

An audit of Pediatrics Inpatients in General Pediatrics Department of Tertiary Care Children's Hospital

Prakash Joshi,¹ Bishnu Rath Giri,¹ Najala Khatun,¹ Bina Prajapati,¹ Subhana Thapa Karki¹

¹Department of Pediatric Medicine, Kanti Children's Hospital, Kathmandu, Nepal.

ABSTRACT

Introduction: In Nepal currently there are very few reports about disease spectrum in pediatric inpatients. This study was conducted to determine the pattern of morbidity among pediatric inpatients aiming that the result thus obtained will help in proposing strategies for future healthcare planning and resource allocation.

Methods: This was a descriptive cross sectional study conducted at Kanti Children's Hospital from January 2017 to December 2017, after taking ethical approval from Institutional Review Committee (Ref. no:14/075-076) of the hospital. Data on age, sex, diagnosis, date of admission and discharge was extracted from hospital record of 5,128 admitted children. Data were entered into MS Excel and analyzed using SPSS 16. The results were expressed as number, proportion and median.

Results: Out of 5,128 admitted patients 3,240 (63.18%) were male and 1,888 (36.81%) female. Children between 1 to 60 months were 3,225 (62.89%) of which infant constitute 1617 (50.13%). The leading causes of hospitalization were pneumonia, sepsis, enteric fever, bronchiolitis, congenital heart diseases and nephrotic syndrome constituting 898 (17.51%), 658 (12.83%), 274 (5.34%), 268 (5.22%), 227 (4.42%) and 221 (4.30%) of total admission respectively. System-wise, respiratory tract infection 1,308 (25.50%) was most common followed by 'Other infectious diseases' 1069 (20.85%), nephrology 607 (11.83%), gastro-intestinal tract 592 (11.54%), neurology 487 (9.49%), hematology 281 (5.47%) and cardiac system 278 (5.42%).

Conclusions: Majority of the children affected were under-five, residing outside the capital city. Respiratory infection and other infectious diseases were major cause of childhood morbidity. Programs like Integrated Management of Neonatal and Childhood Illness (IMNCI) needs to be strengthened, in resource poor country like ours.

Keywords: Inpatients; morbidity; neonate.

INTRODUCTION

Globally, around 6.3 million children under 15 years of age died mostly due to preventable and treatable causes like birth complications, pneumonia, sepsis, diarrhea and malaria.¹ As children under 15 years of age, cover 34% of our population, their morbidity and

mortality pattern does have significant role in determining health status of the country.²

There are only few reports³⁻⁴ about disease spectrum among pediatrics inpatients in country. Therefore we planned to carry out this study at the only central level government's pediatric hospital catering services to children referred from all over the country.

The main objective of study was to determine the pattern and prevalence of common

Correspondance:

Dr. Prakash Joshi,

Department of Pediatric Medicine, Kanti Children's Hospital, Kathmandu, Nepal.

Email: dr.prakash346088@gmail.com,

Phone: +9779841346088.

diseases, duration of hospital stay, temporal distribution and geographical distributions among admitted children up to 14 years of age. Results thus obtained would be useful in planning healthcare strategies, appropriate resource allocation and formulating appropriate interventions in the management of the most prevalent diseases in community.

METHODS

This is a descriptive cross sectional study conducted at Kanti Children's Hospital over a period of one year from January 1, 2017 to December 31, 2017 after taking an Ethical approval from Intuitional Review Committee of the Hospital. All the pediatric patients, aged 1 month to 14 years, admitted in general pediatric wards except those having surgical and oncologic illness were included in the analysis. Neonates and patients admitted in intensive care units were also excluded. Thus record files of 5,128 children admitted in the general pediatrics ward of medical department were reviewed retrospectively. Patient's data on age, sex, date of admission, date of discharge and diagnosis at discharge were recorded. Diagnosis was classified as per international classification of disease and was categorized for analysis according to the system affected. Infectious diseases affecting more than one system and tropical diseases were categorized into 'Other infectious diseases' category such as sepsis, tuberculosis, PUO, chickenpox, kala-azar, dengue, pertusis, pertussis like illness, scrub typhus etc. For concomitant comorbidities, the primary diagnosis was taken into consideration. Their addresses mentioned in the record file were categorized into: within Kathmandu valley and outside Kathmandu valley. Kathmandu valley is the capital city comprising of Kathmandu, Lalitpur and Bhaktapur districts. The data were entered into MS Excel and analyzed using SPSS vs 16. Results were expressed as number, proportion and median.

