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Original Research Article

Association of iron deficiency anemia with acute bronchiolitis in children below 2 years of age

Prodip Kumer[1]*, M. Abdur Rouf[2], Mohammad Moniruzzaman Bhuiyan[1], M. Abu Taleb[3], Vikarun Nesa[4]

[1]Department of Paediatrics, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh
[2]Department of Paediatrics, MH Samorita Hospital and Medical College, Dhaka, Bangladesh
[3]SIBL Foundation Hospital, Dhaka, Bangladesh
[4]Department of Neonatology, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh

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***Correspondence:**
Dr. Prodip Kumer,
E-mail: drmalaker@gmail.com

ABSTRACT

Background: Bronchiolitis is the leading cause of respiratory distress in small children and one of the main causes of hospitalization in children <2 years of age. Anemia is also identified as a risk factor for lower respiratory tract infection. Iron deficiency is considered the most common cause of anemia in developing countries. As anemia is highly prevalent in children of our country, this study was undertaken to evaluate whether iron deficiency anemia is associated with acute bronchiolitis.

Method: This Cross-Sectional Analytical study was carried out in the Department of Paediatrics, Sir Salimullah Medical College Mitford Hospital (SSMCMH), Dhaka, during the period of December 2021 to November 2022 after obtaining ethical approval to explore the association between iron deficiency anemia and bronchiolitis. Hemoglobin level, RBC indices, TWBC count, serum iron, TIBC level, Transferrin saturation, and PBF were investigated and compared in all children with bronchiolitis and control. For this purpose, a total number of 71 patients were enrolled in the study and among them, 35 children with bronchiolitis were considered as cases, and 36 healthy children without bronchiolitis were considered as control, who were matched with age. After taking written informed consent from parents/legal guardians, a detailed history and thorough clinical examination and laboratory investigations were carried out on each child. Data were recorded in separate case record form and analyzed by SPSS version 23.0.

Results: The mean age was found 12.1±6.7 months in cases and 14.1±6.9 months in controls. Male participants (47, 66.2%) were the predominant group in the study and female participants were (24, 33.8%). Exclusive breastfeeding was found in 10 (28.6%) cases and 25 (71.4%) controls. There was a statistically significant difference in Hb (gm/dl), MCV (fl), S.Iron (µg/dl), Transferrin Saturation (%) and RDW-CV (%) between cases and controls ($p<0.05$). Among 35 cases, 25 (67.6%) had Iron Deficiency Anemia and statistical difference between the case and control was significant ($p=0.001$) with an odds ratio of 5.0.

Conclusion: Iron deficiency anemia has a significant association with bronchiolitis. A larger and more extensive study was recommended.

Keywords: Iron deficiency anemia, Acute bronchiolitis, Children

INTRODUCTION

Bronchiolitis is an acute inflammatory respiratory illness involving the lower respiratory tract occurring in the first 2 years of life.[1] Bronchiolitis is the leading cause of respiratory distress of small children. Bronchiolitis is mostly (95%) a viral disease. Multiple studies were conducted to identify the etiology of bronchiolitis. Respiratory syncytial virus (RSV), human rhinovirus (hRV) and human bocavirus (hBoV) are the most frequently detected viruses.[2] Respiratory syncytial virus (RSV) is responsible for >50% of cases. Bronchiolitis is one of the main causes of hospitalization due to respiratory infection in children <2 years of age.[3] According to WHO, nearly 2 million under-5 children die from ARI every year, which is about 19% of all deaths in this age group. Pneumonia and bronchiolitis are considered the leading contributors to the global burden of ARI in young children and are responsible for death that mostly occurs in the developing world.[4] The incidence of bronchiolitis is as high as 11 cases per 100 children per year of the first 18 months of life. In the USA 5 children per 1000 are hospitalized with bronchiolitis per year in the first 24 months of age.[5] A cross-sectional study done in forty-three hospitals in Bangladesh revealed that among 5157 admitted children, 3484 (67%) had respiratory problems and among them bronchiolitis 744 (21%) and pneumonia 402 (11.5%) respectively.[6]

