performed for:

I- Descriptive statistics: To evaluate the frequencies & percentages of age, sex, duration of lactation, duration of pregnancy, mode of delivery, child rank. upper and lower respiratory

tract infections, number of siblings, state of the house, and the socioeconomic status in the studied sample.

II- Chi-square test to evaluate if there is a statistical significant relation between the sex, duration of lactation, duration of pregnancy, mode of delivery, child rank, number of siblings, state of the house, and socioeconomic status and the upper and lower respiratory tract infections in the studied sample.[41]

RESULTS

The sample is analyzed by using descriptive statistic and Chi-square test to identify frequencies and relationships between different variables of a given sample.

During the time of study 141 case were collected randomly from inpatient and out patient clinic, we divided the sample into four groups according to the duration of lactation: No BF 41 (29.1%), BF < 3 months 10 (7.1%), BF 3-6 months 38(27%), BF > 6 months 52(36.8%).

Thus the infants who are breastfed > 6 months appear to have the highest percentage, while those with breastfeeding < 3 months have the lowest percentage.

The mean duration of lactation was 8.65 months. Most of the infants were of the age group ranging from 6-12 months since they appear with the highest percent 40.4%. Regarding sex; males represent the highest percentage of the studied sample and it was 65.2%. Most infants were full term (97.9%), delivered by a normal vaginal delivery (67.4%), in a non-crowded house (56%), with an intermediate socioeconomic status (48.9%).

In no BF group the infants were mostly male, among age group ranging from 6-12 months, a product of a term normal vaginal delivery, they belong mostly to a family of an intermediate socioeconomic status who lives in a non-crowded house, while in the BF groups most of the infants were males also, age above 6 months, a product of a term normal vaginal delivery, and most of them from not crowded house with an intermediate socioeconomic status table (I).

Table (3): Shows the demographic characteristics of infants 6efow two years according to 6reastfeeding status.

		No BF N=41 (29.1%)	BF < 3 m. n=10, (7.1%)	BF 3-6 m. n=38, (27%)	BF > 6 m. n=52, (36.C%)	Total n=141	%
		No.	No.	No.	No.		
age	< 6 months	6	5	24	0	35	24.8
	6-12 month	23	3	8	23	57	40.4
	> 12 months	12	2	6	29	49	34.8
sex	Male	25	8	24	35	92	65.2
	female -	16	2	14	17	49	34.8
DOP	Term	41	9	37	51	138	97.9
	Preterm	0	1	1	1	3	2.1
MOD	Normal	27	7	21	40	95	67.4
	Caesarian	14	3	17	12	46	32.6
house	Crowded	17	6	11	28	62	44
	Not crowded	24	4 ,	27	24	79	56
Econo.	Low	17	5	9	18	49	34.8
	Intermediate	18	4	19	28	69	48.9
	High	6	1	10	6	23	16.3
Child rank	1"	15	3	11	14	43	30.5
	'''	11	4 '	17	16	48	34.0
	3`d		2	7	5	23	16.4
	4"	3	0	1	1 0	14	9.9
	5th		1	1	4	7	5
	6"	1	0	1	2	4	2.8
	7"	1	0	0	1	2	1.4
No of sibling	No	16	2	9	11	38	27
	One	11	4	19	18	52	36.9
	Two	7	3	7	5	22	15.6
	Three	4	0	1	10	15	10.6
	Four	1	1	1	5	8	5.7
	Five	1	0	1	2	4	2.8
	six	1	0	0	1	2	1.4

In this study we divided respiratory tract infection into upper and lower. Upper respiratory tract -infection includes; rhinitis, tonsillitis, adenoiditis, and otitis media. Otitis media was regarded as a separate entity to see its relation with the duration of lactation. Lower respiratory tract infection includes; acute bronchitis, pneumonia, and bronchiolitis, each one of them was regarded as a separate entity to see their relation with the duration of lactation.

In the studied sample, patients had either one or more than one infections. Number of attacks of upper and lower respiratory tract infections for the sample are shown in table (2).

Table (2): Shows number and percentage of attacks at respiratory Uai infection among the studied sample.

Attacks		No.
One attack	69	48.9%
Two attacks	56	39.7%
Three attacks	15	10.6%
Four attacks	1	0.7%
Total	141	100%

Thus most infants develop one attack of respiratory tract infections 48.9%, while those who develop four attacks represent only 0.7% of them. Therefore; number of attacks per each infant regarding upper respiratory tract infections appears to be (0.8), while those of lower respiratory tract infections appears to be (0.9). So the end result is (1.6) attack per each infant as shown in table (3).

Table (3): Shows number of attacks per cad; infant among the studied sample.

