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Occurrence of common diseases in children in rural area of Eastern Nepal visiting Rangeli Hospital of Morang district

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Abstract: *Morbidity and mortality of children are important indicators of the presentation of the public health system in any country. In Nepal, the children's disease spectrum under 12 years old is still unclear. This study aims to explore the distribution of diseases in children under 12 years visiting hospitals in Rangeli hospital, a rural hospital in Nepal. Medical records data for August2019 to February 2020 were collected from Rangeli hospitals in Nepal. The age-specific disease spectrum was analyzed. The most common diseases were those of the respiratory system (54.9% of all 113 children). The top four diseases were diseases of the respiratory system (54.9%), diseases of the urinary tract system (8.8%), neonatal sepsis (8.0%), and enteric fever (8.0%). The most common diseases for neonates were neonatal sepsis (early-onset 37.5%, late-onset 18.8%) and pneumonia (18.8%). In infants, 75.4% of cases were of lower respiratory tract infection (7.8% bronchitis; 30.8% pneumonia). The most common disease in young children was of the lower respiratory tract (37.5%) and urinary tract (37.5%). Enteric fever and common fever were the most common disease in children. A significant relationship between the age of the patients and the disease (χ^2 =61.511, p=0.01) has been established. There was no significant relationship between the sex of the patients visiting the Rangeli hospital and the diseases of the patient. It was established that there was no any significant relationship of the particular geographic locations with diseases occurring there (Fisher's Exact χ^2 =4.418, p=0.956).This study analyzed the medical records of a rural hospital of Eastern Nepal to provide the first overview of the disease spectrum and its age-specific distribution among children in Rangeli Municipality.*

Keywords: *children, infant, lower respiratory tract infection, neonate, neonatal sepsis*

1. INTRODUCTION

US FDA classification for Pediatric Age Categories is neonate (birth to 1 month), infant (1 month to 2 years), children (young child 2 – 6 years; child 6 - 12 years) and adolescent (12 to < 16 years) [1].A newborn infant, or neonate, is a child under 28 days of age when the child is at the highest risk of dying.

Drowning, one major cause of accidental death, is a major public health issue with an annual incidence of 500,000 patients and 360,000 mortalities worldwide [2]. Drowning is defined as an acute respiratory failure because of immersion or submersion of the airways in a liquid medium, generally water, and leading to death [3]. Near-drowning results in multiple complications, including aspiration pneumonia, that often proceeds to life-threatening conditions [4]. There were an estimated 1·7 million cases of neonatal sepsis and 510 000 cases of neonatal pneumonia in 2010 [5].

A respiratory tract infection (RTI),an infection of the respiratory tract, is normally further classified as an upper respiratory tract infection (URI or URTI) or a lower respiratory tract infection (LRI or LRTI). LRTIs are generally more serious than URTIs. LRTIs are the sixth-leading cause of death overall worldwide. Lower respiratory tract infections (LRTIs) are the major cause of morbidity and mortality globally [6].The two most common LRIs are bronchitis and pneumonia. Upper respiratory tract infection (URTI) include tonsillitis, pharyngitis, laryngitis, sinusitis, otitis media, certain types of influenza, and the common cold [7]. URTI is one of the leading causes of outpatient admission and antibiotic prescription [8].

Pneumonia affects approximately 450 million people globally (around 7% of the population) and accountsfor 4 million deaths per year [9].Pneumonia developed as a result of inhaling food or drink, saliva, or vomit into the lungs is called Aspiration pneumonia [10]. Several types of bacteria like *Mycoplasma pneumonia* and *Chlamydophila pneumoniae* cause atypical pneumonia or walking pneumonia. Atypical pneumonia symptoms differ from those of other types of bacterial pneumonia [11]. When a human's body temperature rises above the normal range of 36–37°C (98–100° F) is called fever. Typhoid fever is an acute systemic febrile illness caused by the infection of bacterium *Salmonella enterica* serovar Typhi. The clinically similar condition called paratyphoid fever is caused by *Salmonella enterica* serovars Paratyphi A, B, and C. Typhoid and paratyphoid fevers are collectively known as enteric fevers [12, 13].