There are some risk factors for bronchiolitis like non breast feed baby, living in crowded conditions, passive smoking, wood burning stoves, prematurity, low birth weight etc.[1] Anemia is identified as a risk factor for lower respiratory tract infection.[7] Anemia is one of the most common nutritional problems in the world and is associated with increased risk for morbidity and mortality especially, among under the 5 years of age and iron deficiency is considered the most common cause of anemia in developing countries.[8] In developing nations, IDA exceeds 50% and inadequate nutrition is typically blamed for it.[9,10]

Low hemoglobin (Hb) level impairs tissue oxygenation and acts as an independent risk factor for developing lower respiratory tract infection in children.[9] The role of iron in immunity is necessary for immune cell proliferation and maturation, particularly lymphocyte associated specific response to infection.[11] Iron deficiency anemia in children occurs most frequently between 6 months to 3 years of age.[9] In a study, it was found that patient with Hb level less than 10 gm/dl had 10 times higher risk of severe acute bronchiolitis with normal Hb levels. The patients with lower Hb level also had a longer hospital stay. There is a significant negative correlation between severity of acute bronchiolitis and Hb level.[12-15] A hemoglobin level under 10 g/dl on admission was associated with a higher use of continuous positive airway pressure as well as a longer duration of respiratory support.[12] In another cross-sectional analytical study at Paediatrics department of Benha University Hospital, Egypt, it was found that children with anemia and those with iron deficiency anemia were more susceptible to acute lower respiratory tract infection and also more susceptible to recurrent chest infections when compared with children without iron deficiency anemia.[13] As anemia and bronchiolitis is common in our country, so this study was carried out to find the association between anemia and bronchiolitis.

Objectives

General objective was to explore the association between Iron deficiency Anemia and Acute Bronchiolitis. Specific objectives were; to estimate Hb%, RBC count, RBC indices, TWBC count and Peripheral Blood Film (PBF) in study subjects, to measure Serum Iron, Total Iron Binding Capacity (TIBC) level and Transferrin saturation in study subjects, to compare the Hb level, RBC indices, PBF and iron profile between children with Acute Bronchiolitis and healthy control and to find out the relationship between Iron deficiency Anemia and Acute Bronchiolitis.

METHODS

Study design, duration and location

Current study was a cross-sectional analytical study conducted for Twelve months duration (December 2021 to November 2022) at Department of Paediatrics, Sir Salimullah Medical College Mitford Hospital (SSMCMH), Dhaka.

Study population

Children from 1 month to 2 years of age with bronchiolitis admitted in the department of paediatrics, SSMCMH were recruited as case and age matched healthy children from outdoor without acute lower respiratory tract infection (ALRTI) were recruited as control during the specified period of time. Control: age matched healthy children from outdoor without acute lower respiratory tract infection (ALRTI).

Inclusion and exclusion criteria

Children from 1 month to 2 years of age attended in the Department of Paediatrics of Sir Salimullah Medical College Mitford Hospital with clinical and radiological findings of bronchiolitis were included. Patients with Chronic respiratory disease. Congenital heart disease. Consolidation or atelectasis on a chest roentgenogram. Severe systemic illness (e.g., malnutrition, tuberculosis) were excluded.

Sampling method and sample size

Purposive sampling was used and Sample size was calculated using formula;

$$n = \frac{P_1(100-P_1) + P_2(100-P_2)}{(P_1-P_2)^2} \times (z_\alpha + Z_\beta)^2$$

Where; n = Sample Size, P_1 = Proportion in case (Bronchiolitis) which is 64.5%, P_2= Proportion in control (without bronchiolitis) which is 28.2%, Z_α = Z value of standard normal distribution at a given level of significance 1.96 at 5% level of significance, Z_β = z value of standard normal distribution at a given power 0.85 at 80% power.[14] After calculation, sample size, n=26.07. For this study, 35 sample was included in the case and 36 sample was included in the control.