RESULTS

Among 5,128 children included in the study, there were 3,240 (63.18%) males and 1,888

(36.81%) females giving a male: female ratio of 1.7:1.

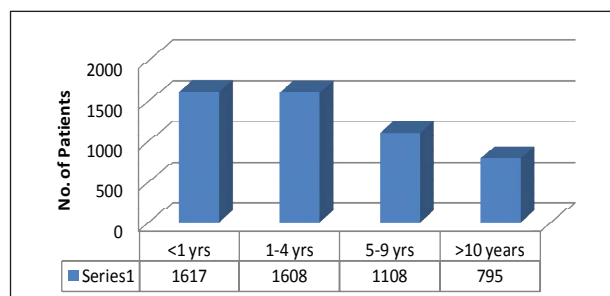


Figure 1. Age distributions of patients.

Infants were the leading group 1617 (31.53%) requiring admission among the total study population. The subpopulation of children aged below 5 years was 3,225 (62.89%) out of which infant constitute 1617 (50.13%). Children between 5-9 years were 1108 (21.60%) and least number were among 10-14 years age group 795 (15.50 %) (Figure 1). The median age of the subjects was 33.82 months.

Respiratory diseases were responsible for 1,308 (25.50%) admissions followed by other infectious diseases group 1,069 (20.84%). Other major conditions were diseases pertaining to nephrology, gastro-intestinal, nervous, hematology and cardiac system respectively (Figure 2).

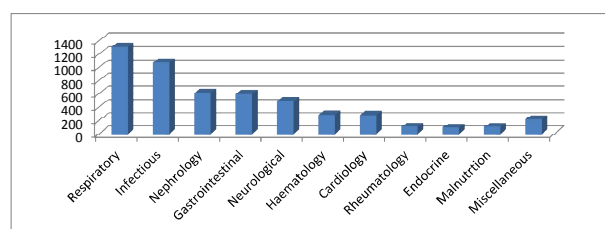


Figure 2. Frequency of Diseases: System-wise.

Among respiratory diseases (1308), pneumonia and bronchiolitis were the commonest causes for admission comprising 898 (68.65%) and 268 (20.48%) respectively followed by lung abscess/ effusion 66 (5.1%), asthma 43 (3.3%) and others 30 (2.3%). Among 1,069 patients in "Other infectious

diseases" group, sepsis 658 (61.55%), tuberculosis 139 (13%) and scrub typhus 64 (5.98%) were more common. Rest of the diseases including, PUO, pertussis like illness, kala-azar, chickenpox and dengue together constitute 208 (4%) of total admissions. In the gastrointestinal diseases group (592), enteric fever, acute infective hepatitis and diarrhea constituted 274 (46.28%), 148 (25%) and 98 (16.55%) patients respectively. Among 487 neurological cases, seizure disorder was seen in 196 (40.24%) admitted children. Similarly meningitis/encephalitis, cerebral palsy and acute flaccid paralysis were seen in 156 (32.03%), 29 (5.95%) and 25 (5.13%) admitted children respectively. Febrile seizure was seen in 69 children constituting 35.20% of seizure disorder and 14.16% of total CNS cases. Nephrotic syndrome 221 (36.40%), acute glomerulonephritis 172 (28.33%) and UTI 151 (24.87%) were the common among 607 cases of renal diseases. Among 278 cardiac patients, there were 227 (81.65%) children with congenital heart disease (CHD) and 34 (12.23%) with rheumatic fever/rheumatic heart disease. There were total 185 anemic (primary diagnosis) children admitted out of which 38 (20.54%) were iron deficiency anemia, 33 (17.83%) were aplastic anemia and 27 (14.59%) were thalassemia. Out of 281 hematological cases, ITP was seen in 52 (18.50%) children. SLE 24 (23.52%), HSP 35 (34.31%) and JIA 28 (27.45%) were common among 102 rheumatologic disorder. Miscellaneous group included metabolic disorder, poisoning, congenital syndromes, genetic defects, mixed morbidities etc. constituting 215 (4.19%) of study group. Overall top ten diseases covering almost two-third of total admissions is shown in (Table 1).

Table 1. Top Ten Common Diseases.

