



Risk Factors of Pneumonia Among Children Under 5 Years at a Pediatric Hospital in Sudan

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ABSTRACT

Introduction: Pneumonia is major cause of mortality among acute respiratory infections, killing up to 5 million of children below the age of 5 years annually in developing countries. Total 50% out-patients cases in Sudan are children while 30% of children admissions are due to pneumonia. Every year, the number of deaths in infant and children below the age of 5 years is reported to be 12 million. **Objectives:** The aim of this study is to find out the pneumonia risks in Sudan among children <5 years and to establish a baseline data and statistical information about pneumonia in the age group for future use. **Study design and Setting:** A hospital based descriptive study was conducted among children <5 years at Mohamed Al-Amin Hamid Pediatric Hospital in February 2017. **Methods:** Parents of 40 children <5 years admitted to the hospital during the study period completed the constructed questionnaire after obtaining informed consents from each of them. Data was then analyzed. **Results:** Children in this study consisted of 27 (57.50%) males and 13 (42.5%) females. Factors found to have association with pneumonia include low socio-economic status and low educational level of mothers. **Conclusion and Recommendations:** The study concluded that the pneumonia is more prevalent in children less than one year. Factors found to have association with pneumonia include low socio-economic status and low educational level of mothers admitted to Mohamed Al-Amin pediatric hospital in Omdurman locality. It was recommended to have an early diagnosis and treatment of pneumonia. Community health education and completion of the immunization program are recommended to decrease the infection.

Keywords: Pneumonia, Developing countries, Immunization programs, Surveys and questionnaires

INTRODUCTION

Sudan is considered as one of the developing countries that faces increased morbidity and mortality rate due to pneumonia among children <5 years due to the low standard of living and low socio-economic status. In Sudan, every year about 1 million children suffer from pneumonia and about 50% of out-patients are children under 5 years, and 30% of hospital admissions are attributed to pneumonia. According to the latest WHO data published in May 2014, influenza and pneumonia deaths in Sudan reached 37,775 (14.50%) of total deaths. Pneumonia kills up to 5 million children under the age of 5 years annually in developing countries [1].

Every year, 12 million children die before their fifth birthday, many during the first year of life. Seven in ten of these deaths are due to acute respiratory infections mostly due to pneumonia. Mortality rates of children under the age of five years in most developing countries ranges from 60 to 100 per 1000 live births, one fifth of these deaths are due to pneumonia and these mortalities due to childhood pneumonia is strongly linked to poverty-related factors such as under nutrition, lack of safe water and sanitation, indoor air pollution and inadequate access to health care. Pneumonia is the lower respiratory tract infection that exclusively affects the lung. While it attacks every person, children under the age of five years are particularly prone to pneumonia. A range of both bacterial and viral pathogens have been recognized to cause pneumonia in children with *Streptococcus pneumoniae* accountable for most of the cases.

Also, 1 in every 5 knew the two indicative symptoms of pneumonia: fast breathing and difficult breathing. Previous research has shown that in low resource settings, risk factors for pneumonia in children have included malnutrition,

inadequate paternal education, bad ventilated living room, and smoking habits of parents, age, and sex of the child and widely vary across the regions of the world [2].

Objective

To identify main risk factors of pneumonia among children under five years admitted to Mohamed Al-Amin Hamid pediatric Hospital in Omdurman.

Specific Objectives

- To identify nutritional status in relation to pneumonia among children under the age of 5 years.
- To examine standard of living among families of child with pneumonia.
- To establish baseline data and statistical information about pneumonia under five years of age for the future use.

METHODS AND METHODS

It is a descriptive cross-sectional hospital-based study. This study was carried out on children less than five year of age at Mohamed Al-Amin Hamid Pediatric Hospital at Omdurman city of Sudan.

Study Design

The main aim of this study was to determine the risk factors contributing to pneumonia among children under five of age. Data was collected using a questionnaire. The questionnaire gathered information regarding background information on mother and child, (breastfeeding, weaning and immunization). It also gathered information regarding the socio-economic information and educational level of the mother and fathers, as well as determined the water and hygiene information.