Study procedure

The study cases were selected from IPD who were from 1 month to 24 months old with a history of runny nose, cough, breathing difficulty, chest indrawing and rhonchi on auscultation. Age-matched control was selected from outdoor healthy children without ALRTI. Informed written consent were taken from the mother or father or any legal attendant of the child. Information was collected by interviewing, from clinical and laboratory findings. Data was collected in a structured questionnaire. Both study case and control were investigated for Hb, RBC count, RBC Indices, PBF, Serum Iron, TIBC, and Transferrin Saturation. Transferrin Saturation was calculated using the formula of Iron level/TIBC. The cut-off point for low hemoglobin level is 11 gm/dl as per WHO definition. Blood samples were taken from the antecubital vein of each child by phlebotomist. Sterile, disposable syringes and needles, and proper tubes were used. Each sample was divided into 2 parts: one part (2 ml) put into a K3EDTA tube for CBC and the other part (3 ml) put into plain vacutainers for serum iron and TIBC. Serum was obtained at 3000/RPM for 5 minutes by lab rotator. Serum ferritin level was not investigated as in cases with infection, it increases probably as acute phase protein.

Laboratory analysis

Hb% and RBC indices were analyzed by fully Automated Pentra DX Nexus (Horiba Medical) Haematology Analyzer, Japan, and verified manually by Hematologist. S. iron and TIBC were determined by using Chemiluminescent MicroparticalImmunue Assay (CMIA/ELIZA) by Mindray BS-230, Automated Biochemical Analyzer, China. Transferrin Saturation (%) is calculated by using the formula:

$$Transferrin\ Saturation = (S.Iron \div S.TIBC)\ x\ 100.$$

Statistical methods

The numerical data obtained from the study, was analyzed, and the significance of differences was estimated by using statistical methods. Computer-based Statistical Package for Social Science (SPSS) version 23 was used. Qualitative values were expressed as frequencies and percentages and numerical data were expressed as Mean ± SD. The comparison between the groups was done for the qualitative variables using a Chi-square test. When the conditions for Chi-square validity were not met, it was replaced by Fisher's exact test. The association between pathology (bronchiolitis) and potential causal factors (IDA) was described by the relative risk and its confidence intervals. Continuous variables were compared through Student's t-test. P-value of 0.05 or less was considered significant.

Facilities available at the place of study

Informed written consent was taken from each legal guardian before each data collection. Study subjects were informed of their right to withdraw from the study at any stage of the study period. Assurance about the confidentiality concerning their information was ensured. The research was conducted in full accord with ethical principles. Study subjects were available in the in-patient and outpatient department of pediatrics. All laboratory facilities necessary (except iron profile) for the study were available. Equipment Used: Computer, Stethoscope, Thermometer, Pulse oximeter etc.

Operational definition

Bronchiolitis: Children from 1 month to 2 years of age presented with a history of runny nose, low-grade fever, cough, wheezing, respiratory distress, vomiting or feeding problem and chest roentgenogram shows hyper translucency, hyperinflated lung fields with increased interstitial markings.[1] Iron deficiency Anemia: Hemoglobin level below 11 gm/dl is considered as anemia by WHO.[11] Anemia is considered an IDA with three or more of the following criteria.[13] PBF-Hypochromia and microcytosis. MCV - Under 75 fL, RDW-CV - Greater than 14.5, Mentzer index (MCV/RBC count) - Greater than 13.5, Transferrin Saturation (S. Iron/TIBC ×100) - Less than 10%.

RESULTS

The (Table 1) shows that the majority of the patients (19, 26.8%) were in the age group between 13-18 months. The mean age was found 12.086±6.736 months in cases and 14.111±6.947 months in controls. The mean age difference was not significant between the two groups ($p>0.05$). The (Figure 1) shows the distribution of the participants by gender. Male participants (47, 66.2%) were the predominant group in the study and female participants (24, 33.8%).

The (Table 2) shows that Exclusive breastfeeding was found in 10 (28.5%) cases and 25 (69.4%) controls respectively. The differences were statistically significant ($p<0.05$) between the two groups in the chi-square test. Overcrowding was found in (26, 56.5%) cases and (20, 43.5%) controls respectively.

Table 1: Distribution of study subjects according to age in months (n=71).

Age (months)	Case (N=35)	Control (N=36)	P value
	Frequency (%)	Frequency (%)	
1-6	11 (64.7)	6 (35.3)	0.312
7-12	8 (47.1)	9 (52.9)	
13-18	10 (52.6)	9 (47.4)	
19-24	6 (33.3)	12 (66.7)	
Mean±SD	12.086±6.736	14.111±6.947	

Quantitative values of age were expressed in mean±SD, Qualitative values regarding age were expressed as frequency & percentage. Students unpaired 't' test was done to compare the mean between two groups.