RTI	Minimum	Maximum	Mean	Std. deviation
URTI	0	2	0.8	0.5498
LRTI	0	3	0.9	0.6489
Total	1	4	1.6	0.7011

In the other hand bottle fed infants develop one attack in 17.1% of cases and four attacks in 2.4% of cases as shown in table (4).

Table (4): Shows number and percentage of attacks of respiratory tract infection among bottle-fed infants.

Attacks		No.
One attack	7	17.1%
Two attacks	24	58.5%
Three attacks	9	22%
Four attacks	1	2.4%
Total	41	100%

Datoroa VGDuw

Therefore; number of attack per each infant regarding upper respiratory tract infections appears to be (0.9), while those of lower respiratory tract infections appears to be (1.2). So the end result is (2.1) attack per each infant regarding the total respiratory tract infections as shown in table (5).

Table (5): Shows number of attacks of respiratory tract infection per each bottle- fed infant.

RTI	Minimum	Maximum I Mean		Std. deviation
IMP	*0*	2	6.§	tigiiii
LRTI	**0**	**3**	**1.2**	**0.6008**
Total	**1,**	**4,**	**2.1,**	***0.7002***

Chi-square test reveals that duration of lactation has a significant relationship with respiratory tract infections (OM, pneumonia, and bronchiolitis) since p values were 0.026, 0.008, and 0.002 respectively; while it has insignificant relationship with URTI and acute bronchitis since p values were 0.056 and 0.390 respectively.

Table (6): Shows the relationship between duration of lactation and URTI.

DOL	URTI	%	Other dis.	%	Total	P-value
No BF	**30**	**73.2**	**11**	**26.8**	**41**	
BF < 3 month	**7**	**70**	**3**	**30**	**10**	
BF = 3.6 month	**18**	**47.4**	**20**	**52.6**	**38**	**0.056**
BF > 6 months	**26**	**50**	**26**	**50**	**52**	
Total	**81**	**57.4**	**60**	**42.6**	**141**	

OM was more common in infants with no BF 21.95%, while those who fed more than 6 months were 3.8%.

Table (7): Shows the relationship between duration of lactation and OM.

DOL	OM	%	Other dis.	%	Total	P-value
No BF	**9**	**21.95%**	**32**	**78.05**	**41**	
BF < 3 month	0	0.00%	10	100	**10**	
BF = 3.6 month	**4**	**10.5%**	**34**	**89.5**	**38**	**0.026**
BF > 6 months	**2**	**3.8%**	**50**	**96.2**	**52**	
Total	**15**	**10.6%**	**126**	**89.4**	**141**	

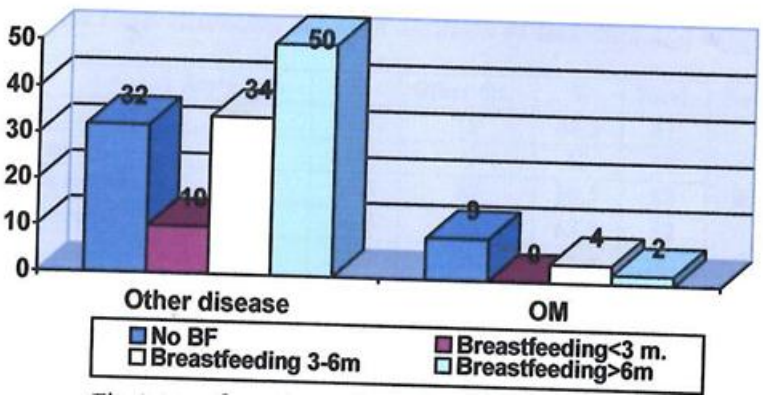

Fig. 2: Bar chart shows relation between (DOL and OM).

Pneumonia was more common in infants with no BF 48.8%, while those who fed more than 6 months were 17.3%.

Table (10): Shows the relationship between duration of lactation and pneumonia.

DOL	Pneumonia	•%	Other dis.	%	Total	P-value
No BF	20	48. 8	21	51.2	41	
BF < 3 month	5	50	5	50	10	
BF = 3-6 month	12	31.6	26	68.4	38	0.008
BF > 6 months	9	17.3	43	82.7	52	
Total	46	32.6	95	67.4	141	

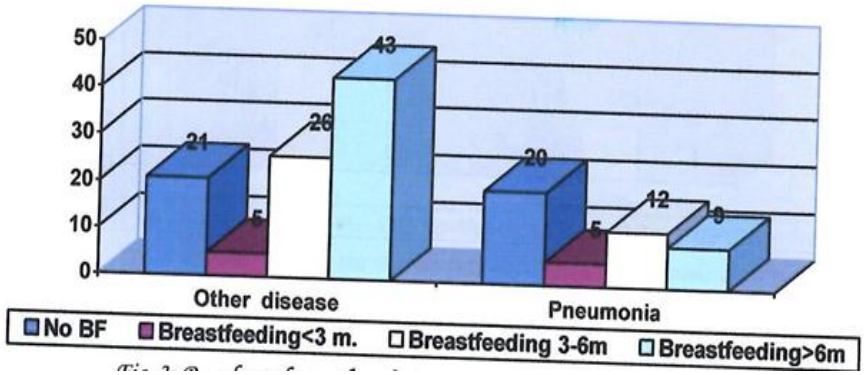

Fig. 3: Bar chart shows the relation between (DOG and pneumonia).

