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Highlighting The Nutritional Status In Under Five Age Group Children With Respiratory Tract Infection

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Introduction

Term 'respiratory disease' alludes to various conditions that impacts lungs or their parts, each of these conditions are described by some level of impairment of lungs in performing the essential function of gas exchange. Respiratory disorders are isolated into two classifications- Acute Respiratory infection and Chronic Respiratory disorders[1]. ARI is not restricted to the respiratory tract just but likewise have systemic effects too[2]. Both viral and bacterial pathogens are responsible for ARI[3]. Acute respiratory infections (ARIs) are partitioned into two sub headings; upper respiratory tract infections (URTIs) and lower respiratory tract infections (LRTIs).

The primary hazard factors which are incharge of ARTI are Poverty, Low parental training, restricted family income, absence of breastfeeding and above all malnutrition[3]. A firm relationship amongst ailing health and mortality from ARI has been observed to be the main source of mortality and morbidity from pneumonia in less than five year age group of children[4]. As per WHO malnutrition is synonymous with PEM signifying an excesses or imbalances in a person's intake of energy and/or nutrients[5]. Almost 50 percent of all deaths in youngsters under 5 years are owing to undernutrition. This converts into the pointless loss of around 3 million youthful lives a year. Undernutrition puts youngsters at more risk of dying from regular infections, expands the recurrence and seriousness of such infections, and adds to delayed recovery. Likewise, the connection amongst undernutrition and disease can make a possibly deadly cycle of intensifying sicknesses and deteriorating nutritional status. Poor nourishment in the initial 1,000 days of a kid's life can likewise prompt hindered development, which is irreversible and related with disabled psychological capacity and decreased school and work execution[6].

Although, incidence of ARI are similar in developed and developing countries, the course of the disease and the outcome of ARI is more severe in developing nations[7]. More than 8.795 million of youngsters die every year in developing countries . In 2008, more than 5.970 million of youngsters kicked the bucket because of illnesses because of contamination, among which 18% (1.575 million) passed on due to pneumonia[8]. In our study we have emphasized on studying the nutritional status and growth parameters of children with acute respiratory infection found in under five age group children.

Material And Methods

The study was carried out in Department Of Paediatrics, MMIMSR Mullana, Ambala from September 2015 -

August 2017. It is a prospective observational study done on a total of 100 children of under five age group with respiratory tract infection admitted in the paediatric wards of the hospital. The children with major congenital anomalies and whose parents or caregivers refused to give consent were excluded from the study.

Methodology

In all patients a detailed history, clinical assessment for nutritional status and immunization status was inquired as per National Immunization Schedule 2014 followed by anthropometric measurements that were Weight (Wt) and Height (Ht). In addition, socio-demographic profile as per structured proforma was also recorded. All measurements were done by the same physician. The mean value and standard deviation were assessed as per reference WHO charts and the nutritional status classified as per the WHO classification guidelines. According to these criteria, the likelihood of malnutrition is defined using a cut off point of -2 SD. In order to assess the patients nutritional status, Wt for age , Ht for age , Wt for Ht and Z score for Wt for age and Wt for Ht were calculated. Parameters of Ht/A and Ht/A Z were considered essential for defining chronic malnutrition whereas Wt/A, Wt/Ht & Wt/AZ scores for acute malnutrition. The patients were classified as either moderate or severe malnutrition as per WHO criteria[29]. The socio-economic profile was done according to Modified Kuppuswamy's Socioeconomic Scale.

The general condition and vital parameters- (heart rate, respiratory rate, temperature and saturation) were analysed and the vital signs (pallor, clubbing, cyanosis and lymphadenopathy) seen. Throat examination done by use of sterile tongue depressor with well illuminated background (use of hand torch) and respiratory examination done wth inspectory findings that were confirmed with palpation, percussion and auscultation of all areas using standard parameters. Following lab investigations were carried out according to provisional diagnosis -Complete blood count, Peripheral blood film, Erythrocyte sedimentation rate, Throat swab (for staining, culture and sensitivity),Sputum analysis (for staining, culture and sensitivity), Blood culture and sensitivity, Mantoux test (Standard dose of 5 tuberculin units that is 0.1 ml solution used)**.** All suspected cases of lower respiratory tract involvement were subjected to chest X rays; done by trained technician and reported by radiologist**.** Other specific investigations were done as needed according to case.

Results And Discussion

The incidence of ARI and various socio-demographic factors influencing its causation were studied in the hospitalized children of our hospital under the age of 6-60 months (Table 1 and Table 2).

