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Dr. Kahtan A
Mousl Health Directorate, Iraq

Dr. Hiba S Raoof
Mousl Health Directorate, Iraq

Dr. Ragheb H Sultan
Mousl Health Directorate, Iraq

Correspondence
Dr. Kahtan A
Mousl Health Directorate, Iraq

Clinical and epidemiological study of bronchiolitis in Mosul

Dr. Kahtan A, Dr. Hiba S Raoof and Dr. Ragheb H Sultan

Abstract
One hundred sixty babies with bronchiolitis were studied in Al-Khansa' Maternity and Children Teaching Hospital from the 1st of December 2005 to the 30th of March 2006. Males were 108 (67.5%) and females were 52 (32.5%) with male to female ratio of 2.08: 1, their ages were less than one year, the peak incidence was 2 month old babies, the mean age was (5.08+- 3.25 month), and most of them were full term. Bronchiolitis was more common in low socioeconomic families, in those whose parents are smokers, in crowded families and in those whose older siblings were having upper respiratory infection. Family history of atopy was not significant. Breast feeding is really valuable in protecting against this infection where the main presenting features were cough, shortness of breath, fever, irritability with upper respiratory infection, and most of the babies were in respiratory distress with retractions and fine crepitations. The main findings in their chest radiography were air trapping, increase vascular marking with little consolidation and collapse. All babies were given salbutamole nebulizer, corticosteroids with antibiotics, most of them were given oxygen and some were given aminophylline. Most of the babies stayed for few days in the hospital and all of them were discharged well.

Keywords: clinical, bronchiolitis, Mousl, Iraq

Introduction
Bronchiolitis is a common disease of the lower respiratory tract infection in infant, resulting from inflammatory obstruction of the small airways [1].

Etiology
1. Respiratory syncitial virus (RSV) (45-75%) [2]: RSV is a paramyxo virus family virus, comprises the genus pneumo virus [3]. It is RNA virus, has lipid envelop bearing to glycoprotiens one of which is fusion protien, facilitates entry of virus into the cell [4]. IgA antibody present in colostrum and milk is mainly directed against this fusion protein [5].
2. Parainfluenza virus (4.3-22%) [6] Type 3 is the most important frequently causes illness during the first month of life [7]. Type4 causes mild illness [8].
3. Adenovirus (3-5%) [9] It is associated with long term complications including bronchiolitis obliterans and unilateral hyperlucent lung syndrome [10].
4. Influenza virus: type B higher attack rate causes less severe illness than that caused by type a [11].
5. Rhinoviruses (2%): infection rates are higher among infants and decrease with age [12].
6. Mumps virus [13].
7. Mycoplasma pneumonia [14].
   The last 4 causes account for less than (7%) [15].

Epidemiology: Both bronchiolitis and RSV infection appear in yearly epidemics [16, 17], which occurs in either late fall, winter or spring and can last up to five months [13, 14, 18, 19, 20]. The outbreak are less seasonal in tropical climates but are concentrated in rainy season [15]. Re-infection can occur but it is usually less severe, [21, 22] and it is in the rate of 10-20% per epidemic [17]. RSV is transmitted by close contact and by self-inoculation of the conjunctiva or anterior nares [23]. Virus may also spread by coarse aerosols but it is inefficiently spread by fine particles aerosols [24]. Bronchiolitis is more common in male, in those who have not breast-fed and in those who live in crowded conditions. Older family members are common source of infection but may experience only minor respiratory symptoms [1]. Colostrum and breast milk contain large amount of IgA antibody, some of which is RSV specific [25], which is mainly directed against fusion protein of RSV [26]. Infant inhale milk and regurgitate then through

Nose and the IgA collected in the respiratory tract might protect against severe respiratory infection [25]. IgG anti-RSV antibodies are present in breast milk and in reactive T-lymphocyte [27]. About 3% of infants younger than one year of age are admitted to the hospital with bronchiolitis [28]. The rate of admission to hospital with bronchiolitis has increased over the past decade. The reasons for this are not fully understood and are likely to be multifactorial and include improved survival of preterm infants, increase attendance of infants in daycare centers and change in criteria of hospital admission [1, 28].

Pathophysiology: The pathological process leads to airways obstructions and atelectasis which impairs normal exchange of gases in the lungs and ventilation-perfusion abnormalities [13, 29, 30]. Hypoxaemia may occur early in the course, but hypercapnia does not usually occur except in severely affected patients. [29], and it suggest either exhaustion and/or severe ventilation-perfusion mismatching. [30] Acute bronchiolitis characterized by bronchiolar obstruction with edema, mucous and cellular debris. When obstruction is partial lead to over inflation because radius of an airway is smaller during expiration, the so called ((dynamic compression [1, 9]. If obstruction is complete with resorption of trapped air the child develop atelectasis, usually involving the right upper or middle lobe [1, 3]. There is plugging of small airways the mucous and debris, fibrin strands deposit in the lumen, necrosis of the bronchiolar epithelium and destruction of ciliated lining layer [2, 13, 30, 31].
Peribronchial inflammation and lymphocytic infilitration is usually accompanied by involvement of the lung interstitium [32, 33].