The relation between acute bronchitis and duration of lactation was insignificant since p value was 0.390.

Table (11): Shows the relationship between duration of lactation and acute bronchitis.

DOL	Acute bro.	%	Other dis.	%	Total	P-value
No BF	22	53.7	19	46.3	41	
BF < 3 month	4	40	6	60	10	
BF = 3-6 month	15	39.5	23	60.5	38	0.390
BF > 6 months	19	36.5	33	63.5	52	
Total	60	42.6	81	57.4	141	

Bronchiolitis has a strong relationship with the duration of lactation as it was more in no BF infants (48.8%) and less in infants who were breastfed more than 6 months (15.4%).

Table (12): Shows the relationship between duration of lactation and bronchiolitis.

DOL	Bronchio.	%	Other dis.	%	Total	P-value
No BF	20	48.8	21	51.2	41	
BF < 3 month	6	60	4	40	10	
BF = 3-6 month	12	31.6	26	68.4	38	0.002
BF > 6 months	8	15.4	44	84.6	52	
Total	46	32.6	95	67.4	141	

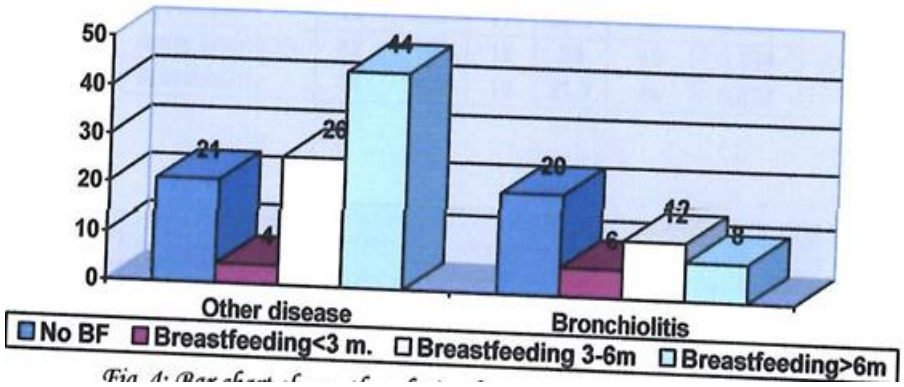

Fig. 4: Bar chart shows the relation between (DOL and bronchiolitis).

In this study acute respiratory tract infections appear to have insignificant relationship to the age apart from acute bronchitis where p-value equal to (0.012).

Table (13): Shows the relationship 6etween age and respiratory tract infection.

	Age						Total	P-value
	< 6 m.	I	6-12m.	%	> 12 m.	I		
URTI	17	20.9	33	40.7	31	38.4	81	0.404
OM	4	26.7	6	40	5	33.3	15	0.983
Pneumonia	15	32.6	17	36.9	14	30.5	46	0.327
Acute bronchitis	8	13.3	31	51.7	21	35	60	0.012
Bronchiolitis	12	26.1	20	43.5	14	30.5	46	0.753

Bronchiolitis has a significant relationship with the sex as it is more common in male (78.3%) than in female (21.7%) with a p-value equal to (0.024). in the other hand URTI, OM, pneumonia, and acute bronchitis have insignificant relationship with the sex as shown in table (12).

Table (14): Shows the relationship 6etween sex and respiratory tract infection.

	Male		Female		Total	P-value
	No.	I	No.	I		
URTI	51	62.9	30	37.1	81	0.508
OM	8	53.3	7	46.7	15	0.305
Pneumonia	29	63.1	17	36.9	46	0.702
Acute bronchitis	42	70	18	30	60	0.308
Bronchiolitis	36	78.3	10	21.7	46	0.024

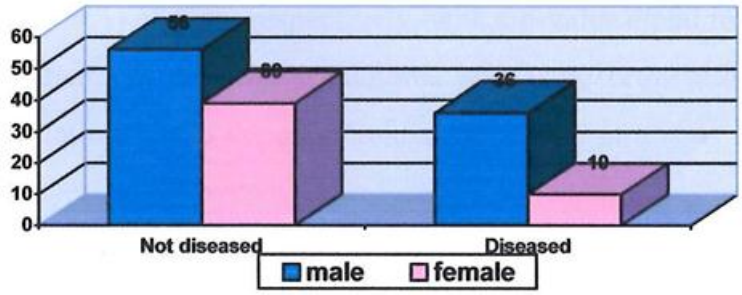

Fig. 5: Oar chart shows relation between sex and bronchiolitis.