ARI in the study population

The total enrolled cases were 100 having acute respiratory infections diagnosed with proper tools. On categorizing them as URTI and LRTI it was found that maximum children 90/100 (90%) suffered with LRTI and remaining 10/100 (10%) with URTI. This could be explained with fact that LRTI as a medical condition requiring hospitalization than URTI. Although studies done in fields like by Vinod K Raman et al[10] found 19.25% with URTI and only 8% with LRTI from a total ARI incidence of 27.25%in the urban slums of Gulbarga city. Also these results could be compared with studies Acharya D et al[79], Chabra P et al[80], Zaman K et al[81]. Our study showed the incidence of pneumonia amongst the ARI as the maximum (40%). WHO reports show the incidence of pneumonia from 20-30% in developing countries and about 3-5% in developed countries. A higher LRTI attack rate in our study could be explained of prevalent environmental factors like air pollution and dense population.

ARI incidence with age

Categorising children ARI incidence in 4 major groups that is 6 months (21%), 7-12 months (22%), 13-24 months (23%) and 25-60 months (34%). Tupasi Thelma et al[11] study reported that the risk of ARI for infants was 1.8 times significantly higher than 1-4 year children, while Sigh MP[12] et al showed that higher rate for infants and for 4-5 year age group. Further detailing the site of infection ; LRTI (90%) children; the distribution showed that children with age group 25-60 months were maximum 31/90 (34.4%) while 6months and 13-24 months had an equal number (21.1%) ; there was no statistical significance. F A Ujumva[13] and C T Ezeonce studied acute respiratory tract infections in under five children found, 80% of subjects being less than 29 months with around 60.9% with pneumonia and 86.7% of bronchiolitis, depicting a high percentage of LRTI in this age group.

ARI incidence with gender

The M:F ratio in our study was 1:9:1; ratio of LRTI being 2:1:1. S. Broor et al[14] also showed a high incidence male prevalence in their study (2.5:1=M:F) Distributing it in LRTI and URTI; LRTI being the maximum (90%); 61/90 (67.7%) and (32.2%) 29/90 were males and females respectively; with similar finding in above study (S.Broor et al) with 73.1% of males with LRTI and 26.9% females. H.N Bashour et al[15] and S C Dharmage et al[16] also showed a higher susceptibility of boys (OR=0.41). On the contrary Acharya D et al[17] reported similar incidence of ARI in both sexes in their study. The probable of boys getting affected more could be because of their outdoor activities more than girls making them more exposed to infected aerosols in the atmosphere.

ARI incidence with locality/area

On distributing the participants according to the area of living;77% were from rural area and 23% from urban, 90% of children in our study had LRTI, of which 71/90 (78.85) were of rural area and 23/90 (21.2%) were of urban area. Kapil Goel et al[18] and Deb et al[19] also showed a high prevalence of ARI in rural (67.11%) compared to urban area (36.89%), highlighting the poor living conditions and poor access to medical facilities in the rural areas pleading to high prevalence of ARI in children; under five age group being most vulnerable. As said by Chabra et al[20] in their study that ARI incidence was significantly lower among children living in well ventilated homes (1.79 episodes/child/year) than those living in poorly ventilated homes (2.87 episodes/child/year).

ARI with immunization status

Most of the children in our study were immunized 87/100 (87%), only 13/100 (13%) of subjects were not. In whose who were immunized 10/87 (11.5%) had URTI and 77/87 (88.5%) had LRTI. This data is highlighting may be because of the maximum participants are having LRTI in our study. Although there has been literature showing poor immunization status was found to significantly affect the prevalence of ARI. Oyejide CD[21] and Prajapati B et al[22] found that poor immunization status significantly affect the prevalence of ARI. They had a high percentage (about 50%) who were poorly immunized and had severe forms of ARI. Our study could not highlight such a high incidence relating to immunization status of children with ARI.

ARI incidence with socioeconomic status

The maximum participants in our study belonged to upper lower (class 4) (76/100 ;76%) of them (68/76;89.5%) were suffering with LRTI. Kapil Goel et al[23] showed about one fifth (19%) belonged to upper social class and remaining 79% were of low social class (class 3, 4 and 5) during study on prevalence of ARI in under five years old children of Meerut district. Our results were similar to

study by Mitra NK[24] ,Savitha MR et al[25] showing a significant high risk found in child from socioeconomic status class 4 and 5. In contrast Murali Madhav S et al[26]., and Arnold Monto S et al[27]., showed that mothers in higher socioeconomic status reported a higher incidence of ARI in their children. The association of ARI and lower socioeconomic class (4 and 5) could be due to factors which characterize the poor such as inadequate housing facilities, overcrowding, malnutrition, financial constrains, educational limitations and resulting ignorance.