A febrile seizure, also known as a fever fit or febrile convulsion, is caused by a spike in body temperature, often from an infection but without any serious underlying health issue. It commonly occurs in young children (6 months to 5 years) with normal development without a history of neurologic symptoms [14]. It lasts for a few minutes. Cellulitis is defined as an

acute bacterial infection of the skin involving the dermis and subcutaneous tissues [15]. Gram-positive cocci such as *Streptococcus* spp and *Staphylococcus aureus* are thought to be the major cause of cellulitis [16]. An abscess is a cavity filled with pus that has built up within the tissue of the body showing redness, pain, warmth, and swelling. Stridor is an abnormal, high-pitched monophonic sound produced by turbulent air flow through a partially obstructed airway at the level of the supraglottis, glottis, subglottis, or trachea. It is quite commonly observed in children of various ages [17].

Morbidity and mortality of children are important indicators of the presentation of the public health system in any country. In Nepal, the children's disease spectrum has gradually changed in recent years. However, the disease spectrum for children under 12 years old is still unclear. This study aimed to assess the prevalence of the commonly encountered pediatric medical diseases by pediatric patients under 12 years of different age groups in Rangeli Municipality.

2. METHODS

A retrospective research study was carried out from August 2019 to February 2020 at Rangeli Hospital which is located at Rangeli Municipality, Morang District of Nepal. Our study used data from the Rangeli Hospital (Nepal) disease record register. Besides Rangeli Municipality, patients from different places like Koshi Haraicha, Ratuwamai, Sunawarshi, Kanepokhari, India, and other parts also visited the hospital. The places were clustered in three categories viz. Rangeli Municipality, Sunawarshi Municipality and others (Fig 1). Sixty-four Number of patients from Rangeli, Sunawarshi and others were 64 (male 43, female 30), 39 (male 26, female 13) and 10 (male 5, female 5) respectively.

2.1. Study Population

A total of 113 subjects aged up to 12 years with clinical features were enrolled in this study. The study subjects were categorized into four groups as per US FDA classification for Pediatric Age Categories: neonate (birth to 1 month), infant (1 month to 2 years), children (young child 2 – 6 years), and child (6 - 12 years). Though the findings of all types were accounted in the study, it mainly focused at respiratory tract problems like pneumonia, bronchitis; enteric fever and urinary tract infection (UTI); neonatal septicemia like early onset of neonatal sepsis (EONS) and late-onset of neonatal sepsis (LONS).

2.2. Types of Diseases

According to the disease record book of Rangeli hospital, the diseases among children below 12 years of age were acute gastroenteritis (AGE), early-onset of neonatal sepsis (EONS), late-onset of neonatal sepsis (LONS), lower respiratory tract infection (LRTI), bronchitis, pneumonia, urinary tract infection (UTI), enteric fever, fever, loose motion, vomiting, anemia, seizure, poisoning, cellulitis.

2.3. Data Analysis

Data were recorded in Microsoft Excel Worksheet 365 and were analyzed for descriptive analysis. Data from this study were analyzed using Statistical Package for the Social Sciences (SPSS) version 21.0 software. Fisher exact test and Pearson's Chi-square tests were used for statistical analysis data. P-values ≤0.01 were considered statistically significant. It is hypothesized that there is no any significant relationship between the age of patient and diseases. It was hypothesized that there is no relationship between the sex of the patients visiting the Rangeli hospital and their geographic locations. It is also hypothesized that no particular age group has any relationship with the particular geographic locations.