Diseases	n (%)
Pneumonia	898 (17.51)
Sepsis	658 (12.83)
Enteric Fever	274 (5.34)
Bronchiolitis	268 (5.22)
CHD	227 (4.42)

Nephrotic Syndrome	221 (4.31)
Seizure Disorder	196 (3.82)
Anemia	185 (3.61)
AGN	172 (3.35)
Meningitis/Encephalitis	156 (3.04)

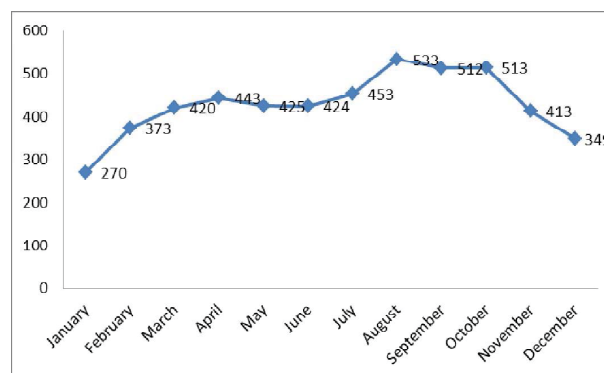


Figure 3. Monthly distributions of patients.

CHD: Congenital Heart Disease;
AGN: Acute Glomerulonephritis

Maximum patients were admitted during the month of August 533 (10.39%), September 512 (9.98%) and October 513 (10%) whereas least admissions observed during the months of winter, December 349 (6.80%), January 270 (5.26%) and February 373 (7.27%) (Figure 3). Though respiratory diseases like pneumonia and bronchiolitis outnumbered other diseases almost throughout the year, bronchiolitis 117 (43.65%) were more common in late autumn and winter between November and February. Similarly, acute glomerulonephritis 73 (42.44%) were found more common between November and February. Around 43.06% (118) of Enteric fever and 44.59% (66) of acute infective hepatitis cases were concentrated in summer and rainy season between May to August.

Respiratory diseases, Sepsis and CHD were more common during infancy comprising 570 (43.57%), 392 (59.57%) and 153 (67.40%) cases respectively. Similarly Acute infective hepatitis (AIH), Enteric fever and AGN were seen more in children above five with the prevalence of 94 (63.51%), 162 (59.12%) and 122 (70.93%) cases respectively. (Figure 4).

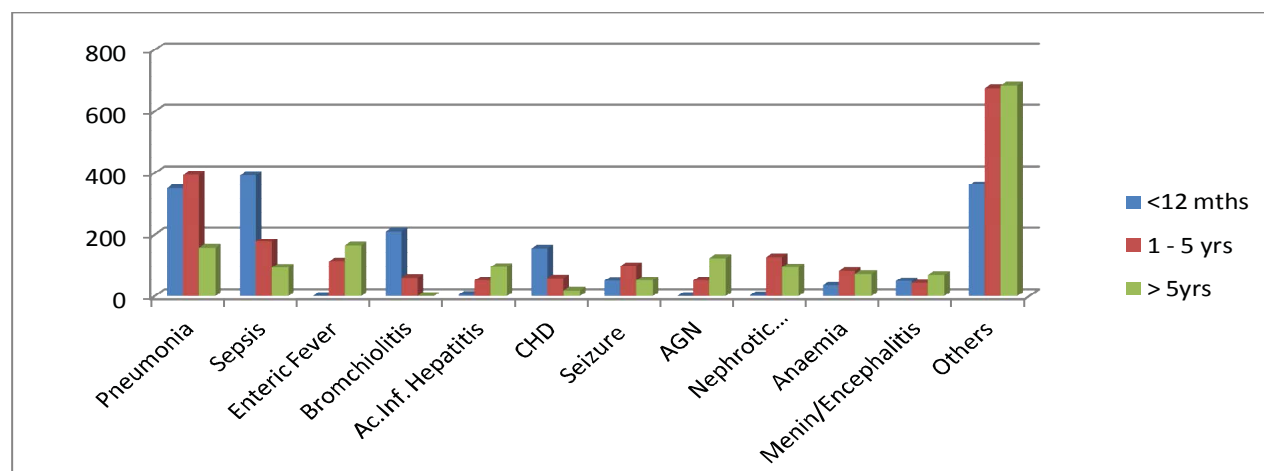


Figure 4. Commonest disease frequency in relation to age.

Majority of the admitted patients 4243 (83%) were from outside Kathmandu valley. Only 885 (17%) of the admitted patients belonged to the capital city.

The duration of stay in hospital were less than 5 days for maximum number of patients 2285 (44.55%) similarly 1712 (33.38%) patients were admitted for 5 to 7 days and 1131 (22.05%) patients for more than 7 days. Median duration of hospital stay was 5.34 days.