Study Area and Period

This study was carried at Omdurman city in the period between February 2017 to March 2017 in Mohamed Al-Amin Hamid Pediatric Hospital at Khartoum state, Omdurman locality. The hospital is located in the east of Omdurman with total area of 7200 m² with length 120 meter and width 60 meter. This hospital was established in 1986 by Mohammed Al-Amin Hamid.

Sample Size

The total sample size was 40 children, and the data was collected within two weeks. All the samples were chosen which included all pneumonia cases of children under five years of age, whose mother, father, or family member had admitted to the hospital during this period of the study at Mohamed Al-Amin Hamid pediatric hospital.

Inclusion Criteria

All pneumonic children aged between 0-60 months who attended Mohamed Al-Amin Hamid pediatric hospital Khartoum state at Omdurman locality with their mother.

Exclusion Criteria

Severely ill children and mothers who have hearing impairments or talking problem.

Data Collection and Technique

Data were collected from mothers, fathers or any family member of children who was in attendance with the admitted children in the hospital at the time of study. Questionnaire was used to collect data. The questionnaire was designed to match the objectives of this study. Questions included child gender, child age, and educational level of parents, socio-economic status, anthropometric measures, and nutrition information. Anthropometric measures were used to identify the different stages of malnutrition. These measurements were obtained from the hospital reports at time of interviews.

Data Analysis

Statistical analysis was carried out by using the statistical package for the social science (SPSS) version 20 program.

Ethical Considerations

Ethical clearance was obtained from the Ministry of Health and University of Bahri. Verbal consents from parents and care takers of children were obtained and the objective of the study was explained to them. Privacy, and confidentiality of collected information was ensured at all level.

RESULTS

Table 1 shows that 23 (57.50%) children were males, while 17 (42.50%) were females. Majority of them (57.50%) were less than one year while 17 (42.50%) were found 1-4 years of age.

Table 1 Distribution of study population according to child gender and age (N=40)

| Gender | Frequency (N) | Percent |
|--------------------|----------------------|----------------|
| Male | 23 | 57.50% |
| Female | 17 | 42.50% |
| Total | 40 | 100% |
| Age | Frequency (N) | Percent |
| Less than one year | 23 | 57.50% |
| 1-4 years | 17 | 42.50% |
| Total | 40 | 100% |

Table 2 indicated that majority of families had children less than five years of age 26 (65.0%) and had more than three children, while 14 (35.0%) families had 1-2 children. The number (1-3 children) of children in the family was 22 (55.0%).

Table 2 Frequencies of children distribution among families (N=40)

| Number of children less than five years | Frequency (N) | Percent |
|--|----------------------|----------------|
| One child | 5 | 12.50% |
| Two children | 9 | 22.50% |
| Three children | 9 | 22.50% |
| More than 3 children | 17 | 42.50% |
| Total | 40 | 100.00% |
| The number of children in the family | Frequency (N) | Percent |
| 1-3 | 22 | 55.00% |
| 4-6 | 18 | 45.00% |
| Total | 40 | 100% |

Table 3 describes father's occupation where 27 (67.50%) were labor (worker), while 1 (2.50%) un-employment and 7 (17.50%) were trader. Twenty-two father's educations (55.0%) was basic, while 5 (12.50%) were secondary education and 1 (2.50%) was graduated from the university and 10 (25.0%) were illiterate.

The family income of 26 (65.0%) fathers were less than 150 SDG (Sudanese Pound), while 12 (30.0%) earned 150-300 SDG and 2 (5.00%) had more than 600 SDG.

Table 3 Socioeconomic characteristics of the families (N=40)

| Father's occupation | Frequency (N) | Percent |
|----------------------------|----------------------|----------------|
| Un-employment | 1 | 2.50% |
| Trader | 7 | 17.50% |
| Other | 5 | 12.50% |
| Workers | 27 | 67.50% |
| Total | 40 | 100.00% |
| Father's education | Frequency (N) | Percent |
| Illiterate | 10 | 25.00% |
| Basic | 22 | 55.00% |
| Secondary | 5 | 12.50% |
| University | 1 | 2.50% |

| | | |
|----------------------|----------------------|----------------|
| Other | 2 | 5.00% |
| Family income | Frequency (N) | Percent |
| Less than 150 SDG | 26 | 65.00% |
| 150-300 SDG | 12 | 30.00% |
| More than 600 SDG | 2 | 5.00% |
| Total | 2 | 5.00% |

Table 4 shows that, most of the children 29 (72.50%) whose mothers were interviewed breastfed their children. Majority of child weaning 22 (55.50%) were gradually, while 3 (7.50%) weaned suddenly.