3. RESULTS

In this study, 57.5% (n=65) children were male while 42.5% (n=48) were female. Out of 113 cases of children up to 12 years, 54.9% (n=62) cases were of LRTIs, 8.8% (n=10) of UTIs, 8.0% (n=9) of neonatal sepsis (6 cases of EONS and 3 cases of LONS), 8.0% (n=9) of enteric fever, and 12.4% had fever. Among LRTIs, 8.1% cases were of bronchitis and 41.9% were pneumonia cases (16.1% severe pneumonia).The mean age of all the children was 2.38± 0.30 years.

Of the total 113 patients visiting during the study period, 16 (14.2%) were identified as neonates.62.5% (n=10) of the cases were of male. The majority of neonates (37.5%) were suffering from the early-onset of neonatal sepsis (EONS) followed by 18.8% suffering from late-onset of neonatal sepsis (LONS) and pneumonia each (Fig 2). 25% of cases (n=4) were of LRTI with pneumonia and severe pneumonia. Enteric fever with UTI, scalp abscess, and fast breathing also showed their presence in the rest of the neonates with each case in 6.2% neonates. The mean age of neonates was0.032 years.

Sixty-five infants' cases (57.5%) were found in 113 cases during the study period. 62.5% (n=36) of the infants were of male.75.4% (n=49) cases were of lower respiratory tract infection (LRTI) ofwhich7.8% cases (n=5) were suffering from bronchitis and30.8% (n=20)also had pneumonia or severe pneumonia (Fig 3). LRTI with anemia or stridor or perineal abscess was also seen at least one of the cases each.12.3% (n=8) were suffering from fever of which three cases hada cough. Among infant cases, 4.6% were suffering from acute gastroenteritis (AGE).One case was suffering from bronchitis as well as acute gastroenteritis. 3.1% (n=2) were suffering from the drowning of which one case has progressed towards pneumonitis. 3.1% (n=2) were suffering from enteric fever. The febrile seizure was seen in 3.1% of cases of which half of the cases also had lower tract respiratory infection (LRTI). 1.5%

(n=1) were suffering from cellulitis and loose motion each. The mean age of infants was 0.791 years.

