Malnutrition as a Modifiable Risk Factor of Lower Respiratory Tract Infections Among Under Five Children

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ABSTRACT

Background: Pneumonia is the single largest cause of death in children worldwide. Malnutrition increases the incidence and severity of ALRI and similarly it contributes to malnutrition. By identifying and treating the cases of malnutrition will decrease disease burden. **Objective:** To identify malnutrition as a risk factor of lower respiratory tract infection among children of under five years. **Methods and Materials:** A case control study was conducted at Nepalgunj Medical College, Kohalpur Teaching Hospital, Kohalpur, Nepal from June 2014 to November 2014. All diagnosed case of ALRI as per WHO were selected for case group. The controls were healthy children presented in OPD, pediatric ward and immunization clinic. The predesigned case performa with check list was the tool to identifying risk factor of ALRI. All data were entered in SPSS version 19. Descriptive and analytic statistics were used for analysis of data with level of significance at p value <0.05. **Results:** 107 cases and 107 controls were enrolled with age and sex matched. Male to female ratio was 1.6:1 vs 1.8:1 and the proportion of infants, 70.1% vs 68.3% in cases and controls respectively. Moderate wasting was present on 36.4% (39) of case group and 16.8% (18) of control group and It was significantly associated with ALRI (p=0.003). 10.3% (11) of case group children were moderately stunted while 6.5% (7) of control group. It was not statistical associated with ALRI (p=0.325). **Conclusions:** Wasted children were more prone to suffer from ALRI as compare to stunted children. As it is modifiable risk factor, we should focus on effective community education and public health measures to prevent malnutrition.

Key words: *Acute lower respiratory tract infections, risk factor, malnutrition*

INTRODUCTION

According to WHO, Pneumonia is the single largest cause of death in children worldwide. Every year, it kills an estimated 1.2 million children under the age of five years, accounting for 18% of all deaths of children under five years worldwide[1].More than 99% of all pneumonia deaths occurring in developing countries, and three-quarters take place in just 15 countries. The annual incidence of Pneumonia in developing countries is 10-12 times higher than in a developed country that is 10-20/100. However incidences exceeding 50/100 occur with high prevalence's of Malnutrition and high HIV infection rates in children. More than 95% of all new cases of pneumonia in children, less than 5 years occur in developing countries, due to increased prevalence of under nutrition, which is implicated in 53% of all deaths among children less than 5 years[2]. Acute lower respiratory tract infections are ranked among the first five leading causes of mortality in children in most of the developing countries including Nepal. Mortality due to ALRI was 18% of total under five mortality rates, which were 61 per 1,000 < 5 yrs population. Half of children with symptoms of ARI were taken to a health facility or health provider. Seven percent of children with ARI symptoms received antibiotics. So that Ministry of health and population recognized ALRI as a major public health problem among under five year children[3].

The excess of morbidity and mortality rates from acute lower respiratory tract infections in the developing world indicate the several risk factors could be responsible. In developing countries malnutrition, lack of breast feeding, lack of immunization and overcrowding were reported as the usual risk factors of acute lower respiratory tract infections[4-7]. Nationally 11% of children of under five age were wasted and 3% severely wasted whereas 41% of under five children were stunted and 16% severely stunted[3] and malnutrition increases the incidence and severity of ALRI and similarly it contributes to malnutrition[3,8]. So if we can able to identify and treat the cases of malnutrition, it will not only decrease the ALRI but also contribution on prevention of malnutrition as.

