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Pattern of Morbidity and Outcome of Hospitalized Children: A Retrospective Study in a Tertiary Care Hospital in West Bengal, India

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ABSTRACT: The pattern of morbidity and outcome of hospitalised children may be useful to a health planner in planning and designing a priority allocation of resources. In light of these concerns, we conducted this hospital-based retrospective study in the department of paediatrics at BankuraSammilani Medical College and Hospital (BSMCH) in West Bengal, India on hospitalised children aged 1 month to 12 years old who were admitted during the period of September 1, 2020 to February 28, 2021. All the relevant data like age, gender, length of stay (LOS) in the hospital and final diagnosis at the time of whatever the outcome was collected from the departmental patient's registry using predesigned proforma. The data was analysed by Epi Info (version 3.5.1) software. On analysis, a total of 2882 children with a male to female ratio of 1.85:1, were admitted to the ward of paediatric medicine during the study period. Infants, excluding neonates, accounted for 52.39% of total admissions, while under-5s accounted for 82.37%. The pneumonia contributed 31.12% of total admissions, which was followed by acute undifferentiated febrile illness (AUFI) (14.33%), the diseases of the nervous system excluding central nervous system infections (11.31%), and acute gastroenteritis (AGE) (8.40%). In terms of outcomes, 80.78% of children have been discharged home, while transfer to paediatric intensive care unit (PICU) for special care, transfer to elsewhere and left against medical advice (LAMA) were found to be recorded in 15.37%, 2.15% and 1.70% cases respectively. From this study it was concluded that respiratory diseases and the most vulnerable children under the age of five have been identified as two distinct category that require specific attention.

Keywords: Children, retrospective, morbidity, and outcome.

I. INTRODUCTION

Bankura is a district of West Bengal, India, with literacy rates of 81% for men and 60.44% for women. The proportion of children (0-6 years) in the overall population (3596292) is 11.21%, with a male to female kid ratio of 1.06:1 [1]. It has a government medical college, BankuraSammilani Medical College and Hospital that provides medical education, research, and health care to residents of the Bankura district, surrounding districts, and even neighbouring states [2]. It is located in the eastern region of our nation, India, and is one of the drought-prone places.

India is the world's second-largest democratic country, and home to about 19% of the world's children [3]. There have been substantial variations in our country's health indices throughout the country and states [4]. It's to be expected, given the diversity of cultures and behaviours found within a single boundaries, as well as the prevalence of environmental diversity, disparities in health-care facilities, and variable literacy rates. Infections such as respiratory tract infections, acute gastroenteritis, malaria, and whooping cough are the primary causes of morbidity and early mortality among children in impoverished countries. Acute respiratory infections, fever, diarrhoea, and malnutrition are major morbidities among children in India [5]. Respiratory tract infections and diarrhoea are two of the most common infectious diseases in children [6,7].

Continuous changes in environmental factors, rapid urbanisation, changes in human activities, changes in an individual's socioeconomic status, and parental cultural beliefs and practises all have an impact on children's health, and an estimate of the burden of different diseases can

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help a health planner in planning and designing a priority allocation of resources. With these concerns in mind, we undertook the first retrospective analysis of its kind since the medical college's establishment in 1956 in this western part of West Bengal.

II. OBJECTIVES

The goal of this study was to look into the pattern of morbidity and the outcomes of children who were admitted to the hospital.

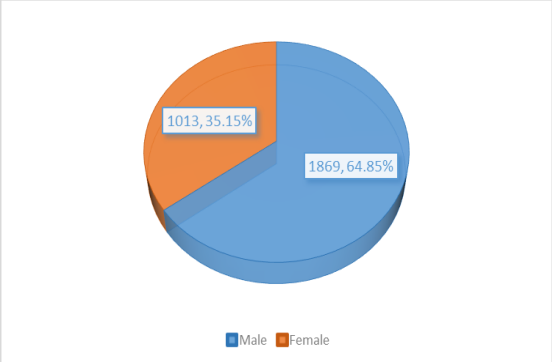
III. METHOD

We undertook a medical audit on children aged one month to twelve years old who were admitted to the hospital between September 1, 2020, and February 28, 2021. Infants under the age of 28 days, as well as children beyond the age of 12, have been excluded. This research excluded children with chronic haemolytic anaemia who were cared for in designated thalassemia day care centres, as well as those with haemophilia, von Willebrand's disease, and thrombosthenia. Readmissions were counted as fresh enrolments. Upon admission, all of the children got routine care as per unit policy and were subjected to various tests for diagnosis and management. Patients that needed special attention were transferred to PICU and treated accordingly. The outcome was categorised into : (i) discharged from the hospital following a satisfactory recovery. (ii) Transfer to the PICU, (iii) Transfer to a different health care institution for super speciality treatment, and (iv) Left against medical advice (LAMA). Using a predesigned proforma, all relevant data such as age, gender, length of stay (LOS) in the hospital, and final diagnosis at the time of whatever the outcomes was retrieved from the departmental patient's register. Epi Info (version 3.5.1) software was used to analyse the data, which was placed into a Microsoft Spread Sheet. The median, mean, and standard deviation were used to measure continuous data, whereas proportions and ratios were used to measure categorical variables.