Table 4 Frequency distribution of feeding practices among children under five years of age (N=40)

| | | |
|---------------------------------|----------------------|----------------|
| The child breast feeding | Frequency (N) | Percent |
| Yes | 29 | 72.50% |
| No | 11 | 27.50% |
| Total | 40 | 100.00% |
| The child is weaned | Frequency (N) | Percent |
| Gradually | 22 | 55.00% |
| Suddenly | 18 | 45.00% |

Table 5 indicated child weight, majority of them 23 (57.50%) were 6.0-10.99 kg. Majority of children mid-arm circumference 27 (67.50%) were found 10.0-14.99 cm, while 9 (22.50%) were found 15.0-19.99 cm, and 4 (10.0%) were found 5.0-9.99 cm.

Table 5 Frequency distribution of anthropometric measurement of children under five years of age (N=40)

| | | |
|---|----------------------|----------------|
| Child weight (kg) | Frequency (N) | Percent |
| 1.00-5.99 | 7 | 17.50% |
| 6.00-10.99 | 23 | 57.50% |
| 11.00-15.99 | 6 | 15.00% |
| 16.00-20.99 | 4 | 10.00% |
| Total | 40 | 100.00% |
| Child mid arm circumference (cm) | Frequency (N) | Percent |
| 5.00-9.99 | 4 | 10.00% |
| 10.00-14.99 | 27 | 67.50% |
| 15.00-19.99 | 9 | 22.50% |
| Total | 40 | 100.00% |

Table 6 describes that majority of study participants 26 (65.0%) used tap water while only 14 (35.0%) used well and river. Most of the study participants (mothers) 19 (47.50%) used zeer pot fridge for drinking water and storage. While 18 (45.0%) used barrels and jerry cans.

Table 6 Frequency distribution of water safety among families (N=40)

| | | |
|---|----------------------|----------------|
| Main source of drinking water supply for household | Frequency (N) | Percent |
| Tap water | 26 | 65.00% |
| Well | 6 | 15.00% |
| River | 8 | 20.00% |
| Total | 40 | 100.00% |
| Equipment's used for drinking water | Frequency (N) | Percent |
| Barrels | 9 | 22.50% |
| Zeer pot fridge | 19 | 47.50% |
| Jerry cans | 9 | 22.50% |
| Barrels and zeer pot fridge | 3 | 7.50% |
| Total | 40 | 100.00% |

Figure 1 indicates majority of mothers 27 (67.50%) attended health care center, while 13 (32.50) did not attended health care center.

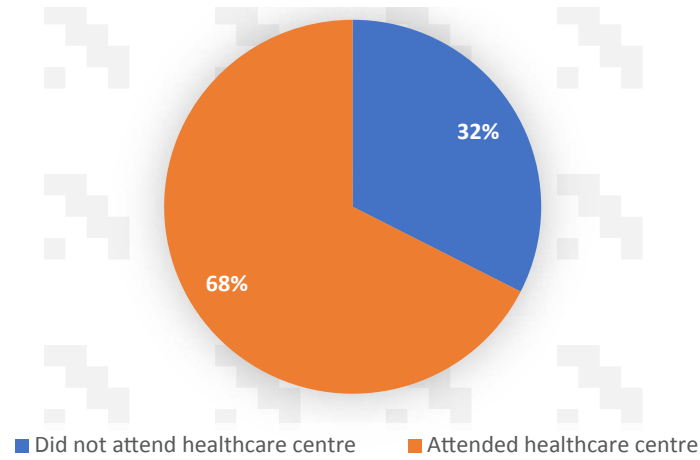


Figure 1 Frequency of attending child health care center (N=40)

Figure 2 shows majority of mothers 28 (70.0%) were given traditional treatment to their sick children, while 12 (30.0%) were given medical treatment to their sick children.