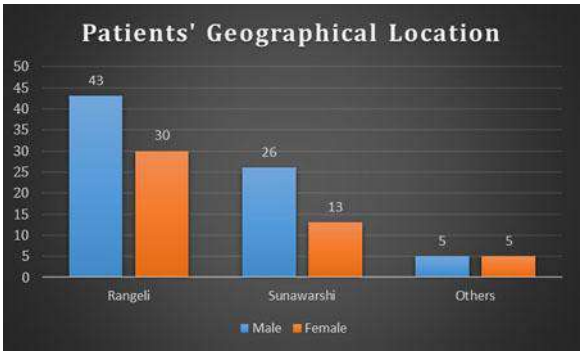


Fig 1. *Patients' Geographical Location*

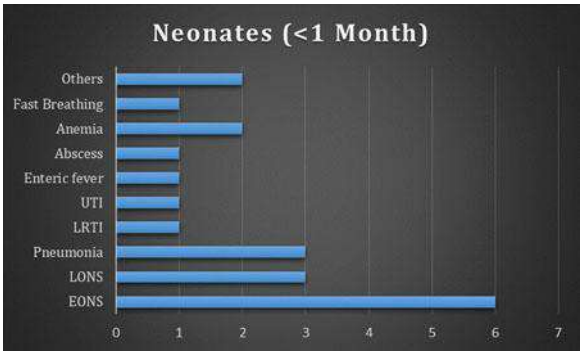


Fig 2. *Disease distribution in Neonates*

Fig 3. *Disease distribution in Infants*

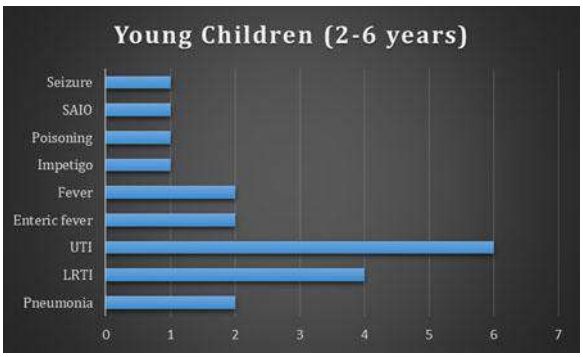


Fig 4. *Disease distribution in Young Children*

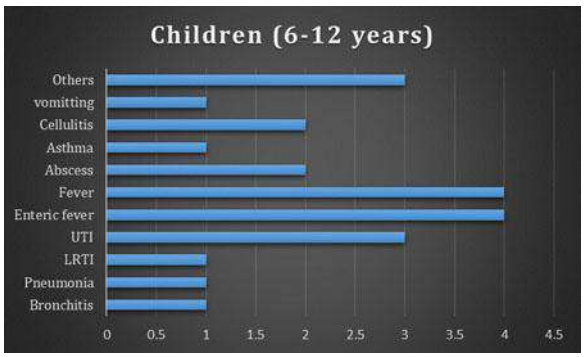


Fig 5. *Disease distribution in Children*

Sixteen young children's cases were reported in 113 cases. 68.8% (n=11) of the cases were of male. 37.5% of cases (n=6) were of LRTI of which one case was of aspiration pneumonia and another was of pneumonia (Fig 4). 37.5% of cases (n=6) were of UTIs. Two UTI cases showed enteric fever while one case had pneumonia too. Each case of subacute intestinal obstruction, poisoning, impetigo, fever was also observed. The mean age of young children was 4.12 years.

Sixteen children's cases were also recorded in 113 cases. 50% (n=8) of the cases were of male. Three cases of enteric fever were observed along with UTIs while one case was of enteric fever with pharyngitis (Fig 5). Of four respiratory cases; each one was of asthma, pharyngitis, severe pneumonia and lower tract infection. Four cases of fever with decreased evaluation were also observed. A few cases of abscess, loose motion, vomiting, cellulitis, and cystitis were also observed.The mean age ofthe children group was 9.44 years.

There was a significant relationship between the age of the patients and the disease of the patients (χ^2 =61.511, p=0.01) (Table 1). There was no significant relationship between the sex of the patients visiting the Rangeli hospital and their geographic locations (Pearson χ^2 =2.073, df=2, p=0.355) (Table 2) or the diseases of the patient(Fisher's Exact χ^2 =4.179, p=0.535) (Table 3).It was established that there was no any significant relationship of the particular geographic locations with any age group (Fisher's Exact χ^2 =4.142, p=0.66) (Table 4) or diseases occurring there (Fisher's Exact χ^2 =4.418, p=0.956) (Table 5).

Table 1. Chi-Square Tests between age of patient and the disease categorized

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	93.632[a]	15	.000	.[b]
Likelihood Ratio	70.612	15	.000	.[b]
Fisher's Exact Test	61.511			.000
N of Valid Cases	113			

a. 16 cells (66.7%) have expected count less than 5. The minimum expected count is .28.
b. Cannot be computed because there is insufficient memory.

Table 2. Chi-Square Tests between sex of patient and their geographical location

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	2.073[a]	2	.355	.390
Likelihood Ratio	2.100	2	.350	.390
Fisher's Exact Test	2.115			.375
N of Valid Cases	113			

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 4.25.

Table 3. Chi-Square Tests between sex of patient and the disease categorized

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	4.026[a]	5	.546	.572
Likelihood Ratio	4.059	5	.541	.640
Fisher's Exact Test	4.179			.535
N of Valid Cases	113			

a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is .85.

Table 4. Chi-Square Tests between age of patient and their geographical location

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	4.342[a]	6	.630	.646
Likelihood Ratio	5.281	6	.508	.608
Fisher's Exact Test	4.142			.660
N of Valid Cases	113			

a. 3 cells (25.0%) have expected count less than 5. The minimum expected count is 1.42.