Clinical features: Bronchiolitis is a seasonal viral illness characterized by coryzal phase which precedes the onset of other symptoms, clear rhinorrhoea, fever of 38.5-39C (101-102F) although temperature may range from subnormal to markedly elevated, usually paroxysmal dry wheezy cough, dyspnoea, irritability, poor feeding (usually due to dyspnoea and it is often the reason for hospital admittion) [34, 1, 35, 36, 37]. Gradually respiratory distress increase with dyspnoea, tachypnoea, subcostal and intercostal and supraclaviculer recession, and apnoea especially in the very young and in premature and low birth weight infants [1, 26, 36, 38, 39, 40]. These symptoms last about (72 hours) before symptoms improvement [35]. On examination there is high pitched expiratory wheeze which is not universal, fine expiratory crackles which is common in bronchiolitis [34, 35, 38, 41, 42]. Infants with no crackles and only transient wheezing usually classified as having viral-induced wheeze rather than bronchiolitis [39].

Diagnosis: The diagnosis of bronchiolitis is based on clinical history and finding on physical examination [26]. Criteria for diagnosis of bronchiolitis include first episode of acute wheezing, age 24 months or younger, accompanying physical finding of viral infection (i.e. coryza, cough, fever) and exclusion of pneumonia or atopy as a cause of wheezing [43].

Investigations that can be done include

1. RSV can be identified in the nasopharyngeal secretions by PCR, viral culture, or antigen assay by the enzyme immunoassay membrane test for RSV antigen that completed in (15 minutes) and does not require specialized equipment or trained personnel [44, 45, 46].
2. Oxygen saturation: pulse oximetry should be performed in every child who attends hospital with acute bronchiolitis, lower oxygen saturation level on hospital admission (<=92) predict more severe disease and longer length of stay [47, 48].
3. Blood gases: the degree of hypoxaemia or hypercarbia may have influenced the decision to use oxygen and the concentration used [49].
4. Chest X-ray: it reveals hyperinflation with patchy atelectasis [1].

Differential diagnosis

The differential diagnosis can be divided into

1. Pulmonary causes: which include asthma(may not be distinguished during first episode but repeated episodes of wheezing, absence of viral prodrome and the presence of family history of atopy or asthma support the diagnosis of asthma), pneumonia, congenital lung disease, cystic fibrosis and inhaled foreign body [1, 28, 39].
2. Non pulmonary causes: which include congestive heart disease, sepsis, severe metabolic acidosis, gastro esophageal reflux [1, 28, 39, 44].

Treatment: The disease is self-limiting, typically lasting between (7-10 days), so most infants managed at home, often with primary care support which include adequate oral intake and antipyretic agent for fever [28, 44]. Indications for hospital admission include: young age (<6 months), moderate to severe respiratory distress(sleeping respiratory rate 50-60 breath/ minute or higher), hypoxaemia (PaO^2<60mmHg or oxygen saturation<92% in room air), the occurrence of apnoea, inability to tolerate oral feeding and lack of appropriate care available at home.(44) Children with underlying medical problem (prematurity, cardiac disease, underlying respiratory disease such as Broncho pulmonary dysplasia, with neuromusculer disease and immune deficiency) are more susceptible to severe disease and so have higher rates of hospitalization [28, 44].

For hospitalized patients the following treatment may be given

1. The infant is somewhat more comfortable if sitting with head and chest elevated at 30^0 angle with neck extended [1].
2. Nasal suction: should be used to clear secretions in infants who exhibit respiratory distress due to nasal blockage [50].
3. Cool humidified oxygen for hypoxaemic child by nasal cannula or face mask sufficient to maintain PaO^2 of 70-90mmHg (oxygen saturation>=93%) [1, 44, 51].
4. The infant with tachypnoea may be fed through nasogastric tube to reduce the risk of aspiration during oral feeding, however if there is risk of further decompensation potentially necessitating tracheal intubation, the infant should be kept NPO and maintained with parenteral fluid [1, 35, 52].
5. Inhaled bronchdilater: may demonstrate short term clinical benefit which include B2 agonist, ipratropium and neubolized epinephrine [1, 44, 53, 54, 55].
6. Corticosteroid: whether parentral, oral or inhaled are widely used despite conflicting studies, and it has no effect on length of hospital stay, time of becoming asymptomatic or rate of respiratory re-admission to the

hospital in a previously well infant less than (12 months) of age with acute bronchiolitis, so it is not indicated for previously healthy infants with RSV [1, 56, 57, 58].

7. Ribavirin aerosole: a specific antiviral agent to children with RSV infection has been used for infants with congenital heart disease or chronic lung disease [1, 44, 59]. One study which used anebulized water placebo suggested that nebulized ribavirin reduced length of hospital stay and the number of days of mechanical ventilation [60].
8. Intubation and mechanical ventilation are required to treat respiratory failure or severe apnoea [44].

Criteria for hospital discharge

1. Infants with oxygen saturation>94% in room air monitored for a period of (8-12 hours) after stopping supplemental oxygen [61, 62].
2. In hospitalized infants with bronchiolitis, oral feed volumes have been reported as less than half that of well infants, they should not be discharged until can maintain an adequate oral intake(>75% of usual intake) [63].

Prognosis: Usually the prognosis is excellent with resolving symptoms in (7-10 days) [44], 20%of infant with bronchiolitis (40-50% of those hospitalized) proceed to a grumbling, sometimes protracted respiratory syndrome of persistent cough and recurrent viral induced wheeze [16], ongoing symptoms may relate to continuing inflammation and temporary clinical dysfunction [64]. An association between acute bronchiolitis and later respiratory morbidity and lower average levels of lung functions are recognized [44, 65]. Mortality rate is less than 1% with death attributed to apnoea, uncompensated respiratory acidosis or severe dehydration [1].

Complications: These include apnoea, respiratory failure, atelectasis, otitis media (RSV or secondary bacterial), secondary bacterial infection, bronchiolitis obliterans, and pneumothorax or pneumomediastinum (in the child requiring mechanical ventilation) [44].