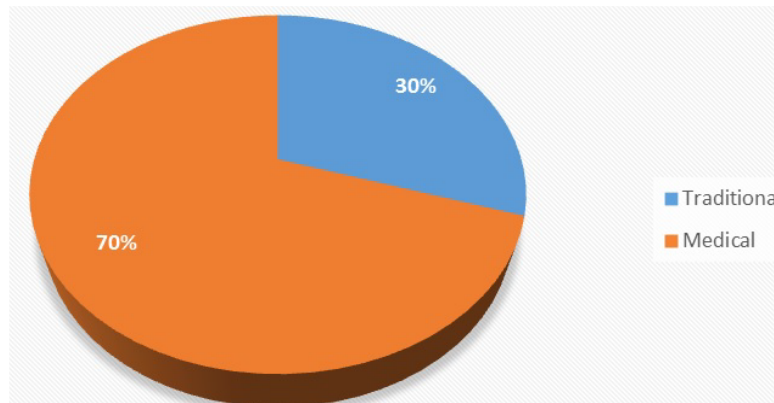


Figure 2 Frequency of kind of treatment that child takes (N=40)

Figure 3 indicates that majority of mothers 20 (50.0%) were using gas, while 20 (50.0%) used coal and wood.

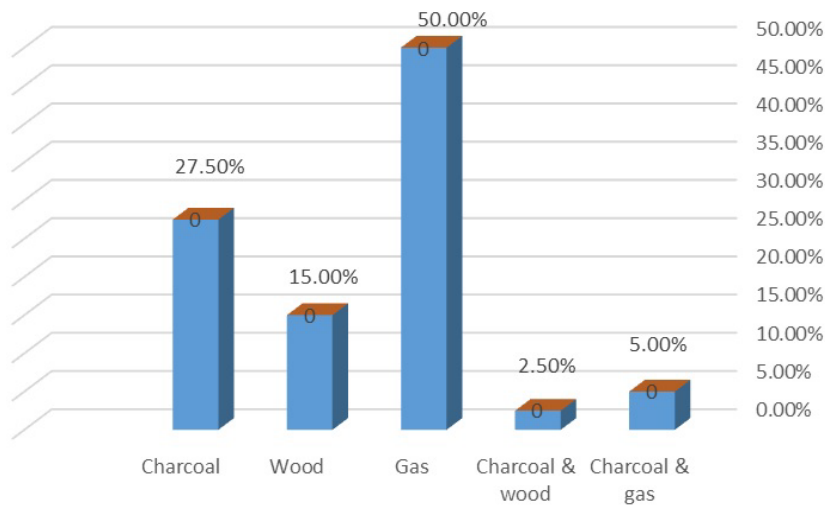


Figure 3 Frequency of fuel used for cooking (N=40)

Figure 4 shows that majority of 27 (67.50%) were not cigarette smokers among family members, while 13 (32.50%) were cigarette smokers.

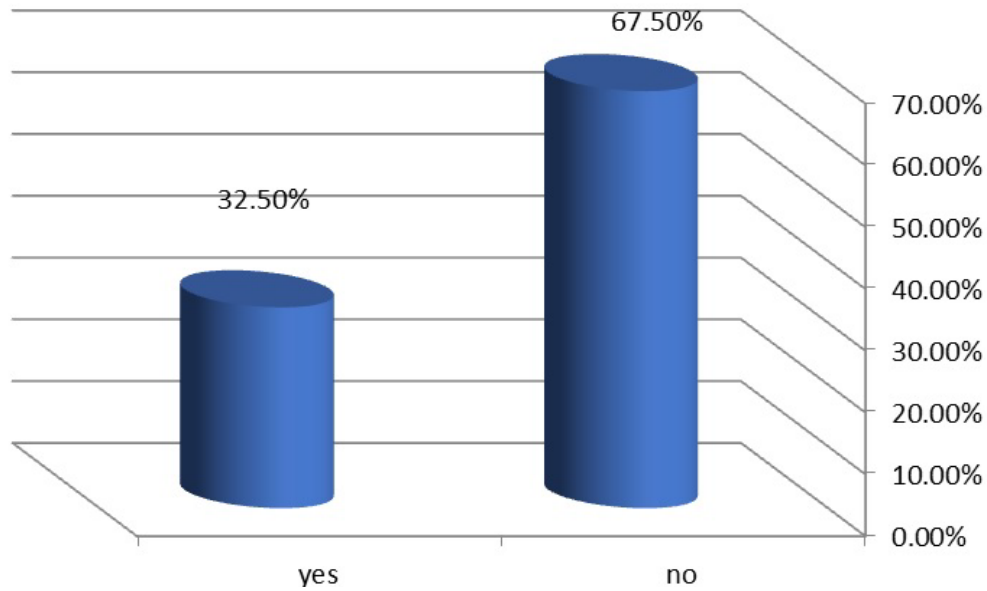


Figure 4 Frequency of cigarette smoking among family members (N=40)