The duration of pregnancy appears to have insignificant relationship with acute respiratory tract infections as shown in table (13).

Table (15): Shows the relationship between duration of pregnancy and acute.

	Term		Preterm		Total	P-value
	No.	%	No.			
URTI	80	98.8	1	1.2	81	0.393
OM	15	100-	0	0.00	15	0.546
Pneumonia	46	100	0	0.00	46	0.223
Acute bronchitis	59	98.3	1	1.7	60	0.744
Bronchiolitis	45	97.8	1	2.2	46	0.979

Just like the dufation of pregnancy, mode of delivery has insignificant relationship with acute respiratory tract infections.

Table (16): Shows the relationship between mode of delivery and acute respiratory.

	Normal		Caesarian		Total	P-value
	No.	%	No.	%		
URTI	57	70.4	24	26.6	81	0.378
OM	9	60	6	40	15	0.519
Pneumonia	29	63.1	17	36.9	46	0.445
Acute bronchitis	39	65	21	35	60	0.605
Bronchiolitis	28	60.9	18	39.1	46	0.252

13ronchiolitis has a strong relationship with the state of the house (table 15) and the economic status of the since it appears in (73.9% and 60.9%) of cases respectively, with a p-value equal to (0.0001) for both of them. In addition pneumonia and acute bronchitis show a significant relationship to the economic status of the family as shown in table (16).

Table (17): Shows the relationship between state of the house and acute respiratory tract infection.

	No.					
URTI	35	43.2	46	56.8	81	0.832
OM	5	33.3	10	66.7	15	0.380
Pneumonia	24	52.2	22	47.8	46	0.172
Acute bronchitis	28	46.7	32	53.3	60	0.579
Bronchiolitis	34	73.9	12	26.1	46	0.0001

Table (18): Shows the relationship between the socioeconomic status and acute respiratory tract infection.

	Low		intermediate		High		Total	P-value
	No.	%	No.	%	No.	%		
URTI	28	34.5	42	51.9	11	13.6	81	0.548
OM	5	33.3	7	46.7	3	20	15	0.920
Pneumonia	21	45.7	22	47.8	3	6.5	46	0.042
Acute bronchitis	20	33.3	35	58.3	5	8.4	60	0.049
Bronchiolitis	28	60.9	14	30.4	4	8.7	46	0.0001

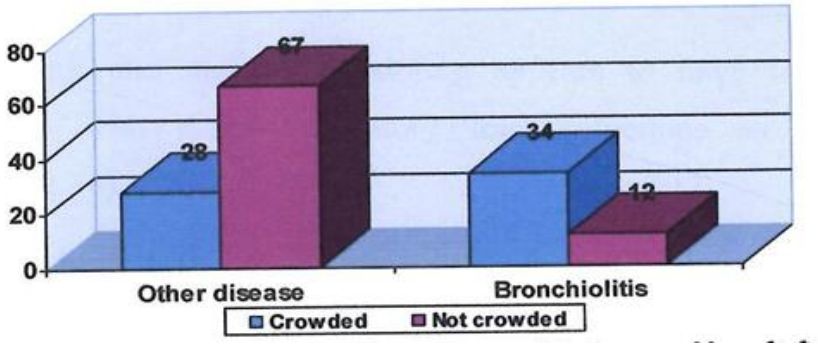

Fig. 6: Oar chart shows the relation between state of the house and bronchiolitis.

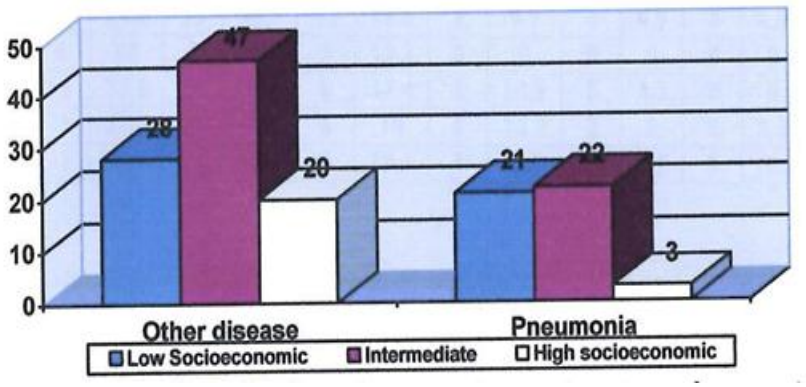

Fig. 7: Bar chart shows the relation between socioeconomic status and f pneumonia.