Prevention

1. Meticulous hand washing is the best method to prevent nosocomial transmission (RSV destroyed by soap and water/alcohol gel).(1,66)
2. Palivizumab (hyperimmune RSV spesific intravenous immunoglobuline): is a humanized monoclonal RSV antibody licensed for prophylaxis of development of severe disease from RSV infection(but it does not prevent the infection) and effective in reducing the incidence of RSV hospitalizations in high risk infants, given before and during RSV season (during winter) as monthly intramuscular injection for infants were born at or less than 35 weeks gestation (premature),very low birth weight infants, 6 months of age or younger, children 24 months of age or younger with bronchopulmonary dysplasia, infants with congenital heart disease and infants with immune deficiency [1, 44, 67, 68, 69, 70, 71].

The aim of the study is

1. To identify the epidemiological profile of infants with bronchiolitis in term of age, sex, area of residence.
2. To study the risk factors associated with bronchiolitis and type of feeding.
3. To describe the clinical characteristics of infant with bronchiolitis in respect to the main symptoms, signs and laboratory tests.
4. To assess the lines of treatment used in bronchiolitis.

Patients and Method: One hundred sixty patients with bronchiolitis admitted to Al- Khansa' Maternity and Children Teaching Hospital were studied during the period from the 1st of December 2005 to the 30th of March 2006. The babies who were enrolled in this study were having their 1st attack of bronchiolitis and their age was less than one year. They were 108 males (67.5%) and 52 females (32.5%). The criteria for the diagnosis of bronchiolitis was tachypnea, cough, wheeze and poor feeding and babies with congenital heart disease were excluded from this study.

Information were taken from their mothers including age, sex, gestational age, residence, feeding, socioeconomic status, family history of atopy, parental smoking, number of persons per room, presence of concomitant respiratory infection in the family, vaccination, the presenting features (fever, cough, shortness of breath, cyanosis, rhinorrhoea, tachypnea, apnoea, poor feeding and irritability). All the babies were examined carefully mainly concentrating on the respiratory system looking for the signs of bronchiolitis (respiratory distress, hyperinflation, retractions, fine crepitations, and wheeze). Chest radiography was taken to all patients. Other investigations like complete blood picture (CBP) were not done because of the large burden on the laboratory of our hospital, and actually they were not needed. Other hundred healthy babies attending the vaccination room of the hospital were taken as a control group for comparison regarding the risk factors for bronchiolitis and they were age and sex matched. The results were analyzed using chi square method where the p- value less than 0.05 is significant, less than 0.001 is highly significant, while if it is more than 0.05 is not significant

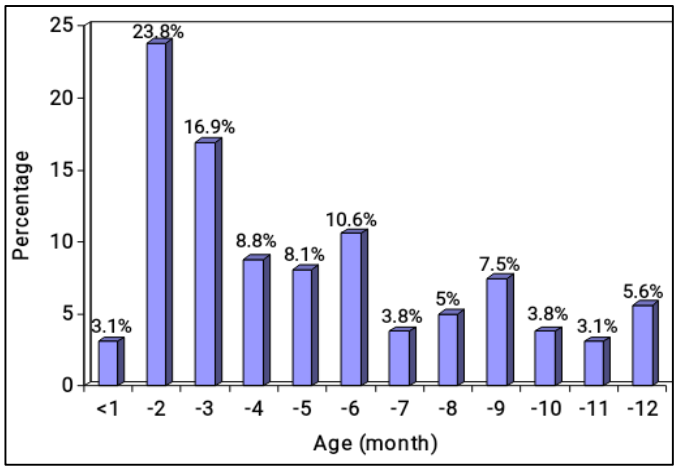

Fig 1: Age distribution of infants with bronchiolitis

Results

1. **Age:** The age incidence of patients with bronchiolitis is shown in figure (1)

The peak age was 2 months which compromise 38 (23.8%) of the patients, and the mean age was 5.08 ±3.25 months.

The males mean age were 4.88 +- 2.99 months, and females mean age were 5.49 +- 3.72 months.

The gestational age is shown in figure (2):

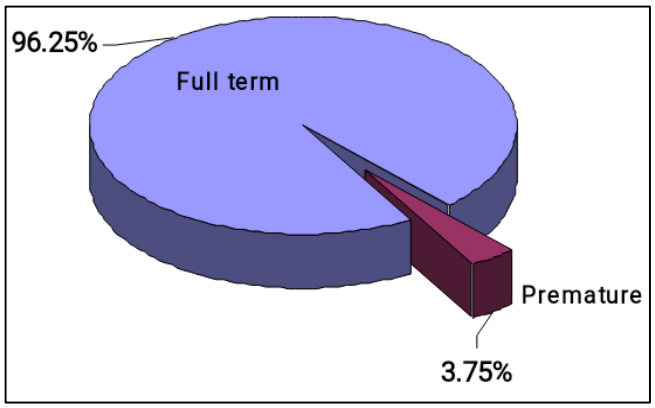

Fig 2: Distribution of gestational age in infants with bronchiolitis

Five patients were neonates, all of them were full term and the youngest age in the study was 22 days old, 6 patients were premature and their mean age at the time of illness were 6.25 +- 4.24 months.

