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Sociodemographic Risk Factors of Community Acquired Pneumonia Among Under Five Children in Rajshahi Medical College Hospital

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ABSTRACT

Introduction: *Community acquired pneumonia (CAP) refers to an acute infection of lung parenchyma acquired outside the hospital. It is an important cause of morbidity and mortality of children in developing countries. This study was under taken to find out the socio-demographic risk factors of CAP among under-five children.* ***Methods:*** *This cross-sectional type of descriptive study was conducted from January, 2017 to December, 2018 among the under-five children (2 to 59 months) in the department of Pediatrics and Expanded Program on Immunization (EPI) center of Rajshahi Medical College Hospital. A total of 123 patients with CAP (case) and 123 healthy children (control) were enrolled purposively for this study. Data was collected by face-to-face interview with a predesigned questionnaire containing all the variables of interest. Clinical examinations and relevant investigations of the patients were recorded. At the end, data were processed and analyzed by computer using SPSS software version-20. p value was obtained from X^2 test and $p<0.05$ was considered statistically significant.* ***Results:*** *Among the 123 patients, most (77, 62.60%) of the cases were within 2 to <12 months of age and majority (82, 66.67%) were male. Regarding housing status, maximum patients lived in mud houses (59, 47.97%) with improper ventilation (73, 59.35%) and in overcrowding situation. They were used to smoked producing cookers (100, 81.30%). Most of the patients were from lower class family (99, 80.49%) and their parents were illiterate.* ***Conclusion:*** *CAP could be reduced by improving the socioeconomic status and living conditions of families. This includes the provision of adequate ventilation, avoiding overcrowding and use of firewood should be discouraged.*

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INTRODUCTION

Community acquired pneumonia (CAP) is a lower respiratory tract illness that affects children who have not spent the previous 14 days in a hospital or other healthcare facilities.[1] CAP is an important cause of morbidity as well as mortality of children in developing countries.[2] Over the last two decades, children deaths have declined globally from 12.6 million to 6.6 million but still CAP has remained the world's leading cause of death among children under five years of age.[3,4]

Globally, pneumonia contributes 16% of the total 5.6 million deaths of children under five and

>95% of which are observed in developing countries.[5] Most of the deaths occur in India, Nigeria, Pakistan, Democratic Republic of Congo, Ethiopia, China, Angola, Indonesia, Bangladesh and the United Republic of Tanzania.[6] Children of low income countries are at 18 times greater risk of death due to pneumonia and other acute infection than children of developed countries.[7]

In Bangladesh, the highest incidence rate of CAP cases for children less than five years is reported at 0.51 episodes/child-year.[8] CAP accounted for 26% of neonatal deaths leading to high Infant Mortality Rate (IMR) in Bangladesh.[8] Among the all identified cases of CAP, 10% require hospitalization.[9,10]

Children living in rural areas with acute poverty and malnutrition are the most vulnerable to pneumonia.[11] In general, the limited access of less privileged families to the healthcare services means that, they delay seeking adequate care. As a result, the deterioration of their condition and an increased risk of hospitalization.[12,13] Reduction of all causes of children mortality occurred between 2000 and 2011 worldwide. CAP was estimated to account for more than one million children deaths and 80% of which occurred in children under two years of age.[10]Parents educational level, particularly maternal education is inversely related to morbidity and mortality of childhood pneumonia.[14,15] There is evidence of a link between poor socioeconomic status and pneumonia in children.[16]

So, this study was under taken to assess the socio-demographic risk factors of community acquired pneumonia among under five children (2-59 months' children) attending at Pediatrics department and Expanded Program on Immunization (EPI) center of Rajshahi Medical College Hospital, Rajshahi, Bangladesh.

METHODS

This hospital based cross sectional type of descriptive study was conducted among the under-five children (2-59 months) from January, 2017 to December, 2018 in the department of Pediatrics and EPI center of Rajshahi Medical College Hospital (RMCH), Rajshahi. A number of 123 children suffering from CAP were selected as cases and 123 healthy children were selected as control purposively. Hospital acquired pneumonia and other respiratory illness were excluded from this study. Study approval was taken from the Ethical Review Committee (ERC) of RMCH and informed written consent was taken from the guardian of study subjects. Data was collected by face to face interview with a predesigned questionnaire containing all the variables of interest. Clinical examinations and relevant investigations of the patients were recorded. At the end, data were processed and analyzed by computer using SPSS software version-20. *P value* was obtained from X^2 test and $p<0.05$ was considered statistically significant.

RESULTS

Figure 1 showed that, Maximum patients (77, 62.60%) were in 2 to <12 months of age group whereas in control group, majority (64, 52.03%) were in 12 to 59 months of age.