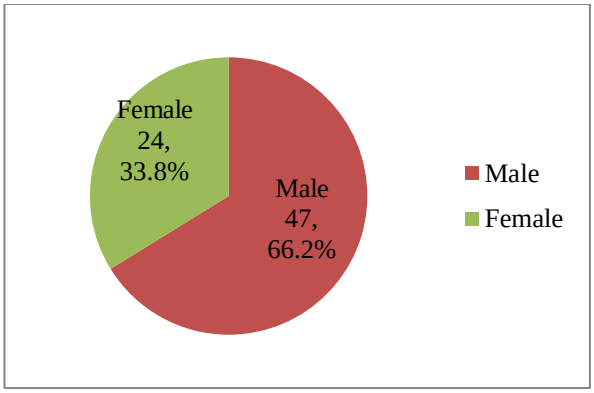

Figure 1: Distribution of study subjects according to gender (n=71).

Table 2: Distribution of study subjects according to the risk factors (n=71).

Risk Factors	Cases (N=35)	Controls (N=36)	OR	95%CI		P value
	Frequency (%)	Frequency (%)		Lower	Upper	
Exclusive breastfeeding						
Present	10 (28.6)	25 (71.4)	0.176	0.063	0.488	0.001
Absent	25 (69.4)	11 (30.6)				
Overcrowding						
Yes	26 (56.5)	20 (43.5)	2.311	0.847	6.303	0.099
No	9 (36.0)	16 (64.0)				
Cooking						
Gas	27 (46.6)	31 (53.4)	0.544	0.159	1.864	0.329
Wood	8 (61.5)	5 (38.5)				
Smoking in family						
Present	24 (50.0)	24 (50.0)	1.091	0.403	2.950	0.864
Absent	11 (47.8)	12 (52.2)				
Family history of atopy						
Present	2 (28.6)	5 (71.4)	0.376	0.068	2.081	0.429
Absent	33 (51.6)	31 (48.4)				

Values were measured within frequency & percentage over the row in total. A Chi-square test and Fisher's exact test were performed.

Table 3: Comparison of lab findings in between case and control (n=71).

Investigation findings	Case (N=35)	Control (N=36)	P value
	Mean±SD	Mean±SD	
Hb (gm/dl)	9.43±1.67	10.79±2.11	0.004^{S}
TWBC (cmm)	16033.31±23311.13	8882.33±2035.08	0.079^{NS}
MCV (fl)	72.27±10.70	76.89±7.94	0.042^{S}
MCH (pg)	23.55±4.53	25.60±3.48	0.036^{S}
MCHC (g/dl)	31.60±1.68	32.67±1.78	0.012^{S}
S.Iron(µg/dl)	43.08±20.34	63.38±22.58	$<0.001^{S}$
TIBC (µg/dl)	385.86±76.13	354.92±71.07	0.081
Transferrin Saturation (%)	12.43±8.41	18.81±9.02	0.003^{S}
RDW-CV (%)	15.34±2.78	14.18±1.98	0.048^{S}
Mentzer Index	17.43±4.16	16.33±2.38	0.177^{NS}

An unpaired sample t-test was performed to see the difference between the two groups. NS=non-significant and S=Significant.

Cooking by gas was found in (27, 46.6%, and 31, 53.4%) cases and controls respectively. The presence of smoking in the family is distributed equally in both case and control groups. Positive family history of atopy was

represented by (2, 28.6%) cases and (5, 71.4%) controls. There was no statistical significance between the two groups regarding overcrowding, cooking, smoking, and family history of atopy.

Table 4: Distribution of the study subjects according to laboratory findings (n=71).