The age and sex distribution of babies with bronchiolitis is shown in table (1):

Table 1: Distribution of infants with bronchiolitis according to age and sex

Age (month)	No.	Male		Female	
		No.	%	No.	%
<1	5	2	1.9	3	5.8
-2	38	23	21.3	15	28.8
-3	27	22	20.4	5	9.6
-4	14	13	12.0	1	1.9
-5	13	8	7.4	5	9.6
-6	17	14	13.0	3	5.8
-7	6	5	4.6	1	1.9
-8	8	4	3.7	4	7.7
-9	12	7	6.5	5	9.6
-10	6	1	0.9	5	9.9
-11	5	5	4.6	0	0.0
-12	9	4	3.7	5	9.6
Total	160	108	100.0	52	100

2. Sex: Sex distribution of infants with bronchiolitis is shown in figure (3):

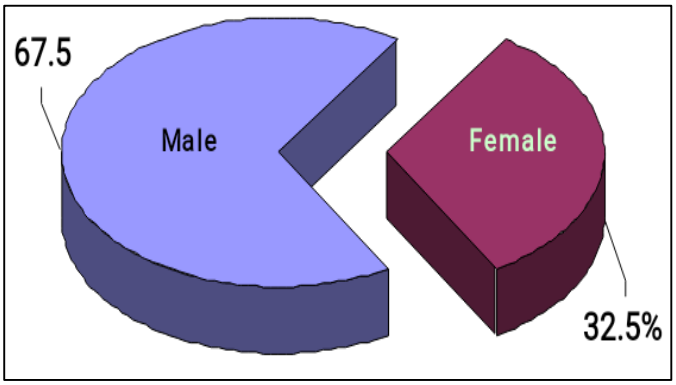

Fig 3: Sex distribution of infants with bronchiolitis

Males were 108(67.5%), females were 52(32.5%), and the male to female ratio was 2.08: 1.

3. Area of residence: Residence of infants with bronchiolitis is shown in figure (4):

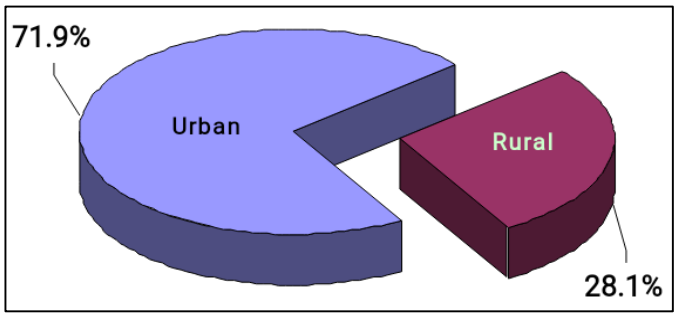

Fig 4: Area of residence of infants with bronchiolitis

One hundred fifty patients (71.9%) came from urban areas, and 45 patients (28.1%) came from rural areas.

4. Risk factors: Socioeconomic status (S.E.S.) of the family: The distribution of S.E.S is shown in figure (5):

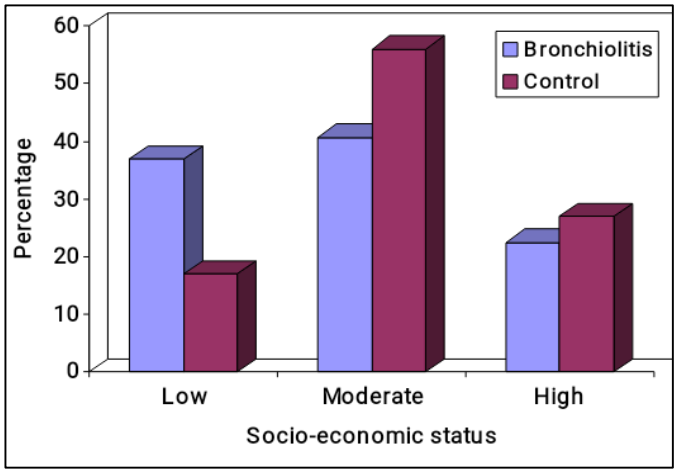

Fig 5: Socio-economic status of the family of infants with bronchiolitis and control infants

The low S.E.S. income is nearly 100000 Dinars/month, moderate S.E.S. income is 200000 – 300000 Dinars/month, high S.E.S. income is more than 300000 Dinars/month (this is nearly a personal rough estimation). The low S.E.S. were recorded in (36.9%) of patients and (17%) of control infants. As it is shown the incidence of bronchiolitis is more common in low S.E.S. where the P value 0.003.

5. Family history of atopy: As shown in figure (6), family history of atopy was positive in 43 patients (26.9%) and in 34 (34%) of control. Where the P value is not significant.

6. Parental smoking: As shown in figure (6) parental smoking was present in 111 patients (69.4%) while in 42 (42%) of control, where the P value is highly significant (< 0.001).

Concomitant respiratory infection (C.R.I.) in the family:

As shown in figure (6), C.R.I. was present in 128 (80%) of patients and in 27 (27%) of control. Where the P value is highly significant (< 0.001).

7. Overcrowding (more than 2 persons per room): As shown in figure (6), overcrowding was present in 122 (76.3%) of patients and in 61(61.0%) of control. It was also significant were P value (0.009).

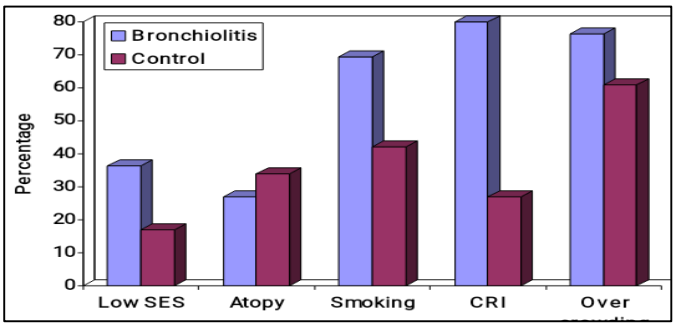

Fig 6: Risk factors in infants with bronchiolitis and control infants

SES = Socio-economic status, CRI = Concomitant respiratory infection.