METHOD AND MATERIAL

A case control study was conducted at Nepalgunj Medical College, Kohalpur Teaching Hospital, Kohalpur, Nepal during the period from June 2014 to November 2014 to identify malnutrition as a risk factor of acute lower respiratory tract infection among the children below five years. All diagnosed case of ALRI as per WHO were selected for case group, the duration of illness being less than 30 days[9]. In the control group healthy children who were accompanied with their mother in OPD, in pediatric ward and immunization clinic without respiratory symptoms and no history of ALRI in past 2 weeks were included with age and sex matched on consideration. The convenience non probability sampling

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technique was undertaken and the minimum required sample size was 107 in both case and control group. Informed consent was taken from the mother of both groups and willingness was kept on consideration. All sociodemographic data were collected with face to face interview from mothers by researcher himself. Weight was recorded accurately on an electronic type of weight scale after correcting the scale or any zero error before measurement. Under 2 years old children, the length were recorded by placing the child supine on the infantometer. Standing height was measured by using stadiometer for the children of two years age and above. The predesigned case performa with check list was the tool to identifying modifiable risk factor of ALRI. All data were entered in SPSS version 19 and descriptive and analytic statistics was used for analysis of data with level of significance at p value <0.05.

RESULTS

Mean age of the case group 11.34±10.168 (M±SD) months and control group 11.57±10.270 (M±SD) months. Among them 70.1% (75) were below 12 month of age in case group whereas 68.3% (72) in control group. Male to female ratio was 1.6 to 1 and 1.8 to 1 in case and control group respectively. 42.1% (45) mothers were illiterate in case group whereas 6.5% (7) in control group. Which is statistically significant (p=0.001). 40.2% (43) fathers of case group were unskilled worker and 15%(16) in control group. Which was also statistically significant (p=0.03). In table no. I majority of families (84.1%) were residing in rural areas in case group and 66.1% in control group (p=0.001). 28% mothers of case group were teenager while they were only 13.1% in control group and Children of case group mothers were 1.5 times higher chance of getting ALRI than controls (p=0.005). According to modified Kuppuswamy's scale, socioeconomic status had been classified into five classes (shown in bar diagram). None of the family was there from upper socioeconomic status. 25.2% (27) of case group family were belonging to lower socioeconomic class but none from control group. It was statistically highly significant (p=0.0001).

As per WHO criteria of assessing severity of ALRI (pneumonia), 56% (60) were diagnosed as cases of severe pneumonia, 35% (37) as pneumonia and 9% (10) were very severe pneumonia. Table no. 2 showed moderate wasting was present in 36.4% (39) of case group and 16.8% (18) of control group, according to new WHO growth chart 2007 and moderately wasted children were 2.8 times higher chance of suffering from ALRI than normal children. It was significantly associated with ALRI (p=0.003). Similarly, 10.3% (11) of case group children were moderately stunted while 6.5% (7) of control group. There were not any statistical association between stunting and occurrence of ALRI (p=0.325) but moderately stunted children were 1. 6 time higher chance of getting ALRI than normal children.

Variables	ALRI		Total (%)	Odd ratio (95% CI)	p value
Address	Case (%)	Control (%)			
Rural	90(84.1)	47(43.9)	137(64)	6.758 (3.55-12.86)	0.0001
Urban	17(15.9)	60(66.1)	77(56)		
Maternal age					
<20	30(28)	14(13.1)	44(20.5)	1.50 (1.160-1.954)	0.0005
20 to 28	77(72)	93(86.9)	170(79.5)		