ARI incidence and demographic variables with Nutritional status

The children were assessed of their nutritional status with limits of parameters of Ht for age (stunting) Wt for Ht (wasting) (Table 4) and WHO classification of malnutrition (Table 3).

Stunting (Ht for age)

It is a parameter to judge the prevalence of chronic malnutrition in children; a total of 47/100 (47%) children were stunted having ARI which is a significant figure of which 16/47 (34%) were moderately stunted while 31/47 (66%) were severely stunted. The common site of infection in moderately stunted ARI children was lower respiratory tract 14/16 (87.5%) and in severely stunted also LRTI was common than URTI that was 29/31 (93.5%). Thus giving us a conclusion that stunted children have ARI in a good percentage and the commoner site is the lower respiratory tract but not statistically significant as similarly depicted by D.A.K Chalabi[28] that Wt for age on growth chart (p=0.104) and Ht for age on growth chart(p=0.104) were not statistically significant related to ARI.

Demographic variables of children with stunting showed that the stunted children with ARI were mostly of age group 7-12 months 14/22 (63.6%) which was on comparison to other group statistically significant (p=0.001) justifying that this age marks the most crucial phase of transition from breast feeding to regular food (period of weaning); a sustained failure to meet the nutritional requirements leads to chronic malnutrition (stunting) with increased susceptibility of infections (like ARI was seen in our study). Male to female ratio in moderately and severely stunted children was 3:1 and 4:1 respectively (p=0.0440); this gender bias can be explained to the fact of more of males participants in our study. The rural population with ARI was found to be more stunted than urban population; 34/47 (72.3%) and 13/47 (27.6%) respectively. Highlighting the fact of poor nutritional status in rural areas predisposing them to infections. Upper lower class to maximum participants with ARI and percentage of stunting is also much higher in this group that is 40/47 (85.1%) of total stunted; though relating to ARI with stunting and socioeconomic status the statistical significance is not found.

Wasting (Wt for Ht)

Of the total participants 24% were moderately wasted and 24% were severely wasted while 52% were in the normal Wt for age category; signifying that most children with ARI were normal for Wt for Ht. Comparing the site of infection mostly were having LRTI; moderately wasted were 24% in total with 23/24 (95.8%) having LRTI and 1/23 (4.2%) having URTI. There are studies done taking Wt for age growth charts; D.A.K Chalabi[28] showed no statistically significance related to ARI of this parameter and so it is in our study. Tupasi et al[29] took the criteria of Wt/Age to assess the malnourishment status in children with ARI and found a significant association between the two.

Demographic variables of children with wasting showed that the age group with maximum cases of moderate and severe wasting were from 7-12 months highlighting the

fact that it is the most vulnerable age of nutritional deficiency and inadequacy. Males were found to be more wasted than females (moderately wasted 2:1 and severely wasted 1.6:1); this gender bias though is not statistically significant and can be explained of the fact that study had male predominance already. Rural population was more wasted than urban children with ARI, conceiting the fact of poor availability of nutritional sources, high rate of infection (example ARI was proven in our study) and negligence. Assessing the socio economic status, the children of upper lower class were most affected with ARI and the number of children moderately and severely wasted were equal 19/76 (25%) while 50% of subjects were normal for Wt for Ht parameter. A study done by Merianos A et al[30], found Wt for Ht of 10% of the cases with LRTI was below third centile, indicating nutritional wasting.

WHO classification of malnutrition

WHO classifies malnutrition as moderate and severe malnutrition based on parameters assessed as Wt for age and Ht for age together plotting as standard deviation of -2 to -3 SD as moderate and <-3 as severe category. Our ARI patients were mostly severely malnourished 46/100 (46%) and 21/100 (21%) as moderately malnourished. Mitra NK[24], Singh MP et al[12] compared their data using the IAP grading of malnutrition and found ARI incidence was significantly high in grade 4 and 5 malnourished that is severe malnutrition similar to our study. LRTI was most prevalent and comparing the category of severe malnutrition it was 43/46 (93.5%) while in children with URTI only 3/46 (6.5%) were moderately malnourished. Ramesh B.Yellanthoor[31] and Vishal K.B et al[32] found that in their study on under five children with LRTI; 113/206 (54.8%) were severely malnourished. Broor et al[33] also found a high percentage (59.9%) of children with LRTI being severely malnourished.