In table (2) a comparison is made for the prevalence of risk factors in infants with bronchiolitis and control group expressed by P value:

Table 2: The prevalence of risk factors in infants with bronchiolitis and control infants expressed by p-value

Risk factor	Bronchiolitis (n=160)		Control (n=100)		p-value
	No.	%	No.	%	
Low socio-economic status	59	36.9	17	17.0	0.003
Family history of atopy	43	26.9	34	34.0	NS
Family history of smoking	111	69.4	42	42.0	<0.001
Concomitant respiratory infection	128	80.0	27	27.0	<0.001
Over crowding	122	76.3	61	61.0	0.009

NS = not significant

8. Type of feeding: The types of feeding of infants with bronchiolitis and control infants are shown in figure (7):

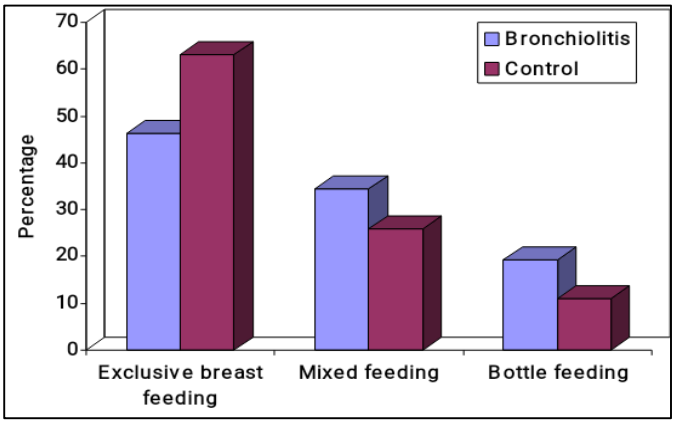

Fig 7: Type of feeding in infants with bronchiolitis and control infants

Seventy four patients (46.3%) were exclusively breast-fed, 55 patients (34.4%) were mixed-fed and 31 patients (19.4%) were formula-fed. Exclusive breast feeding found to have significant protecting effect against bronchiolitis, where the P value is (< 0.01). In table (3) a comparison is made on the prevalence of feeding types in infants with bronciolitis and control infants expressed by P value. There was a significant difference in the type of feeding in both groups.

Table 3: The prevalence of feeding types in infants with bronchiolitis and control infants expressed by p-value

	Bronchiolitis (n=160)		Control (n=100)		p-value
	No.	%	No.	%	
Exclusive breast feeding	74	46.3	63	63.0	<0.01
Mixed feeding	55	34.4	26	26.0	NS
Formula feeding	31	19.4	11	11.0	NS

NS = not significant

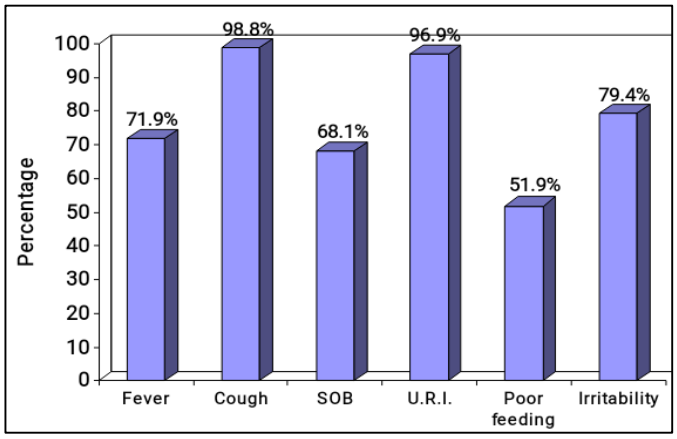

Fig 8: Symptoms of patients

All the babies in the patients and control were vaccinated according to the WHO schedule in Iraq

9. Symptoms: The symptoms are shown in figure (8):

SOB = Shortness of breath, URI = Upper respiratory infection (Coryza). Fig. (8) Symptoms of the infants with bronchiolitis. History of cough was found in (98.8%), upper respiratory tract infection in (96.9%), irritability in (79.4%), fever in (71.2%), shortness of breath in (68.1%) and poor feeding in (51.9%) of patients with bronchiolitis. In table (4) a comparison is made on the prevalence of symptoms in patients under and over 6 months of age:

Table 4: The prevalence of symptoms in infants with bronchiolitis under and over 6 months of age.

Symptoms	<6 months (n=97)		≥ 6months (n=63)		p-value
	No.	%	No.	%	
Fever	64	66.0	51	81.0	0.04
Cough	95	97.9	63	100	0.251 (NS)
U.R.I.	94	96.9	61	96.8	0.977 (NS)
Irritability	81	83.5	46	73.0	0.109 (NS)
S.O.B.	70	72.2	39	61.9	0.174 (NS)
Poor feeding	53	54.6	30	47.6	0.385 (NS)

From the table above fever is more common among patients older than 6 months of age in comparison to patients younger than 6 months of age, where the P value is (0.04).