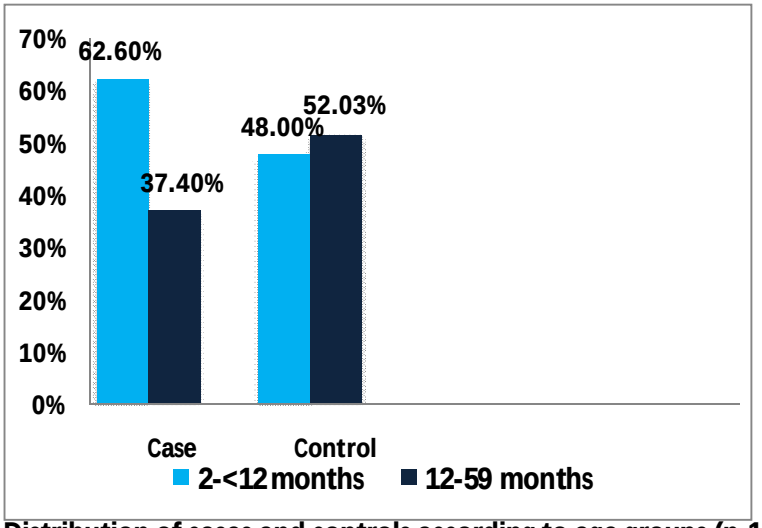

Figure 1: Distribution of cases and controls according to age groups (n-123 in each group)

Out of 123 patients, 82 (66.67%) were male and among the control group, 73 (59.35%) were male (Figure 2).

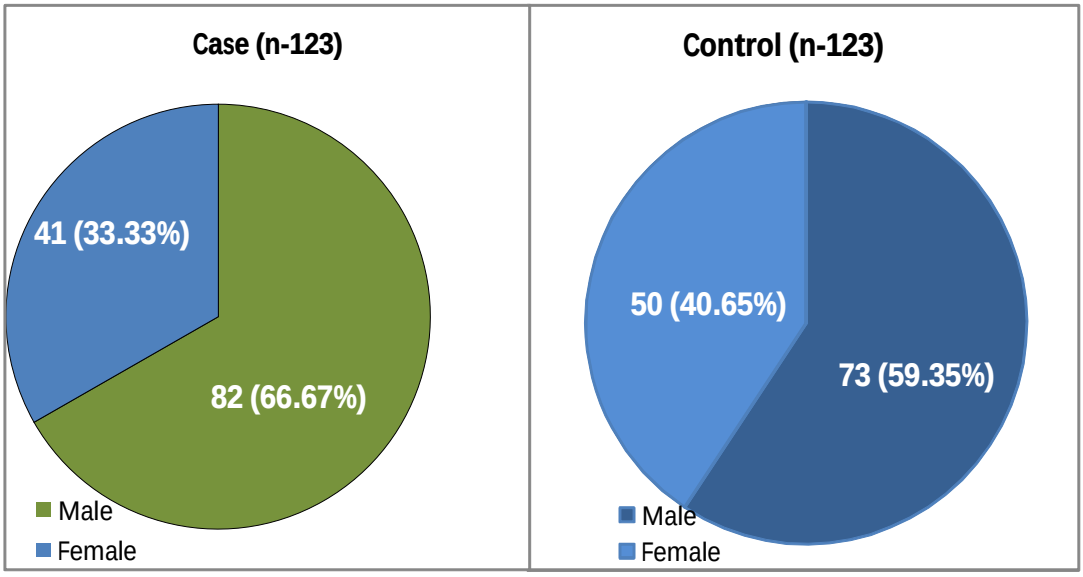

Figure 2: Gender distribution of the children (n-123 in each group)

Regarding housing condition and ventilation, most (59, 47.97%) of the patients were lived in mud/bamboo houses with improper ventilation facilities (73, 59.35%). Living in overcrowded area and cooking in smoked cooker were commonly observed among the patient's family. Most of the cases and controls were used biomass fuels like firewood and cow dung for cooking in their households. Housing status, ventilation facilities, overcrowding condition and smoked cooker were significantly associated with CAP (Table I).

Table I: Housing status of the study subjects

Variable	Case (n-123)	Control (n-123)	X^2	p value
Type of housing:				
Mud/bamboo houses	59 (47.97%)	87 (70.73%)		
Steeled houses	53 (43.09%)	27 (21.95%)	14.02	*p*-0.0009
Bricked houses	11 (8.94%)	9 (7.32%)		
Total	**123 (100%)**	**123 (100%)**		
Ventilation of living room:				
Improper ventilation	73 (59.35%))	91 (73.99%)	5.92	*p*-0.01
Proper ventilation	50 (40.65%	32 (26.01%)		
Total	**123 (100%)**	**123 (100%)**		
Overcrowding:				
Yes	82 (66.67%)	62 (50.41%)	6.69	*p*-0.009
No	41 (33.33%)	61 (49.59%)		
Total	**123 (100%)**	**123 (100%)**		
Condition of cooker:				
Smoked	100 (81.30%)	80 (65.04%)	8.28	*p*-0.004
Smokeless	23 (18.70%)	43 (34.96%)		
Total	**123 (100%)**	**123 (100%)**		

Among the cases, 55 (44.71%) mothers were illiterate and only 9 (7.32%) had higher secondary and above. In control group, 42 (34.15%) mothers were illiterate and only 18 (14.64%) had higher secondary and above (Table II).