Variables	Case (N=35)	Control (N=36)	P value
	Frequency (%)	Frequency (%)	
Hb (gm/dl)			
<11	30 (60.0)	20 (40.0)	0.005[S]
>11	5 (23.8)	16 (76.2)	
TWBC (cmm)			
4,000-11,000	29 (46.8)	33 (53.2)	[a]0.307[NS]
>11,000	6 (66.7)	3 (33.3)	
MCV (fl)			
<75	19 (57.6)	14 (42.4)	0.193[NS]
75-100	16 (42.1)	22 (57.9)	
MCH (pg)			
<27	29 (53.7)	25 (46.3)	0.185[NS]
27-33	6 (35.3)	11 (64.7)	
MCHC (g/dl)			
<31	15 (71.4)	6 (28.6)	0.016[S]
31-37	20 (40)	30 (60)	
S. Iron (µg/dl)			
<50	23 (63.9)	13 (36.1)	0.013[S]
50-120	12 (34.3)	23 (65.7)	
TIBC (µg/dl)			
<250	2 (40)	3 (60)	
250-400	14 (37.8)	23 (62.2)	[a]0.091[NS]
>400	19 (65.5)	10 (34.5)	
Transferrin saturation (%)			
<10	19 (79.2)	5 (20.8)	<0.001[S]
10-45	16 (34)	31 (66)	
RDW-CV (%)			
11-14.5	14 (36.8)	24 (63.2)	0.024[S]
>14.5	21 (63.6)	12 (36.4)	
Mentzer index			
<13.5	30 (47.6)	33 (52.4)	[a]0.478[NS]
>13.5	5 (62.5)	3 (37.5)	
PBF findings			
Anemic	28 (23.2)	19 (23.8)	0.015[S]
Normal	7 (11.8)	17 (12.2)	

Values were measured within frequency and percentage over the row in total. A chi-square test and [a]Fisher's exact test were performed. NS=non-significant and S=Significant.

There was a significant difference in Hb (gm/dl) between cases (M=9.43, SD=1.67) and controls (M=10.79, SD= 2.11), p=0.004, followed by MCV (fl) between cases (M=72.27, SD=10.70) and controls (M=76.89, SD=7.94), p=0.042. The MCH (pg) level was statistically and significantly lower in cases (M=23.55, SD=4.53) compared to controls (M=25.60, SD=3.48), p=0.036; followed by MCHC (g/dl) which was statistically and significantly lower in cases (M=31.60, SD=1.68) compared to controls (M=32.67, SD=1.78), p=0.012. S. Iron (µg/dl) was statistically and significantly lower in cases (M=43.08, SD=20.34) compared to controls (M=63.38, SD=22.58), p=<0.001. Transferrin Saturation (%) was statistically and significantly lower in cases (M=12.43, SD=8.41) compared to controls (M=18.81, SD=9.02), p=.003. RDW-CV (%) was statistically and significantly higher in cases (M=15.34, SD=2.78) compared to controls (M=14.18, SD=1.98), p=0.048.

The (Table 4) shows that among the N=71 patients Hb (gm/dl), MCHC (g/dl), Serum iron (µg/dl), TIBC (µg/dl), and Transferrin saturation (%) findings are statistically significant between the cases and controls. (30, 60%) cases had Hb level <11 gm/dl with (p=0.005), followed by (15, 71.4%) cases had MCHC <31 (g/dl) with (p=0.016). Total (23, 63.9%) cases had Serum Iron <50 (µg/dl) with (p=0.013). (19, 79.2%) cases had Transferrin Saturation (%) <10% with (p=<0.001). The table also shows the patient's RDW-CV (%) and Mentzer Index. Total (21, 63.6%) cases had >14.5 RDW-CV (%) with a (p=0.024) which was statistically significant; followed by (5, 62.5%) cases had >13.5 Mentzer Index. The above table shows that among the 71 study subjects (28, 23.2%) cases had anemia, followed by (19, 23.8%) controls had anemia. Their difference was statistically significant between the two groups (p<0.05). The (Table 5) shows that (25, 67.6%) cases had iron deficiency anemia and the statistical difference was significant (p=0.001) with an odds ratio of 5.000.