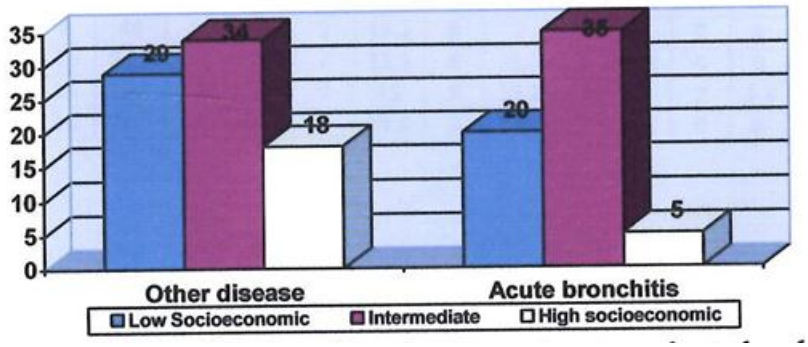

Fig. 8: Bar chart shows the relation between socioeconomic status and acute bronchitis.

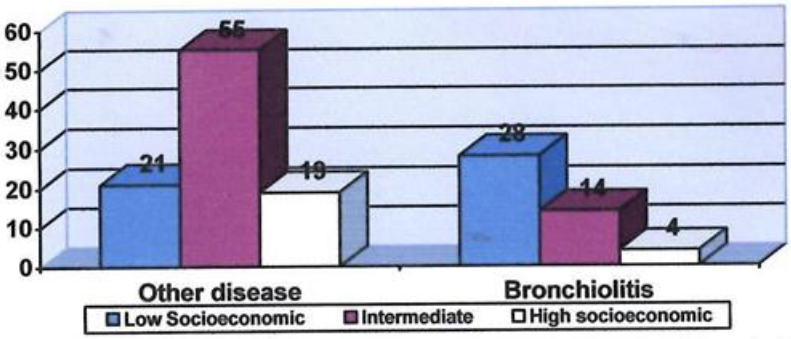

Fig. 9: (Bar chart shows the relation between socioeconomic status and bronchitis.

Child rank and number of sibling appears to have insignificant relationship with acute respiratory tract infections as shown in tables (17 & 18).

Table (19): Shows the relationship between child rank and acute respiratory tract infections.

	total	1"		2"		rd		4"		5th		6"		7"		P. value
		no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	
URTI	81	24	29.6	25	30.9	15	18.5	8	9.9	4	4.9	4	4.9	1	1.3	0.651
OM	15	6	40	6	40	2	13.3	0	0	0	0	0	0	1	6.7	0.321
Pneumonia	46	15	32.6	15	32.6	8	17.4	5	10.9	2	4.3	0	0	1	2.2	0.867
bronchitis	60	19	31.7	21	35	6	10	8	13.3	3	5	2	3.3	1	1.7	0.679
Bronchiolitis	46	11	23.9	20	43.5	9	19.6	4	8.7	1	2.2	0	0	1	2.2	0.361

Table (20): Shows the relationship between number of si6ling and acute respiratory tract infections.

	total	None		one		two		three		four		five		six		P-value
		no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	
URTI	81	20	24.7	29	35.8	13	16.1	10	12.4	4	4.9	4	4.9	1	1.2	0.656
OM	15	6	40	6	40	2	13.3	0	0	0	0	0	0	1	6.7	0.266
Pneumonia	46	16	34.8	14	30.4	7	15.2	6	13.1	2	4.3	0	0	1	2.2	0.528
bronchitis	60	16	26.7	21	35	9	15	8	13.3	3	5	2	3.3	1	1.7	0.983
Bronchiolitis	46	10	21.7	20	43.4	9	19.6	5	10.9	1	2.2	0	0	1	2.2	0.438

DISCUSSION

A cross sectional study performed in the child's central teaching hospital in Baghdad involving a sample of one hundred forty one cases. The sample was collected randomly from the word and the out patient clinic in the period from 15th of Dec. 2007 to 15th of June 2008.

One hundred of the collected sample 70.9% was found to be breastfed infants, while the rest of the sample, forty one 29.1%, were not breastfed infants.

This study was undertaken to verify the effect of breast-feeding duration on the frequency of RTIs in the first 2 years of life. The sample of this study can be considered a normally distributed sample where the sexes of the infants were predominantly males (65.2% male and 34.8% female), mostly having normal duration of pregnancy (97.9% term and 2.1% preterm pregnancy) and normal delivery. The mother's age at the time of delivery as well as the child rank were normally distributed. The lactation duration extended from 0 to around 24 months, averaging approximately 8.6 months, which seems to differ considerably from the national surveys conducted by the Saudian MOH where it was around 5.1+/-3.4 month's[42], and 13 months.[43,44]