Table II: Level of education among the mother's of study subjects

Level of education	Case (n-123)	Control (n-123)	Total (n-246)
Illiterate	55 (44.71%)	42 (34.15%)	97 (39.43%)
Primary	36 (29.27%)	35 (28.45%)	71 (28.86%)
Secondary	23 (18.70%)	28 (22.76%)	51 (20.73%)
Higher Secondary and above	9 (7.32%)	18 (14.64%)	27 (10.98%)
Total	**123 (100%)**	**123 (100%)**	**246 (100%)**

X^2=5.24, p-0.154, not significant

More than half (64, 52.03%) of the fathers were illiterate in case group whereas 30.89% illiterate in controls group. Father's educational level was inversely associated with the risk of CAP (Table III).

Table III: Level of education among the father's of study subjects

Level of education	Case (n-123)	Control (n-123)	Total (n-246)
Illiterate	64 (52.03%)	38 (30.89%)	102 (41.46%)
Primary	27 (21.95%)	30 (24.39%)	57 (23.17%)
Secondary	14 (11.38%)	31 (25.20%)	45 (18.29%)
Higher Secondary and above	18 (14.64%)	24 (19.52%)	42 (17.08)
Total	**123 (100%)**	**123 (100%)**	**246 (100%)**

X^2=14.06, p-0.0028, significant

Most of the cases (99, 80.49%) belonged poor socioeconomic status. A statistically significant association was found between social class and CAP (Table IV).

Table IV: Socio-economic status of the study subjects

Socioeconomic Status	Case (n-123)	Control (n-123)	Total (n-246)
Poor/lower class	99 (80.49%)	67 (54.47%)	167 (67.89%)
Lower middle class	18 (14.63%)	46 (37.40%)	63 (25.60%)
Upper middle class	6 (4.88%)	10 (8.13%)	16 (6.50%)
Total	**123 (100%)**	**123 (100%)**	**246 (100%)**

X^2=20.87, p-0.000029, significant

DISCUSSION

Community-acquired pneumonia (CAP) is the most common childhood illness and its incidence is highest among children less than 5 years old. There are several national and international recommendations regarding the therapy and prevention of pediatric CAP. However, still many significant issues that need to be addressed. This study revealed the association of the socio-demographic risk factors with CAP.

In this study, most (62.60%) of the CAP patients were under one year of age. Similar findings were observed by Srivastava et al.[17] (61.7%) and Aftab et al.[18] (62.5%). This age group of children are vulnerable to CAP due to less immunity. Male (66.67%**)** children were more affected with CAP.

It has similarities with the findings of Srivastava et al.[17] Chatterjee[19] and Bari et al.[20]

Mud houses with improper ventilation facilities were directly linked to pneumonia because of dampness and fluctuations of daily temperature. A study conducted by Sikolia et al.[21] in Nairobi (Kenya) observed that poor housing conditions of family was associated with increased risk of pneumonia in children. Similar results were reported by Savitha et al.[22] In the present study, there was significant (p-<0.05) association between type of housing and improper ventilation with CAP.

Overcrowding contributes to the transmission of infection through respiratory droplets. In this study, there was statistically significant association between overcrowding with CAP (p value <0.05). Overcrowding increases the probability of transmission of infection among family members. This was in agreement with a study conducted by Cardoso et al.[23], where overcrowding was associated with higher (2 to 5 fold) incidence of lower respiratory tract infections (p-0.001). Srivastava et al.[17] also found positive association of pneumonia with overcrowding.

Children living in family with smoked cooker were commonly affected by CAP. Several studies conducted by Savitha et al.[22], Bruce et al.[24], Smith et al.[25] have shown that, indoor air pollution by smoke producing cooker increases the risk of pneumonia. Tazinya et al.[26] observed that, development of respiratory tract infection was 2.63 times more in children exposed to wood smoke. Occurrence of CAP in children was significantly associated with the level of father's education. This finding is consistent with the case control study carried out by Victoria et al.[27] They observed father's education (p-0.0028) was strongly associated with CAP in children. Children from low socioeconomic group were more prone to develop CAP. This study showed that, low socio-economic status was significant association (p<0.05) with childhood CAP. Generally, a better income would lead to good housing, availability of clean fuel for cooking and health care facilities.

It was a single center study which does not represents the whole country. Admission bias was another limitation of this study.

CONCLUSION

Low socio-economic condition, overcrowding, improper ventilation, use of smoked cooker and patents illiteracy were found to be risk factors for community acquired pneumonia (CAP) in under five children. CAP could be reduced by improving the socioeconomic status.

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Conflicts of interest: Author declares that there is no conflict of interest.

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