DISCUSSION

This cross-sectional analytical study was conducted with the aim of exploring the association between iron deficiency anemia and bronchiolitis. A total number of 71 consecutive children were enrolled in this study, out of which 35 children with bronchiolitis were considered as study cases and 36 age-matched children without bronchiolitis were considered as control. Study findings were discussed and compared with previously published relevant studies. In this current study, it was observed that most of the patients (19, 26.8%) belonged to 13-18 months. The mean±SD age was found 12.0±6.7 months in cases and 14.1±6.9 months in the controls. The mean age difference was not significant between the two groups (p>0.05). In this present study, it was observed that (47, 66.2%) were male and (24, 33.8%) were female.[15] found that among 163 infants, 58 patients (57%) were males found among 165 children (124, 75%) were male and (41, 25%) were female.[15,6] Kumar et al observed a male predominance in their study and male to female ratio was 1.3:1, which indicates male children are more prone to ALRI as compared to female children.[16] Elshaer et al stated that there were 72 males and 28 females in cases and 74 males and 26 females in controls found that among 40 cases 65% were male and 35% were female.[8,15] Female ratio is comparable with previous studies.

Table 5: Association of anemia and IDA with acute bronchiolitis in study population (n=71).

Variables	Case (N=35)	Control (N=36)	OR	95% CI		P value
	Frequency (%)	Frequency (%)		Lower	Upper	
Anemia						
Anemic	30 (60)	20 (40)	4.8	1.51	15.19	0.005[s]
Non-anemic	5 (23.8)	16 (76.2)				
IDA						
Present	25 (67.6)	12 (32.4)	5.0	1.82	13.71	0.001[s]
Absent	10 (29.4)	24 (70.6)				

Values were measured within frequency and percentage over row in total. Chi-square test was performed to observe the association between IDA and acute bronchiolitis. S=significant.

In this study, we observed that exclusive breastfeeding was found in 10 (28.6%) cases and 25 (71.4%) controls respectively. The differences were statistically significant (p<0.05) between the two groups found that non–breast-fed children had a 3.6-fold risk of ALRTI.[17] The findings of the current study are consistent with previous studies. In this study, we observed the distribution of some risk factors in both study case and control. Among the study subjects, (26, 56.5%) cases lived in overcrowded areas. We also observed that (31, 53.4%) of the control group use gas for cooking. The majority of the study subjects (24, 50%) had a history of smoking in the family. Most of the subjects (33, 51.6%) in cases had no family history of atopy. Maruti et al observed no significant (p>0.05) association with smoking history in the family showed that only exposure to cigarette smoking was an independent risk factor associated with severe bronchiolitis (OR, 3.5; 95% CI, 1.99-6.18; p=0.0001).[18] Cooking fuel other than liquid petroleum gas was strongly associated with ALRI (p<0.001). Family history of smoking was seen in 73.08% of cases compared to 36.5% of controls, however, this was not statistically significant found that use of cooking fuel other than LPG was associated with 2.5 times greater risk (OR 2.5; 95% CI=1.51-4.16) of ALRTI. In their study smoking by the mother, father or grandparents did not emerge as a significant risk factor in bivariate analysis. The exposure of children due to smoking by fathers may be limited because of the relatively greater time spent by fathers outside the home. The risk factors like parental smoking, cooking, and family history of atopy were less consistent with previous studies. In the current study we found that there was a significant difference in Hb (gm/dl) between cases (M =9.4, SD =1.6) and controls (M = 10.7, SD = 2.1); p=0.004, followed by MCV (fl) between cases (M =72.2, SD =10.7) and controls (M =76.8, SD =7.9); p=.042. The MCH (pg) level was statistically and significantly lower in cases (M =23.5, SD =4.5) compared to controls (M =25.6, SD =3.4); p=0.036; followed by MCHC (g/dl) which was statistically and significantly lower in cases (M =31.6, SD =1.6) compared to controls (M =32.6, SD =1.7); p=.012. S. Iron (µg/dl) was statistically and significantly lower in cases (M=43.0, SD=20.3) compared to controls (M=63.3, SD=22.5); p=<0.001. Transferrin Saturation (%) was statistically and significantly lower in cases (M=12.4, SD=8.4) compared to controls (M=18.8, SD=9.0); p=0.003. RDW-CV was statistically and significantly higher in cases (M=15.3, SD=2.7) compared to controls (M=14.1, SD=1.9); p=0.048. Similarly, found that Median Hb and MCHC levels were significantly lower in infants with AB than controls; 10.1 gm/dl (9.6-10.6 gm/dl) vs. 11.2 (10.6-12.1 gm/dl); p <0.001 and 33.6 gm/dl (32.5-34.1 gm/dl) vs. 34 gm/dl (33.1-34.5 gm/dl) p= 0.012, respectively.