Physical findings Temperature: The temperature of patients is demonstrated in figure (9):

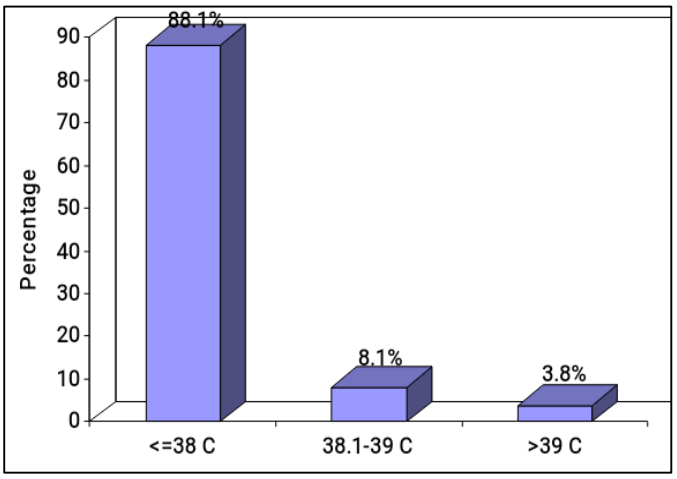

Fig 9: Temperature of infants with bronchiolitis

The majority of the patients with bronchiolitis had low grade fever, there were 141 (88.1%) with temperature of less than 38 C, 13 (8.1%) with temperature between 38.1C – 39 C, and only 6 (3.8%) had a temperature above 39 C.

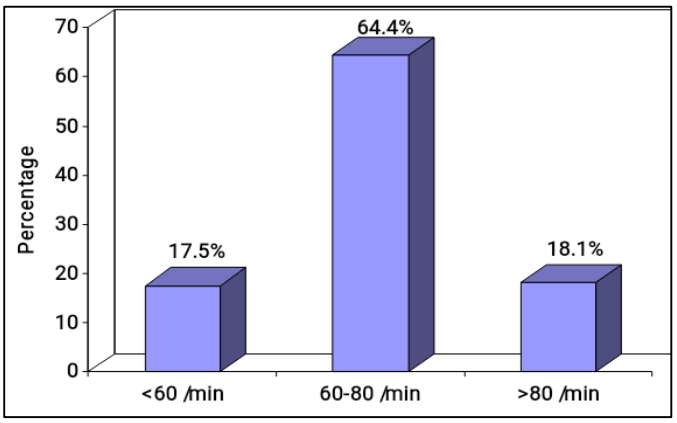

Fig 10: Respiratory rate of infants with bronchiolitis

Respiratory rate: The respiratory rate of patients with bronchiolitis is shown in figure (10):
As it is seen in the above figure the majority were having respiratory rate between 60 to 80 breaths minute.

Cyanosis: As it is shown in figure (11), cyanosis was present in 22 patients (13.8%).

Irritability: As it is shown in figure (11), irritability was present in 127 patients (79.4%).
Severe chest retraction: As shown in figure (11), severe chest retraction was present in 38 patients (23.8%).

Fine rales: As shown in figure (11), fine rales was present in 149 patients (93.13%).

Hyperinflation of the chest: As it is shown in figure (11), hyperinflation was present in 90 patients (56.3%).
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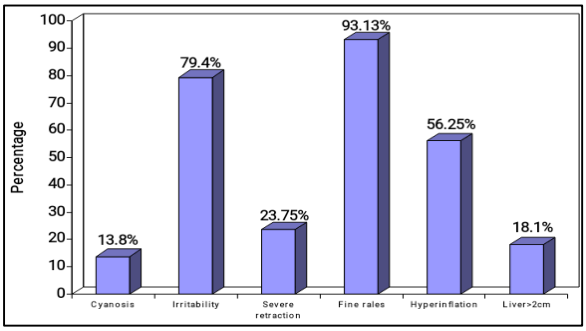

Fig 11: Signs of respiratory distress in infants with bronchiolitis

Liver size more than 2 cm. below costal margin: As it is shown in figure (11), liver size more than 2cm. below costal margin was present in 29 patients (18.1%).

Table (5) a comparison is made on the prevalence of physical findings in patients under and over 6 months of age.

Table 5: The prevalence of physical findings in infants with bronchiolitis under and over 6 months of age

Physical findings		<6 months (n=97)		≥ 6months (n=63)		p-value
		No.	%	No.	%	
Respiratory rate	<60	11	11.3	17	27.0	<0.05
	60-80	70	72.2	33	52.4	<0.05
	>80	16	16.5	13	20.6	NS
Temperature ° C	<38	87	89.7	49	77.8	<0.05
	38.1-39	8	8.2	7	11.1	NS
	>39	2	2.1	7	11.1	<0.05
Fine rales		91	93.81	58	92.06	NS
Irritability		81	83.5	63	100	NS
Hyperinflation		47	48.5	43	68.3	<0.05
Severe retraction		23	23.7	15	23.8	NS
Liver>2 cm		18	18.6	11	17.5	NS
Cyanosis		15	15.5	7	11.1	NS

From the above table, respiratory rate and hyperinflation were more common in infants younger than 6 months of age than infants older than 6 months of age, where the P value was (< 0.05), whereas the fever is more common in infants older than 6 months of age than infants younger 6 months of age, where the P value is (<0.05), the other parameters were not statistically significant.