Table 5. Chi-Square Tests between age of patient and the disease categorized

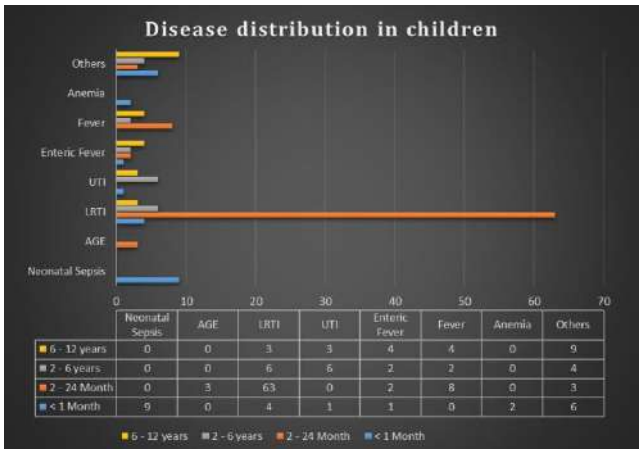
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	4.187[a]	10	.939	.948
Likelihood Ratio	5.010	10	.890	.948
Fisher's Exact Test	4.418			.956
N of Valid Cases	113			

a. 10 cells (55.6%) have expected count less than 5. The minimum expected count is .18.

4. DISCUSSION

Our study had shown that, out of nine neonates, 6 (66.7%) had clinically susceptible early-onset neonatal sepsis (EONS) and 3 (33.3%) (Fig 6) suffered late-onset neonatal sepsis (LONS). The findings aligned with the study by Hafsa et al [18] from Bangladesh, where EONS accounted for 65.4% and LONS accounted for 34.6%.A study of EONS in Bharatpur, Nepal was higher (70.7%) than our findings [19]. Ghosh and Basu study highly differed with our findings, in their study, a total of 38.0% neonates were presented with EONS and 62.0% neonates were presented with LONS [20].

Our study reported 65.4% of LRTI of all the cases till two years of age which was higher than the finding (24.4%) of Seidu et al [21].In this study,30.8% of infants had pneumonia which was higher than the findings (24.6%) of India by Awasthi et al [22]. 4.6% of infants were suffering from acute gastroenteritis (AGE) which was much lower than the findings of Salami in Lebanon [23].



	Neonatal Sepsis	AGE	LRTI	UTI	Enteric Fever	Fever	Anemia	Others
6 - 12 years	0	0	3	3	4	4	0	9
2 - 6 years	0	0	6	6	2	2	0	4
2 - 24 Month	0	3	63	0	2	8	0	3
< 1 Month	9	0	4	1	1	0	2	6

Fig 6. *Disease distribution among children of various age group*

37.5% of young children cases were of LRTI which was lower than the findings (45%) of Manandhar et al in Kathmandu, Nepal [24]. The study of Seidu et al reported lower findings (25%) from Saharan-African countries to our study [21]. The prevalence rates of UTI in young children and children in our study was 37.5% and 18.8% respectively which were higher than the findings of Shrestha et al from Dharan(14.9% and 14.4% respectively) [25].

25% of children were suffering from enteric fever which was higher than the findings (19%) of Andrews et al [26].Children above 2 years to 12 years had 28.1% of UTIs which was higher than the findings (8%) of Shaikh et al [27].Overall, 8.8% of UTIs were reported in our study which was lower than the findings (29.4%) of Ojha and Aryal in Kathmandu [28].

5. CONCLUSION

The disease spectrum for children from rural sectors of Nepal is still unclear. This study initiated the need for the hour from one hospital record to assess the prevalence of the commonly encountered pediatric medical diseases under different age groups in Rangeli Hospital. The most common diseases were those of the respiratory system, diseases of the urinary tract system, neonatal sepsis, and enteric fever in children up to 12 years of age. Effective prophylactic measures, prompt and accurate diagnoses, and subsequent administration of targeted therapy are vital to curbing the excessive burden of the disease. Future epidemiological and clinical studies are also needed to monitor changes in the microorganisms causing neonatal sepsis.

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