Conversely, median RDW was higher in the patient group than healthy group; 14.4% (13.5-15.6%) vs. 14.1% (13.1-15%); p=0.032, respectively.[8,15] that the mean Hb level among anemic cases was 9.42±0.79 g/dl, which was statistically significantly lower than that of controls (10.0±0.43 g/dl) (p=0.03). There was significantly lower mean serum iron in anemic cases (31.4±19.0) than controls (40.6±12.8) (p=0.013) but there was no statistically significant difference concerning TIBC and transferrin saturation.[8] Hussain observed that Mean serum iron level was 35.3 mcg/dl in the anemic and 52.41 mcg/dl in the non-anemic ALRTI cases (p<0.01), while in the control group, the mean serum iron level was 57.1 mcg/dl in the anemic and 62.6 mcg/dl in the non-anemic subjects, (p<0.01).[14]

In this study, we found that the Hb (gm/dl), MCHC (g/dl), Serum iron (µg/dl), TIBC (µg/dl), Transferrin saturation, and RDW-CV were statistically significant between the cases and controls. Total (30, 60%) cases had Hb level <11 gm/dl with (p=0.005), followed by (15, 71.4%) cases had MCHC <31 (g/dl) with (p=0.016). Total (23, 63.9%) cases had Serum Iron <50 (µg/dl) with (p=0.013). Total (19, 79.2%) cases had Transferrin Saturation (%) <10% with (p=0.000). Total (21, 63.6%) cases had >14.5 RDW-CV (%) with a (p=0.024) which was statistically significant. In a study by hemoglobin level <11.0 gm/dl was considered Anemia which was found in 132 (80%) cases in study infants.[6,8] found that there was a significantly higher percentage of anemia among cases (72.5%) than among controls (35%) (p=0.001).[8] Pathak et al found that 96 (68.6%) of the study group and 30 (21.42%) of the control group had anemia.[19] Ramakrishnan stated that seventy-four children (74%) in the study group and 33 (33%) in the control were anemic.[7]

In this study, we found that (25, 67.6%) cases had iron deficiency anemia and p value was significant (p=0.001) with an odds ratio of 5.000. Behair et al stated that there was a statistically significant increased incidence of anemia in group I compared with group II, with OR of 4.64 and 95% CI: (1.99-10.80). In their study, it was shown that 74 (74%) of 100 cases and 38 (38%) of 100 controls were anemic and 60 (60%) of cases and 24 (24%) of controls had IDA, with OR of 4.75 and 95% CI: 2.02-11.14 found a statistically higher percentage of IDA among cases (55%) than among controls (27.5%) (p=0.03) stated a total of 82 cases with ALRTI, 34 cases were IDA positive fulfilling all six criteria, remaining was labelled as IDA negative showed that among the anemic children, 62 (86%) in the study group had iron deficiency.[13-21]

Ramakrishnan et al found that among the anemic group 85 (85%) had iron-deficiency anemia (IDA).[9] There was a strong association between Hb level and IDA with odds ratio of 3, p<0.01. Similarly, there was strong association between MCV <76 fl with IDA with odds ratio of 3.4 and p<0.01 as compared to MCV>76 fl. Similar association was seen with other parameter like MCH, MCHC, RDW and microcytic hypochromic RBC in PBF with IDA having p-value <0.01.[20] A previous study done by Hussain, 64.4% of anemic subjects with 78.9% hadmicrocytic hypochromic picture of RBC morphology.[14] All these findings are consistent with the current study.

Limitations

As this study was conducted on small sample size over a short period of time in one centre, this may not reflect the real picture of whole country. Despite marked recent advances, the diagnosis of IDA in the presence of infection or inflammation is still very challenging.

CONCLUSION

The study has shown that iron deficiency anemia is associated with acute bronchiolitis in children from 1 month to 2 years of age. Moreover, children with iron deficiency anemia are 5 times more susceptible to acute bronchiolitis as compared to healthy control.

Recommendation

There needs multi-centric study with control group in large scale to understand the real picture of prevalence of bronchiolitis and its relation with anemia. Iron supplementation can be used as an indirect measure for the reduction of incidence of bronchiolitis in children, especially for all developing countries.

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