Radiological findings: The radiological findings in infants with bronchiolitis are shown in figure (12)

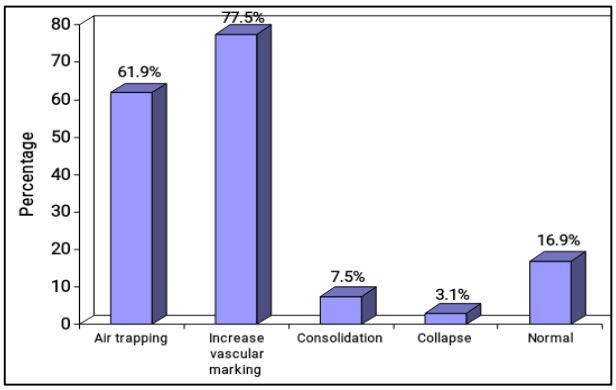

Fig 12: Radiological findings in infants with bronchiolitis

From the above figure we can see that air trapping and increased vascular marking were the most common radiological findings in patients with bronchiolitis, but consolidation and collapse with normal films were present in less frequency. Table (6) shows the prevalence of radiological findings in infants with bronchiolitis under and over months of age:

Table 6: The prevalence of radiological findings in infants with bronchiolitis under and over 6 months of age

Radiological findings	<6 months (n=97)		≥ 6months (n=63)		p-value
	No.	%	No.	%	
Air trapping	61	62.9	38	60.3	NS
Increase vascular marking	76	78.4	48	76.2	NS
Consolidation	7	7.2	5	7.9	NS
Collapse	3	3.1	2	3.2	NS
Normal	17	17.5	10	15.9	NS

From the above table, there was no significant difference of radiological findings between infants with bronchiolitis under and over 6 months of age.

Treatment: The lines of treatment used in patients with bronchiolitis are shown in figure (13):

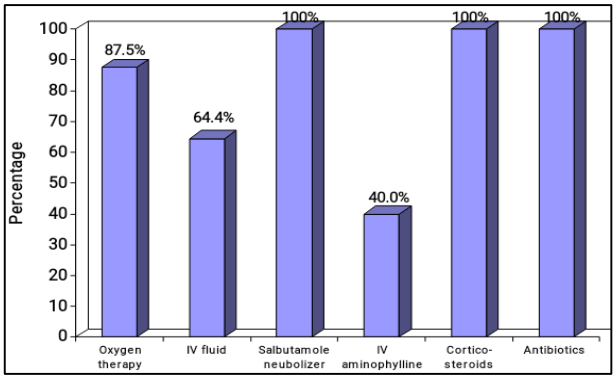

Fig 13: Lines of treatment of infants with bronchiolitis

All patients were treated by antibiotic (mostly Ampicilline+cloxacilline), steroids (Hydrocortisone or Dexamethasone parenterally), and nebulized salbutamole, and most patients were given oxygen (87.5%) Intravenous fluid was used in (64.4%) of patients, where aminophylline was used in (40.0%).

Hospitalization: The majority of the babies stayed in the hospital for about (3) days and discharged in good health.

Mortality: No death occurred during the study even those with severe illness.

Discussion

Age: In this study the peak age was 2 months and the mean age was 5.08+- 3.25 months, also A.K. Nazar in 1993 found that also the peak age was 2 months and the mean age was 5.1+-2.8 months [61]. The neonates included in this study had milder illness than other patients and their body temperature was less than 38 C, which is similar to A.K. Nazar in 1993 [61]. Probably here breast feeding is an important factor in altering the clinical expression of the disease in these neonates.

Gestational age: In this study six patients were premature (< 37 weeks gestational age), four with moderately severe illness and two with mild illness, which is similar to A.K. Nazar in 1993 [61].

Sex: In this study male to female ratio was 2.08:1, and there was no significant difference in the severity of illness between males and females, but A.K. Nazar in1993 found that male to female ratio was 1.6: 1, and also there was no significant difference in the severity of illness between males and females, whereas Holsberg *et al.* in 1991 consider male sex as a risk factor for RSV infection in the infants [72].

Area of residence: In this study bronchiolitis is more common in urban areas (71.9%) than in rural areas (28.1%), which is similar to A.K. Nazar in 1993 [61].

Risk factors

Socioeconomic status: In this study there was significant difference in socioeconomic status of patients and control infants, being the disease is more common in low socioeconomic status families of the infants in contrary to what found by A.K. Nazar where there was no significant difference in socioeconomic status of patients and control infants [61].

Atopy: Bronchiolitis and atopy (eczema, hay fever, rhinorrhea, and drug or food allergy) are two separate entities which have a number of features in common, and overlap in the age range in which they affect children [63]. In this study family history of atopy was almost similar in control and bronchiolitic infants, which is similar to A.K. Nazar in 1991 [61].

Smoking: Passive smoking (measured by saliva cotinine concentration) has a negative dose dependent effect on lung function in healthy child [64]. In this study smoking in the family was highly significant in infants with bronchiolitis than in control infants, but A.K. Nazar in 1993 found that smoking in the family was not significant in bronchiolitis than in control infants [61].

Overcrowding: In this study overcrowding (more than two persons per room) has significant difference between bronchiolitis and control infants, so overcrowding increase the risk of the infection Holsberg *et al*. 1991 found that male sex, number of others sharing the room, and day care were significant risk factors for RSV – associated lower respiratory illness in the 1st year of life [62].

Concomitant respiratory infection: In this study concomitant respiratory infection in the family was highly significant acting as a source of transmitting the infection to the infants. Similarly in A.K. Nazar, 1993 also concomitant respiratory infection was common in infants with bronchiolitis [61].

Type of feeding: In this study there were a significant difference in control exclusive breast- fed infants and patients with bronchiolitis, so breast feeding has a protective effect against bronchiolitis.

Also in many studies it was found that breast feeding had a protective effect against bronchiolitis and RSV infection [19, 65, 62].

Symptoms: In this study upper respiratory tract infection was present in (96.9%), cough (98.8%), irritability (79.4%), fever in (71.9%), shortness of breath (68.1%) and poor feeding was present in (51.9%) of patients. The illness begins with mild upper respiratory tract infection (coryza) with serous nasal discharge and sneezing, and the symptoms usually last for several days [12, 17].