The frequencies of acute respiratory tract infections in the first 2 years were (1.6) attack per infant while in the Saudian study the frequencies of acute respiratory tract infections were 9.2+1-4.1 attacks per infant this difference in the results may be due to the age factor as many of our patients did not complete two years, while all their patients had completed two years but had different duration of lactation.[42]

Approximately half of the sample in our study develops one attack (48.9%), while those who develop four attacks represent only 0.7%. Therefore; number of attack per each infant regarding upper respiratory tract infections appears to be (0.t), while those of lower respiratory tract infections appears to be (0.9). In the Saudian study the lower respiratory tract suffered more frequent attacks than the upper with averaging rate of 5.6-,1-2.6 attacks per inlant compared to 3.7+1-2.2 attacks per infant.[42]

In the other hand we found that bottle led infants develop one attack in 17.1% of cases and four attacks in 2.4% of cases, Therefore: number of attack per each infant regarding upper respiratory tract infections appears to be (0.9), while those of lower respiratory tract

infections appears to be (1.2). Thus the end result is (2.1) attack per each infant regarding the total respiratory tract infections.

DOL have a significant relationship with RTIs especially: OM, pneumonia, and bronchiolitis (P-values were 0.026, 0.008, and 0.002 respectively), while the URTIs have insignificant relationship to the DOL. This is coinciding with the Indian and Canadian studies, which state that all breastfed infants had significantly lower incidence of respiratory tract infections especially for pneumonia and otitis media (P-value 0.001).[45]

Infants with Full BF more than or equal to 6 months were at less risk for havim2, pneumonia in the first year than those with Full BF for 4-6 months, 17.3% and 31.6% respectively; (p-value 0.008) and this coincide with the American study where full BF equal to 6 months vs. BF less than 4 month 1.6% and 6.5% respectively; (P- 0.017).[46]

In Greenland, exclusive breastfeeding compared with no breastfeeding or having weaned was found in a prospective study to protect against lower respiratory tract infection in multivariate analysis.[47]

Similarly, a prospective study in Chile noted that pneumonia during the first 18 months of life associated in multivariate analysis with duration of breastfeeding.[48]

Additionally, no BF infants were more likely to have first episode of OM before 1 year of age than those with Full BF for more than 6 month 21.95% vs. 3.8% (p-0.026) and this result is similar to the American result as the Full BF from1-3 months vs. Full BF for more than 6 months 61.7% and 47.2% respectively; (P- 0.026).[46]

In another study made in Swedish infants, they found that the acute OM frequency was significantly lower in the breast-fed than in the non-breastfed children in each age group ($P < 0.05$). The first AOM episode occurred significantly earlier in children who were weaned before 6 months of age than in the remaining groups.[49]

In the American study there was no statistical signi ficance regarding URTI or wheezing in infants with full BF for more than 6 months compared with those who were full BF for less than 6 months.[46]

Bronchiolitis has a strong relationship to the sex, state of the house, and the socioeconomic status of the family as it appears to be more common in male, crowded house and those who lives in families with low socioeconomic status (p-values were 0.024, 0.0001, and 0.0001 respectively). Watts and Goodman stated that bronchiolitis is more common.

Bronchiolitis has a strong relationship to the sex, state of the house, and the socioeconomic status of the family as it appears to be more common i n male, crowded house and those who lives in families with low socioeconomic status (p-values were 0.024, 0.0001, and 0.0001 respectively). Watts and Goodman stated that bronchiolitis is more common in male those who have not been breastfed, and in those who live in crowded conditions.[36]

In our study we also found that pneumonia and acute bronchitis have significant relationships to socioeconomic status of the family. This coincides with data suggesting that the risk of mortality associated with no breastfeeding was greater for infants whose mothers had little formal education[50], and with poor family income ($p<0.001$) as mentioned by Abdulmoneim and Al-Gamdi.[42]

CONCLUSIONS

The lactation duration has an important relation to the frequency of respiratory infections in infancy. Every effort should he made to encourage and support longer duration of breast-feeding.

Recommendation

1- We should insist on breast feeding because it gives the children a good nutrition and protects from infections
2- Breast feeding benefits are dose and duration responsive
3- We must insist that infant should receive only breast milk during the first 6 months of life
4- We must Increase the duration of breast feeding up to two years
5- A mother should identify a support person (s): family, friends with positive breastfeeding experience, lactation consultant.
6- A mother should choose obstetrician, hospital, and pediatrician who are (baby friendly).