DISCUSSION

Age and sex distribution

Our study showed a male: female ratio of 1.7:1 among pediatric inpatients, which is higher than the earlier studies in country such as 1.43:1 in Nepal Medical College Teaching Hospital (NMCTH),³ and 1.45:1 in Lumbini Zonal Hospital (LZH)⁴. It is lower than that was reported in China (2.73:1)⁵ and India (2.7:1).⁶ Boys formed a disproportionately large number of all patient, a disparity that has been observed even in our neighboring countries as well.^{5,6} A more likely explanation for this gender disparity is that boys are more valued in our society and, therefore, receive preferential attention from the family during illnesses, however trivial they may be. Majority of the admitted children were below 5 years of age, as seen during earlier studies

at NMCTH³ and LZH⁴. The persistence of this observation calls to question, the effectiveness and the need for amendment and strengthening of child health programs which are targeted at the under-five population. Infants constitute half of under-five study population requiring admission thereby forming the leading age group which is almost same as that reported in Chandigarh, India.⁶ This may be related to the immaturity of the immune system which comes from the maternal antibody titer and decreases six months later⁵. Besides, physiological characters of infants make it easy to be attacked by virus and bacterium causing different infectious diseases.⁵ From the logistics standpoint, it implies that of all the material procured for patient care, most of them should be suitable for infants.

Pattern of Diseases:

The predominance of respiratory diseases like pneumonia and bronchiolitis, observed in our study, is similar with earlier studies done at NMCTH³ and LZH.⁴ Contrary to the previous studies^{3,4} our study revealed sepsis to be the second most common cause for admission, more so during infancy. Our finding of infants being predominantly affected by respiratory diseases and Sepsis corroborates with that of Duru C et al in Nigeria.⁷ The cause of high prevalence of respiratory illness and sepsis in this study can be attributed to improved health consciousness, especially during infancy, as well as early and easy referral to tertiary care hospital, as ours is the only largest tertiary

care pediatric hospital of the country.

Among 'Other infectious diseases' group, Tuberculosis and Scrub typhus were more common. Tuberculosis cases were less as compared to the study done in NMCTH³ and LZH.⁴ This is probably because of good coverage of DOTS program throughout the country. Besides, non-complicated tubercular cases like tubercular lymphadenitis were treated as out-patients. In our study Enteric fever was the commonest gastrointestinal disease requiring admission followed by Acute infective hepatitis and Diarrhea whereas Poudel et al at LZH⁴ found diarrhea to be more common. The most affected age group by enteric fever was above five years as shown in the previous study conducted in our center by Rai GK et al in the year 2012.⁸ These findings have shown that morbidity pattern of Enteric fever in our center has remained the same over year. This might be because children presenting with enteric fever often go unrecognized initially, leading to delays in diagnosis and treatment, which makes many parents to rush towards higher treatment center. Less admission of Diarrhea cases could be because we manage such cases in observation ward, next to emergency, and discharge from there, once dehydration is corrected. Only a few of them with complications get admitted to general ward. Besides, acute problems like diarrheal disease is widely treated in health post and sub-health post levels across the country as per IMNCI protocol. It could also be due to improved home management and use of oral rehydration solution as advocated in 'IMNCI program'. Indeed, further survey in the rural area of the country is required to reveal the awareness of home management of diarrhea.

Since 1999, Nepal government adopted the concept of IMCI Program, introduced by WHO and UNICEF, targeting major childhood diseases like pneumonia, diarrhea, malaria, measles, and malnutrition.⁹ Later, in 2014 it was upgraded to IMNCI to include newborn care.² After implementation of IMNCI program the prevalence of symptoms of ARI among children under age 5 in Nepal fell from 5% in 2011 to 2% in 2016.² According

to 2016 Cochrane review, globally, IMNCI was associated with a 15% reduction in child mortality when activities were implemented in health facilities and communities.¹⁰