Figure 5 describes the majority of study participants (mothers) 24 (60.0%), their house was poorly ventilated, while 16 (40.0%) were well ventilated.

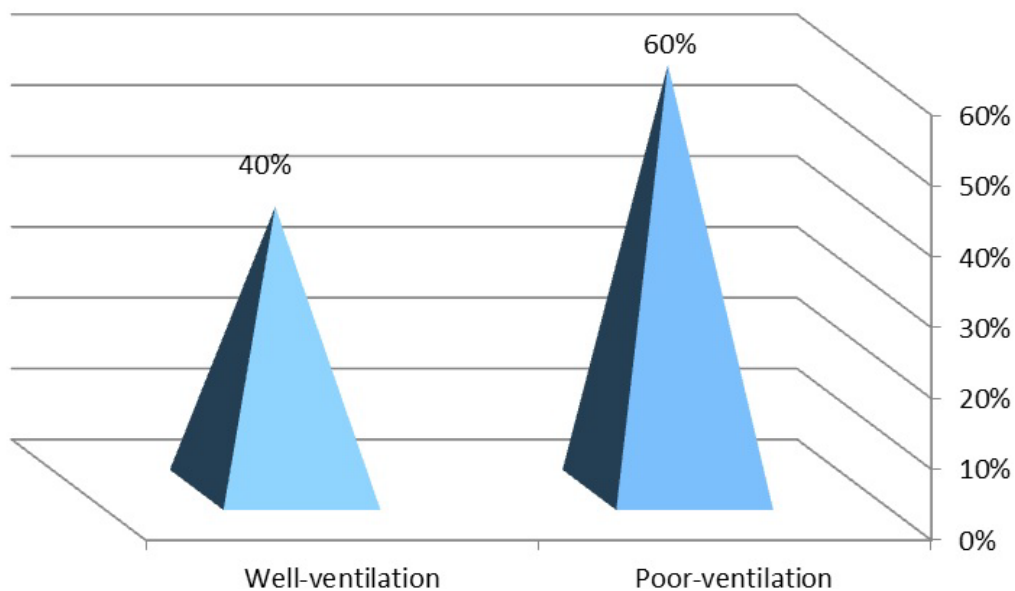


Figure 5 Houses ventilation status (N=40)

Figure 6 shows the mothers 30 (75.0%) were using traditional pit latrines, while only 10 (25.0%) used ventilated improved pit latrines.

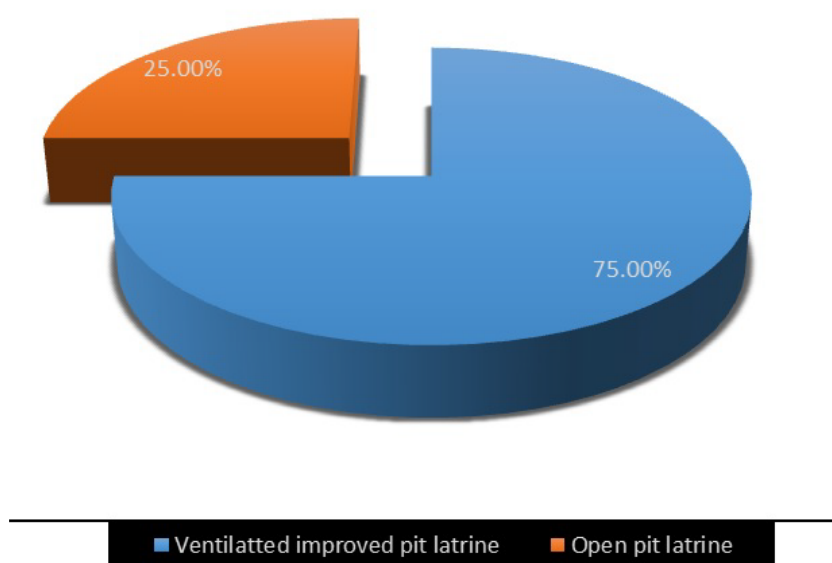


Figure 6 Toilets types used (N=40)