REFERENCES

1. Savage Kitig, F., Helping mothers to breastfeed. Revised., African medical and research foundation, Nairobi, 1992; 6.
2. Grodner, M., Anderson, S.L., Young, S.D., Foundation and clinical application of nutrition, a nursing approach, 2nd ed. Mosby, Missouri, 2000; 332.
3. Lawrence, RA., Lawrence, RM: Breastfeeding, a guide for the medical profession. 5th ed., Mosby, Missouri, 1999.
4. Position of the American dietetic association: promotion of breastfeeding, *J Am Diet Assoc.*, 1997; 97: 622.
5. James, S.D., Breastfeeding. In: William, M., Schwartz, M.D., eds. 2nd ed, the 5 minute pediatric consult. Lippencott Williams and Wilkins, Philadelphia, 2000; 202-203.
6. Al-Dabal, B.K.: Breastfeeding: Knowledge and attitude of college girls. *Saudi Medical Journal, 1998;* 19: 437.
7. Barrett, T.G., Lander, A.D., Diwakar, v.: A pediatric Vade-Mecum, 14th ed., Book power, India, 2004; 148.
8. Subcommittee on nutrition during lactation, food and nutrition board, Institute of medicine, National academy of science, Washington, DC, 1991, *National academy press.*
9. Cunningham, A.S., Jelliffe, D.D., Jelliffe, E.F.P.: Breast-feeding and help in the 1980s: *a global epidemiologic review, J., Pedher.*, 1991; 118: 659.
10. Krebs, N.F., Primak, L.E., Pediatric nutrition and nutritional disorder. In: Kliegman, R.M., Marcdante, K.J., Jenson, H.B., Behrman, R.E., eds. Nelson essentials of pediatrics. 5th ed. Elsevier, Philadelphia, 2006; 131.
11. Shu, X.O., Clemens, J., et al., Infant breastfeeding and risk of childhood lymphoma and leukemia, *International journal of epidemiology*, 1995; 24: 27- 32.
12. Lteif, A.N., Schwenk, A.F., Breast milk: revisited. Mayo clinic proceedings, 1998; 78: 760-763.
13. Kavanaugh, N., Sterner, P., The decision to breastfeed. In: Hernandez, C.G., Singleton, J.K., Aronzon, D.Z., eds. 1st. Primary care pediatrics, Lippencott, Philadelphia, 2001; 79-91.
14. Kalkwarf, Specker, B.L., Heubi, J.E., et al: Intestinal calcium absorption of women during lactation and after weaning, *Am, J, cliii, nutr*, 1996; 63: 526.
15. Montalto, S.A., Saha, V., Paediatrics A core text with self assessment. 1st ed. Churchill Livingstone, Edinburgh, 1999; 6-7.

16. Roth, P., Neonatology. In: Polin, R.A., Ditmar, M.F., eds. Pediatric secrets. 4th ed. Elsevier Mosby, Philadelphia, 2005; 406-409.
17. Buescher, E.S., Mcllheran, S.M..: colostral antioxidants: separation and characterization of two activities in human colostrum, *1, pediatr, gastroenterol, miter,* 1992; 14: 47.
18. Lekeiko, N.S., Chao, C., nutritional requirements. In: Rudolph, A.M., hoffman, Rudolph, C.D., eds. 20th ed. Rudolph pediatrics. Appleton and lange, New York, 1996; 1004-1006.
19. Carlson, S.E., Human milk non protein nitrogen: occurrence & possible function, advances in pediatrics, 1985; 32: 43-70.
20. Morriss, F.H., physical-chemical changes in human milk during the course of lactation. In Howell, R.R., Morriss, F.H., Pickering, L.K., eds. Human milk in infant nutrition and health, 3rd ed, spring field, III, 1996.
21. Kunz, C., Lonnerdal, B., Re-evaluation of whey protein / casein ratio of human milk, *Acta Paediatr Scand,* 1992; 81: 107.
22. Janeway, C.A., Travers, P., Walport, M., Immunology, the immune system in health & disease, 4th ed. Elsevier, London, 1999; 327.
23. Heine, W., Braun, 0.H., Mohr, C., et al: enhancement of lysozyme trypsin-mediated decay of intestinal bifidobacteria and lactobacilli, *J pediatr gastroenterol nutr.,* 1995; 21: 54.
24. George, D.E., Lebenthal, E., Human milk in comparison with cow milk. In: Lebenthal, E., ed, Textbook of gastroenterology and nutrition in infancy. 2nd ed. *Raven press,* New York, 1981; 295-320.
25. Harzer, G., Kauer, FI., binding of zinc to casein, *Am J Clin Nutr.,* 1982; 35: 981.
26. Norgarrd-Hansen K., Ebbesen, F., neonatal vitamin K prophylaxis in Denmark: three years experience with oral administration during the first three months of life compared with one oral administration at birth. *Acta pediatrica,* 1996; 85: 1137-1139.
27. Birkbeck, J.A., Scott, H.F., 25-hydroxy cholicalciferol serum levels in breastfed infant. *Archives of disease in childhood,* 1980; 55: 69-695.
28. Marino, B.S., Fine, K.S., Mcmillan, J.A., Blueprints pediatrics, 3rd ed. Lippencott Williams and Wilkins, Philadelphia, 2007.
29. Macfarlane, J.T., Thomson, A., Pneumonia and other acute respiratory infection. In: Gibson, G.J., Geddes, D.M., Costabel, U., Sterk, P.J., Corrin, B., eds. Text book of respiratory medicine, 3rd ed, Saunders Elsevier, London, 2003; 861-876.
30. Scadding, G., Mitchell, D., rhinitis & sinusitis. In: Albert, R.K., Spiro, S.G., Jett, J.R., eds, clinical respiratory medicine, 2nd ed, Mosby, Philadelphia, 2004; 339-340.