Seizures, perhaps due to their acuteness and frightening visual impact, were the commonest neurological problem, accounting 40.24% (196) of neurological disorders as was seen in Chandigarh, India.⁶ Though the prevalence of febrile convulsions in our study was lower, meningitis and encephalitis cases were, much higher than that was seen in similar earlier studies conducted at NMCTH³ and LZH.⁴ This is attributed to the practice of managing febrile seizure cases in observation ward in our hospital and admitting only the complicated ones. The incidence of febrile elsewhere in the world varies from 0.35% to 14%.¹¹ Besides, probably because of the gravity of disease most cases of meningitis and encephalitis are referred to tertiary level pediatric hospital from periphery. Out of 607 renal cases, Nephrotic Syndrome was to top the list followed by, acute glomerulonephritis (AGN) and UTI. Patient load in each of these was higher than earlier studies.^{3,4} Contrary to our finding, Yadav S P et al found glomerulonephritis more common than nephrotic syndrome in Eastern part of the country.¹² The difference could be due to the type of referral cases received, as many nephrotic syndrome cases were reported to our center. But while considering the age, AGN was found more common in children above 5 years of age, which is supported by the finding of studies in Korea¹³ and eastern Nepal.¹²

Among cardiac patients Congenital heart disease (CHD) and Rheumatic fever/Rheumatic heart disease (RHD) were the commonest problems which is in accordance with the finding of Ramchandran U et al from Pokhara, Nepal.¹⁴ The reported frequency of CHD in children is influenced by the standards of health care facility and availability of cardiac services to detect and treat such cases out of the capital city. Our finding here agree that CHD is the commonest cardiac illness in children and RHD remains to be

the commonest acquired heart disease in developing and underdeveloped countries.¹⁵ High prevalence of rheumatic fever and RHD is attributed to the lack of awareness among parents, lower literacy rate, inadequate family planning, overcrowding and unhealthy hygienic practices that predisposes to the spread of Streptococcal infections.¹⁵ While considering the age, maximum number of children with CHD were picked up during infancy, as shown by the finding of Ramchandran U et al in Pokhara.¹⁴ Many lesions are amenable to surgery and early diagnosis will help to do these at the optimal time. This urges the need to establish facilities for early diagnosis of CHD out of the capital city also.

Almost 3.61% of the study population was anemic out of which 17.83% was iron deficiency anemia (IDA), followed by aplastic anemia and thalassemia. Reddy BL et al in India also found that IDA was the commonest anemia among children.¹⁶ As, severity of anemia has significant effect on cognition, early identification of IDA and iron supplementation may help in improving nutritional status and cognition domains in children.¹⁶

Seasonal trends:

Awareness of the seasonal variation in the incidence of common pediatric diseases is important for administrative planning of preventive action and for the peak season logistics. Seasonal variation was observed in admission volumes, with small peaks from August to October, which was almost similar as found in northeast Nigeria with the highest admission rate during September and October.¹⁷ These peaks in our study were associated with increased admission rates of respiratory and infectious disorders. Further investigation is required to determine the cause of these trends.

There was a strong seasonal variation in the incidence of common pediatric diseases. Enteric fever and acute infective hepatitis although prevalent throughout the

year, were more common during summer and rainy season in our study, as seen in Hyderabad, India.¹⁸ This high number of morbidity and hospital admission could be due to contaminated water, as only 30% of households in urban areas and 12% in rural areas follow appropriate water treatment practices prior to drinking. Another factor could be unhygienic practices in food preparations and poor excreta disposal causing water and food material contamination, as 15% of households still use a bush or open field for defecation.²

An increased number of visits for pneumonia and bronchiolitis during late autumn and early winter could be due to seasonal outbreak of respiratory viral infection during this period is similar to observations elsewhere.^{3,4,6} In consistent with the finding seen in Korea, acute glomerulonephritis was found more common during winter season which could be because PSGN secondary to pharyngitis more often occurs in the winter and spring.¹³

Pattern of hospital stay in our study was same as that found in other part of the country with maximum patients (44.55%) being discharged within five days of admission.^{3,4} Median duration of hospital stay was 5.03 days. Patients with complication of pneumonia, meningitis, Encephalitis, and nephrotic syndrome were found to have longer duration of stay.

Majority of the admitted patients were from out of the capital city. On one side, this reflects the varied geography of our catchment area. Simultaneously on the other side, greater number of cases in almost all sectors is accountable by the referral from periphery, for it being an academic center where post graduate training is conducted and which houses more pediatricians than any other government facility in the country.

There are certain limitations in our study. Since, it was conducted in a tertiary care hospital among hospitalized children; the result may not be generalized to the

community. Moreover, data collected retrospectively from record files of admitted children are inherently incomplete that questions the reliability of definitive clinical and laboratory-confirmed diagnoses.