DISCUSSION

This study was designed to investigate the main risk factors for pneumonia presenting at Mohamed Al-Amin Hamid Pediatric hospital in Omdurman city. The specific objectives were to identify nutritional status in relation to pneumonia among children under five years of age, to examine standard of living among families of child with pneumonia and to establish baseline data and statistical information about pneumonia under five years of age for the future use. This study consisted of 40 mothers who had brought their sick children under five years of age with pneumonia to Mohamed Al Amin Hamid pediatric hospital in Omdurman city.

The findings of this study showed that the numbers of male children were 23 (57.50%) and female children were 17 (42.50%). The gender distribution indicated that pneumonia was more prevalent in male children than in female children, which revealed that a relation existed between gender and pneumonia. This finding agrees with the study of Almirall, et al., who found that pneumonia occurs more commonly in males than females [3]. In several community-based studies, boys appear to be more frequently affected by pneumonia than girls [4]. The excess risk for boys was confirmed in a pneumonia case control study in Brazil [5].

The study showed that 65.7% of the children less than two years of age were more affected with pneumonia than the other age groups, this finding was supported from a case control study conducted in Pakistan, younger children were found to be at increased risk of pneumonia compared to older children under the age of five years. Younger age of the children (2-6 months) was found to be at a significant risk factor for pneumonia [6].

In this study, results indicated that pneumonia was higher among families who have lower income 26 (65.00%), and there was relation between the family income and pneumonia. The study by Park in 2007, who reported that children from low socio-economic status tend to have more risk to respiratory infections [7]. Also, this finding was supported a study conducted in the Gambia by O'Dempsey, et al., in 1996 who founded that children of mothers with a personal source of income are at a lower risk of pneumonia [8].

The majority 34 (85.0%) of pneumonia prevailed among children whose mothers were homemakers. This result was supported by a report from case control study by Graham in 1990 which revealed that maternal occupation was significantly associated with pneumonia in under five years of age [9]. This study showed that 40.0% of pneumonia prevailed among children whose mothers had lower education.

Lack of ventilation might induce dampness and smell, which are risk factors of pneumonia. No significant association between pneumonia in children and current smoking habits among family member were found in study. This is not in line with the reports from WHO training package on health sector, where children whose parents smoke were 60% more affected by pneumonia. Also, this finding is not supported by the scientific articles published in Miami and Poland [10].

Breast feeding the child exclusively during the first 6 months of child's life was not found to be a significant factor for pneumonia in children. This is not consistent with findings from a systematic review and meta-analysis done in UNICEF report, 2011. The integrated action plan for prevention and control of pneumonia and diarrhea depend on exclusive breast feeding which was one of the factors that could determine the incidence, prevalence, and mortality of pneumonia in children [11].

CONCLUSION

The study concluded that pneumonia is more prevalent in children under one year of age, but it is still a health problem among children under five years of age at Mohamed Amin Hamid hospital in Omdurman city of Sudan.

Low family income and low educational levels of mothers were found to be major risk factors of pneumonia among children less than five years of age admitted to Mohamed Al-Amin pediatrics hospital in Omdurman locality. Significantly, higher number of males presented with pneumonia than females in this study. The study had identified a comparatively high prevalence of pneumonia in children less than five years of age. It also pointed out modifiable risk factors of the pneumonia as diarrhea, measles and use of primitive latrines among families. Majority of studied children under five years of age had history of diarrhea. So, the study indicated diarrhea associated with pneumonia disease.

RECOMMENDATIONS

- Early diagnosis and treatment of pneumonia.
- Community health education programs on the disease
- Completion of the immunization program to be compulsory for all children under five years of age.
- Families should be sensitized on the importance of early detection of pneumonia.
- Breast feeding of infants and balanced nutrition for children.
- Health education programs should be introduced in MCH services in all health centers.

DECLARATIONS

Conflict of Interest

The authors have disclosed no conflict of interest, financial or otherwise.

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