31. Pappas, D.E., Hendley, J.0., sinusitis. In: Behrman, .R.E., Kliegman, R.M., Jenson, H.B., eds. Nelson textbook of pediatrics, 18th ed, Saunders Elsevier, Philadelphia, 2007; 1749-1750.
32. Graber, M.A., Beaty, L., autolarygology. In: Graber, M.A., Toth, P.P., Herting, R.L., eds. The family practice handbook, 3rd ed, Mosby, Missouri, 1997; 701.
33. Beattin, R.M., Champion, M.P., essential revision notes in pediatrics for the MRCPCH, past test, U.K., 2002; 687.
34. Hall, D., Johnston, D.1., essential pediatrics, 4th ed. Churchill Living stone, London, 1999; 123.
35. Lerts, B.A., comprehensive pediatrics emergency care, Mosby, Philadelphia, 2005; 124.
36. Watts, K.D., Goodman, D.M., wheezing in infant. In: Behrman, R.E., Kliegman, R.M., Jenson, H.B., eds. Nelson textbook of pediatrics, 18th ed, Saunders Elsevier, Philadelphia, 2007; 1773-1774.
37. Barrett, T.G., Lander, A.D., Diwakar, V., a paediatric vade-mecum, 14th ed. Arnold, London, 2003; 210.
38. Helms, P., Henderson, J., respiratory disorder. In: McIntosh, N., Helms, P.J., Smyth, R.L., eds. Forfar & Arneil's textbook of pediatrics, 6th ed, Churchill Living stone, London, 2003; 780.
39. Sectish, T.C., Prober, C.G., pneumonia. In: Behrman, R.E., Kliegman, R.M., Jenson, H.B., eds. Nelson textbook of pediatrics, 18th ed, Saunders Elsevier, Philadelphia, 2007; 1795-1798.
40. Goodman, D.M., bronchitis. In: Behrman, R.E., Kliegman, R.M., Jenson, H.B., eds. Nelson textbook of pediatrics, 18th ed, Saunders Elsevier, Philadelphia, 2007; 1777.
41. Daniel, W.W., Biostatistics: A foundation for analysis in the health sciences. 8th ed. John Wiley & Sons, New York, 2005; 354.
42. Abdulmoneim and Al-Gamdi, breastfeeding and respiratory tract infection in infancy. *Saudi medical journal*, 2001; 22(4).
43. Al-Mazrou Y., Farid S., eds. Ministry of Health. Saudi Arabia Child Health Survey, Breast-feeding practices. Riyadh, (KSA); MOH, 1991; 139-165.
44. Khoja T.A., Farid S.M., eds. Ministry of Health. Saudi Arabia Family Health Survey, Breast-feeding and supplementation. Riyadh (KSA); MOH, 1996; 60-63.
45. Chandra RK, Prospective studies of the effect of breast feeding on incidence of infection and allergy. *Acta Paediatr Scam!,* 1979* Sep; 68(5): 691-4.

46. Caroline J., Chantry, Cynthia R., Howard and Peggy Auinger, Full Breastfeeding Duration and Associated Decrease in Respiratory Tract Infection in US Children. *Pediatrics*, 2006; 117: 425-432.
47. Koch A, Molbak K, Homoe P, et al. Risk factors for acute respiratory tract infections in young Greenlandic children. *Am. J. Epidemiol*, 2003; 158: 374-384.
48. Lopez Bravo I.M., Sepulveda FL, Valdes I., Acute respiratory illnesses in the first 18 months of life. *Rev Amain Salad PubIlea*, 1997; 1: 9-17.
49. Aniansson G, Alm B, Andersson B, Hakansson A, Larsson P, Nylen O, Peterson H, Rigner P, Svanborg M, Sabharwal H, et al., A prospective cohort study on breast-feeding and otitis media in Swedish infants. *Pediatr Infect Dis J.*, 1994 Mar; 13(3): 183-8.
50. Yoon PW, Black RE, Moulton LH, Becker S. Effect of not breastfeeding on the risk of diarrheal and respiratory mortality in children under 2 years of age in Metro Cebu, The Philippines. *Am. J. Epidemiol.*, 1996 Jun 1; 143(11): 1142-8.