Conclusion

Prevalence of ARI in under five children are common problems as LRTI being most common. Along LRTI, pneumonia was found as most common diagnosis in our study. Malnutrition status of the study population showed a significant correlation with age and socioeconomic status, highlighting the fact that a particular age is vulnerable to be malnourished and particular socioeconomic status (class 4) ; that make them predisposed to infections (like ARI). The study needs a larger population to prove the fact of correlation of ARI with malnourishment. Since the undernutrition has an adverse effect on morbidity and mortality, careful nutritional evaluation of children at hospitalization or during admission is essential.

Limitations

- Hospital based and not community based, hence hospital bias is involved.
- Smaller sample size (only 100 cases)
- Other measures of anthropometric assessment not analyzed (example- abdominal girth, triceps skin fold thickness).

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TABLES:

Table 1: Distribution of various forms of Respiratory tract infections in the study population (N=100)

Diagnosis	Frequency(n)	Percentage(%)
Pneumonia	40	40.0
Bronchiolitis	17	17.0
Bronchial Asthma	16	16.0
Hydro-pneumothorax	5	5.0
Pleural Effusion	5	5.0
Tuberculosis	5	5.0
Acute Tonsillitis	4	4.0
Pharyngitis	3	3.0
Croup	2	2.0
Laryngitis	2	2.0
Empyema	1	1.0

Table 2: Correlation between various factors and site of infection:

S.No	Parameter	URTI (N=10)	LRTI (N=90)	P-value (Chi-square)
1.	Age (0-6) (7-12) (13-24) (25-60)	2 (20%) 1 (10%) 4 (40%) 3 (30%)	19 (21.1%) 21 (23.3%) 19 (21.1) 31 (34.5)	0.578
2.	Sex (M) (F)	5 (50.0%) 5 (50.0%)	61 (67.8%) 29 (32.2%)	0.439
3.	Locality (Rural) (Urban)	6 (60%) 4 (40%)	71(78.9%) 19 (21.1%)	0.342
4.	SES (I) (II) (III) (IV) (V)	0 (0.0%) 0 (0.0%) 2 (20%) 8 (80%) 0 (0.0%)	3 (3.3%) 6 (6.7%) 13(14.4) 68 (75.6) 0 (0.0)	0.877
5.	Immunization status (YES) (NO)	 10 (100%) 0 (0.0%)	 77 (85.6%) 13 (14.4%)	0.428

Table 3 : Malnutrition data of the study population as per WHO classification

Nutritional Status as per WHO classification (z-scores for wasting & /Stunting)	Frequency (N=100) %
Normal for age & sex	33 (33%)
Malnutrition	67 (67%)
Moderate Malnutrition (z-score -2&-3 for HFA or WFH or both)	21 (21%)
Severe Malnutrition (z-score <-3 for HFA or WFA or both)	46 (46%)

Table 4: Correlation between various demographic, socio-economic and site of infection:

S.No	Parameter	Stunting (47)		Wasting (48)	
		Moderate	Severe	Moderate	Severe
1.	Age (0-6)	1 (6.2)	11(35.5)	6 (25.0)	6 (24.0)
	(7-12)	2 (12.5)	12 (38.7)	6 (25.0)	9 (7.5)
	(13-24)	6 (37.5)	5 (16.1)	4 (16.7)	4(16.7)
	(25-60)	24 (45.3)	3 (9.7)	8 (33.3)	5 (20.8)
		P=0.001		P=0.201	
2.	Sex (M)	12 (75.0)	25 (80.6)	16 (66.7)	15 (62.5)
	(F)	4 (25.0)	6 (19.4)	8 (33.3)	9 (37.5)
		P= 0.043		P=0.960	
3.	Locality (Rural)	13 (81.2)	21 (67.7)	17 (70.8)	18 (75.0)
	(Urban)	3 (18.8)	10 (32.3)	7 (29.2)	6 (25.0)
		P=0.372		P=0.670	
4.	SES (I)	0 (0.0)	0 (0.0)	0 (0.0)	31 (51.7)
	(II)	0 (0.0)	1 (3.2)	1 (4.1)	29 (48.3)
	(III)	3 (18.8)	1(3.2)	4 (16.7)	4 (16.7)
	(IV)	13(81.2)	27(87.1)	19 (79.2)	19 (79.2)
	(V)	0 (0.0)	0(0.0)	0 (0.0)	0 (0.0)
		P=0.122		**P=0.005**	
5.	Diagnosis (URTI)	2 (20.0)	2 (20.0)	1 (10.0)	1 (10.0)
	(LRTI)	14(15.6)	29 (32.2)	23 (25.6)	23 (25.6)
		P=0.776		P=0.239	