Table No. I Distribution of demographic variables of case and control group

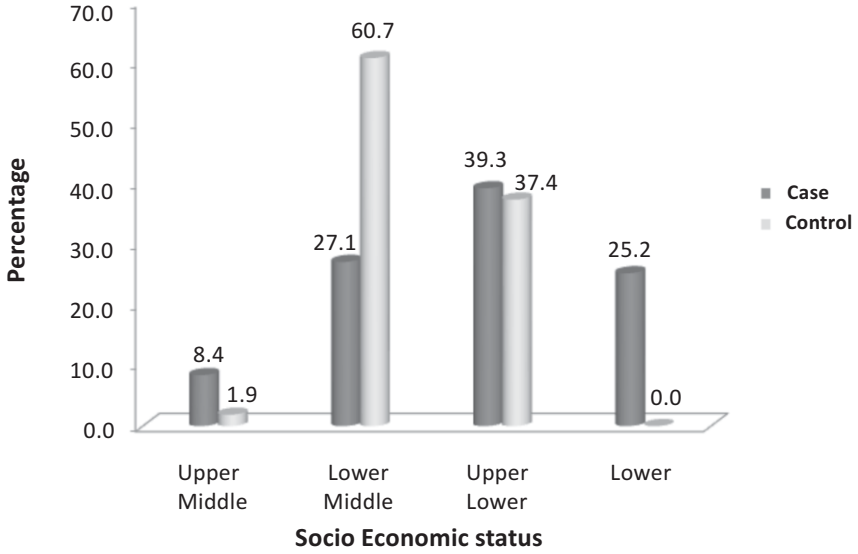

Figure 1: Distribution of socio-economic status in case and control group

Variables	ALRI		Total (%)	Odd ratio (95% CI)	p value
Weight for Height	Case (%)	Control (%)			
Moderately wasted	39 (36.5)	18(16.8)	157(73.3)	2.83(1.423-4.973)	0.003
Normal	68(63.5)	89(83.2)	57(26.7)		
Height for Age					
Moderately stunted	11(10.3)	7(6.5)	196(91.6)	1.6 (0.723-3.146)	0.325
Normal	96(89.7)	100(93.5)	18(8.4)		

Table No. II: Distribution of cases and controls according to nutritional status and its association

DISCUSSION

A total number of 107 cases and 107 controls (age and sex matched) were selected in our study population, where majority of children from cases and controls were infants 70.1% and 68.3% respectively. This finding goes in accordance to other studies reporting 62.5% vs 74.04%[10], 62.2% vs 66.9%[11] and 70.7% vs 67%[12] in cases and controls respectively. It is explained by the fact that various anatomical and physiological risk factors in infants such as they are obligate nose breathers, tongue relatively large, airway narrow, increase metabolic demand and less elasticity of alveoli; associated with incomplete establishment of immunity[13]. Male preponderance was found in both case and control groups (61.7% vs 64.5%) with male to female ratio 1.6:1, 1.8:1.

results were found in different studies conducted in different countriesd[6,10&11]. The possibility of gender bias in seeking medical care may be the cause it. Lower level of education of mother was significantly associated with ALRI and it is similar to other studies. Rural children had six times higher risk of ALRI as compared to urban children (p=0.0001) which was also documented by other researchers from India[10], Bangladesh[14] and Nepal[6]. It might be due to poor access to medical care, low socioeconomic status, low parental education level, poor hygiene, indoor pollution due to cooking fuel and poor knowledge about preventive measures of ALRI in their families. It was observed higher prevalence of ALRI among the children from low socioeconomic class (26.2% vs 8.2%) with its significant association with ALRI (p=0.0001)[15].

Similar was the finding of study conducted in Nepal (38.5% vs 20%) with 2.5 times at higher risk of ALRI[6]. The assessment of malnutrition was done, according to WHO classification of malnutrition. For it weight for height (length) and height (length) for age were taken as criteria of wasting and stunting respectively, labeling as with and without edema. In our study 36.4% children of case group and 16.8% of control group were moderately wasted without edema i.e. malnourished (as wt. for ht. was between -2 to -3 Z score value). Presence of malnutrition (wasting) was significantly associated with ALRI (p=0.001). No significant relationship was established with stunting (10.3% vs 6.3%). Similar was the observation of other researchers[6, 7, 10 & 11]. A study was conducted at Philippines, they reported highest risk of death from ALRI due to malnutrition among those below two years of age[8]. It is well known that malnourished children have defective cell mediated immunity secondary to thymolymphocytic depletion leading to severe gram negative infections and sepsis. They may also have qualitatively abnormal immunoglobins, and impairment of key enzymes involved in bactericidal action of leucocytes, thereby making them all the more prone to infections[16].

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