CONCLUSIONS

Since the causes of admission are common childhood diseases like, pneumonia, bronchiolitis, sepsis and other community acquired infections and majority of the children affected being under the age of five, the age group that bears the highest burden of morbidity and mortality, government authorities needs to work in tune with each other and program like Integrated Management of Neonatal and Childhood Illness (IMNCI) needs to be strengthened and implemented more effectively, in resource poor country like ours. Besides, awareness of the seasonal variation in the incidence of common pediatric illness is important for administrative planning of preventive action and for the peak season logistics.

ACKNOWLEDGEMENT

We would like to thank Dr. Ganesh Kumar Rai, Director of Kanti Children's Hospital for his help and cooperation to undertake this study. The authors also wish to thank Ms Sabina Khadka for her technical assistance.

CONFLICT OF INTEREST: None

REFERENCES:

1. UNICEF, WHO, World Bank, UN-DESA Population Division. Maternal, newborn child and adolescent health: Levels and trends in child mortality Report. 2018. page 2-6.
2. Ministry of Health (MOH) [Nepal] NewEra, and ICF International Calverton, Maryland. Housing characteristic and household population, Child Health. Nepal Demographic and Health Survey 2016. Kathmandu, Nepal. 2017;9,204.
3. Upadhyay S, Sharma A, Rijal P, Shrestha S. Review of Paediatrics In-Patient at Nepal Medical College and Teaching Hospital. *J Nepal Paedtr Soc.* 2011;31(1):25-9.
4. Poudel KM, Sharma S. Review of Paediatrics Inpatient at a Zonal Hospital. *J Nepal Paediatr Soc.* 2012;32(3):239-44.
5. Liu Y, Liu J, Shamsi BH, Hao XX. Changes in the disease spectrum in hospitalized children in a county hospital of china. *J Nepal Paedtr Soc.* 2016 Jan-Apr;36(1):19-23.
6. Salaria M, Singhi S. Profile of patients attending pediatric Emergency service at Chandigarh. *Indian J Pediatrics.* 2003;78(8):621-4.
7. Duru C, Peterside O, Akinbami F. Pattern and outcome of admissions as seen in the paediatric emergency ward of the Niger Delta University Teaching Hospital Bayelsa State, Nigeria. *Niger J Paediatrics.* 2013;40(3):232-7.
8. Rai GK, Karki S, Prajapati B. Is Antimicrobial Resistance Pattern of Enteric Fever Changing in Kathmandu Valley? *J. Nepal Paediatr. Soc.* 2012 Sep-Dec;32(3):221-8.
9. Government of Nepal MoHaP, Kathmandu, Nepal. Annual Report In: Services DoH, ed. Child Health, Community Based Integrated Management of Neonatal and Childhood Illnesses 2017:44.
10. WHO. Towards a Grand Convergence for Child Survival and Health .A strategic review of options for the future building on lessons learnt from IMNCI. 2016.
11. Naik SA, Jan MA, Rafiq WA, Ahmad ST, Maqbool M. Febrile convulsions in preschool children Kashmir India. *International Journal of Contemporary Pediatrics* 2015;2(3):213-5.
12. Yadav SP, Shah GS, Mishra OP, Baral N. Pattern of Renal Diseases in Children: A Developing Country Experience. *Saudi J Kidney Dis Transpl* 2016;27(2):371-3.
13. Kuem SW, Hur SM, Youn YS, Rhim JW, Suh JS, Lee KY. Changes in Acute Poststreptococcal Glomerulonephritis: An Observation Study at a Single Korean Hospital Over Two Decades. *Child Kidney Dis* 2015;19:112-7.
14. Ramachandran U, Alurkar V, Thaplia A. Pattern of cardiac diseases in children in Pokhara, Nepal Kathmandu University Medical Journal. 2006;4(14):222-7.
15. Sharma P, Shakya U, KC. S, Shrestha M. Clinical profile and management of rheumatic heart disease children in a tertiary cardiac care center of Nepal. *Nepalese Heart Journal* 2016;13(2):33-6.
16. Reddy BA, Sharath VC, Eluzai Z. Prevalence and types of anemia among children at a tertiary care hospital. *Int J Contemp Pediatr.* 2018;5(4):1431-5.
17. Sa'ad YM, Haaytu A, Al-Mustapha II, Orachachi YM, Hauwa MU. Morbidity and mortality of childhood illnesses at the emergency pediatric unit of a tertiary hospital, north-eastern Nigeria. *Sahel Med Journal.* 2015; 18(1):1-3.
18. Kalyani D, Shankar K. Assessment and seasonal variations of communicable diseases: 3 year study *International Journal of Research in Medical Sciences.* 2016 April;4(4):1186-92.