Physical findings

Temperature: In this study fever <= 38 C was present in (88.1%) and 38.1 – 39 C was present in (8.1%) and > 39 C was present in (3.8%) of patients with bronchiolitis. Fever is more common in patients older than six months of age. In bronchiolitis usually there is fever of (38.5 -39C) but it may be (39.5-40C) [1]. Carlsen *et al.*, 1980 found that (50%) of cases with fever and (17%) of cases had high fever [66].

Respiratory rate: In this study the respiratory rate was higher in patients under six months of age than patients older than six months of age. Cherian *et al.*, 1988 found that infants with a respiratory rate above 50/min. was the best indicator of lower respiratory tract infections, with sensitivity 89% and specificity 92%. [67] A.K. Nazar, 1993 also found that respiratory rate was higher in patients younger than six months of age than infants older than six months of age [61].

Cyanosis: In this study cyanosis was present in (13.8%) of patients but A.K Nazar in1993 found that cyanosis was present in (8%) of patients [61].

Chest wall retractions: In this study chest wall retractions were present in (23.75%) of patients, but in the study of A.K. Nazar in1993 chest wall retractions were present in (26%) of patients [61]. Chest wall retractions are usually not associated with severity of hypoxaemia [39].

Fine rales: In this study fine rales were present in (93.13%) of patients, but in the study done by A.K. Nazar in 1993 coarse rales were present in (17%) of cases [61].

Hyperinflation: In this study hyperinflation was present in (56.25%) of patients, but in the study of A.K. Nazar in 1993 hyperinflation was present in (46%) of patients [61].

Liver size: In this study liver size more than 2 cm. below costal margin was present in (18.1%) of patients, but in the study of A.K. Nazar it was present in (24%) of patients [61]. Liver breadth below costal margin is not associated with hypoxaemia in acute bronchiolitis [39].

Radiological findings:- In this study air trapping was present in (61.9%), increase vascular marking in (77.5%), consolidation in (7.5%), collapse in (3.1%) and normal chest X-ray was present in (16.9%) of infants with bronchiolitis. Eriksson J. found that the radiological findings in RSV bronchiolitis are non-specific and include air trapping (61-85%), peribronchiolar thickening and infiltrate (46-85%), consolidation most often sub segmental (24%), collapse (10-13%) and normal film in (13%) [68]. In this study there was no significant difference in radiological finding between infants with bronchiolitis under and over six months of age, which is similar to A.K. Nazar in1993 [61].

Treatment

Monitoring: Monitoring of heart rate, respiratory rate, features of respiratory distress are important in the treatment of patients with bronchiolitis.

Oxygen therapy: In this study oxygen was given to almost all patients with bronchiolitis (87.5% of patients), which is proved to be valuable in the treatment especially in hypoxaemic infants.

Humidified oxygen of (40%) concentration is usually indicated since most infants are hypoxaemic [12, 6].

Intravenous fluid: In this study 103 patients (64.4%) received IV fluid, but in the study of A.K. Nazar in 1993 IV fluid was given to (14%) of patients [61].

Bronchodilator drugs: In this study salbutamole neubulization was given to all (100%) patients and seemed to be valuable in the treatment of bronchiolitis, while intravenous aminophylline was given to (40%) of patients. Bronchodilator drugs such as isoprenaline, adrenaline, salbutamole and aminophylline have no influence on the degree of airway obstruction during the acute illness [12, 69].

Ho L. *et al.*, 1991 found that inhaled salbutamole in bronchiolitis causes fall in SaO2 [70]. In other study it had been found that salbutamole neubolized causes improvement in clinical score of young children with acute bronchiolitis [71].

Corticosteroids: In this study steroids (dexamethasone or hydrocotisone) were given to all (100%) patients admitted with bronchiolitis and seemed to be valuable in the treatment and decreasing hospital stay of infants with bronchiolitis, other studies found that corticosteroids whether inhaled or systemic are not recommended for the treatment of acute bronchiolitis in infants [46, 47, 48].

Antibiotics: In this study antibiotics (mostly ampicilline +cloxacilline) were given to all (100%) patients, but in other study antibiotics used in (40%) of patients with bronchiolitis due to RSV infection [72].

Duration of hospitalization: In this study the median duration of hospitalization was (3.1) days similar to what was found by A.K. Nazar 1993 [61]. All the babies discharged well.

Conclusions

1. Bronchiolitis is a common disease of infants lead to a large number of acute admissions to hospital in winter and spring.
2. It usually affects young infants, male more than females, more in urban than in rural areas.

3. Breast feeding seemed to be protective against bronchiolitis.
4. Bronchiolitis is more common in low socioeconomic status families and in those whose parents are smokers and in overcrowded families and in those where the other members of the family have upper respiratory infection.
5. Family history of atopy was not significant.
6. Cough, rhinorrhoea and irritability with fever and shortness of breath together with poor feeding were the commonest presenting features.
7. Oxygen is the most important part of treatment and corticosteroids are highly beneficial in the treatment.
8. The outcome of the disease was good in all the babies.

Recommendations

1. Breast feeding should be highly encouraged at least in the 1st six months of life because of its efficacy against RSV.
2. Admitted babies to the hospital should be monitored carefully for heart rate, respiratory rate, cyanosis, level of consciousness, etc, as this monitoring is highly necessary in the management.
3. Blood gas analysis should be available at hand in order to assess the severity of bronchiolitis.
4. Prophylactic RSV specific immunoglobuline should be available to be given to the high risk group babies.

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