IV. RESULTS

During the research period, a total of 2882 children were admitted. Male children accounted for 1869 (64.85%) of the total, while female children accounted for 1013 (35.15%) (Figure 1).

Figure 1: Pie chart depicts gender-wise morbidity



1.85:1 was the male-to-female ratio. The average age of the youngsters admitted was 2.60 ±3.14 years (minimum-0.08 years, maximum-12 years, and median-1 year). Infants, excluding new-borns, accounted for 52.39% of all admissions (n=1510). It was discovered that 82.37% (n=2374) of children under the age of five were affected (Table 1).

Table 1: Shows age and gender-wise distribution of morbidity

Gender /Age	1month – 1year	1-5 years	5-10 years	>10 years	Total (%)
Male	996	545	262	66	1869 (64.85)
Female	514	319	149	31	1013 (35.15)
Total (%)	1510 (52.9)	864 (29.98)	411 (14.26)	97 (3.37)	2882 (100)

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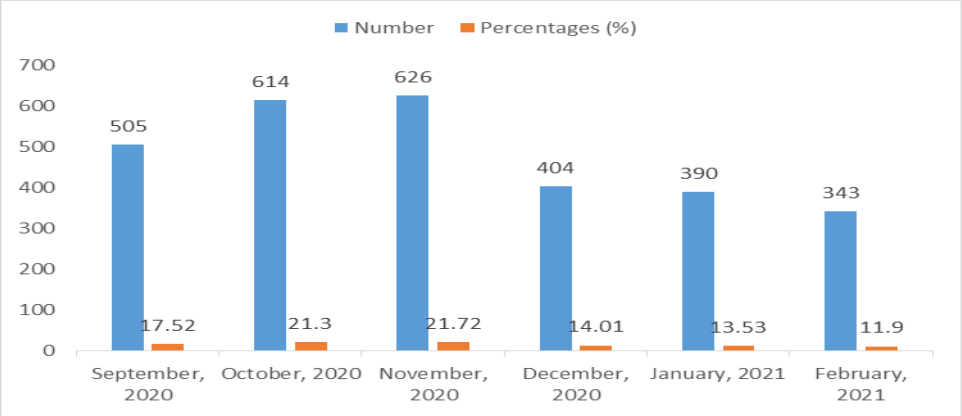
The most children were admitted in November 2020 (21.72%), followed by admittance in October 2020 (21.30%) (Figure 2).

Figure 2: Bar diagram illustrating month-wise admission



Morbidity patterns among hospitalized children are classified according to ICD-10-CM. Respiratory system was the most common organ involved (n=1221, 42.36%), which was followed by central nervous system (CNS) (n=326, 11.31%) excluding CNS infections. Enteric fever, urinary tract infection, dengue fever, malaria, rickettsial diseases like scrub typhus, meningitis and meningoencephalitis, septicaemia, and undefined fever were all included in the AUFI category, and accounted for 14.33% (n=413). Of the AUFI category, most common was undefined fever (n=156), and which contributed 5.41% of total admission, while malaria contributed only 0.03% (n=1). Snake envenoming and unknown bites, as well as unintentional poisoning, were identified in 3.99% (n=115) and 2.29% (n=66) of hospitalised children, respectively. Considering the individual pattern of diseases, pneumonia, convulsion (both primary seizure disorder and febrile seizure), and acute gastroenteritis (AGE) accounted for 31.12% (n = 897), 10.44% (n = 301), and 8.40% (n = 242) of total admission, respectively. In barely 0.07 % (n = 2) of instances, the new threat to humanity, nCovid-19 infections, was uncovered. Table 2: Shows gender-wise pattern of morbidity.

Table 2: Showsgender-wise pattern of morbidity

ICD-10 – CM	Name of the system involved	Male	Female	Total (%)
G00-G99	Nervous system	196	130	326 (11.31)
	Primary seizure disorder	119	71	190 (6.59)
	Febrile seizures	70	41	111 (3.85)
	Others	7	18	25 (0.87)
J00-J99	Respiratory system	816	405	1221 (42.36)
	Pneumonia	595	302	897 (31.12)
	Bronchiolitis	85	31	116 (4.02)
	*HAD	134	72	206 (7.14)
	nCovid-19	2	0	2 (0.07%)
I00-199	Cardiovascular system	17	16	33 (1.15)
K00-K95	Gastrointestinal system	200	112	312 (10.83)
	*AGE	159	83	242 (8.40)
	Others	41	29	70 (2.43)
N00-N99	Genitourinary disorders (except *UTI)	54	16	70 (2.43)
D00-D89	Haematopoietic system	102	45	147 (5.10)
L00-L99	Skin and appendages	2	2	4 (0.14)
E00-E89	Endocrine disorder	6	5	11 (0.38)
R76.9	Immunological disorder	6	5	11 (0.38)
C00-D49	Malignant disorder	19	13	32 (1.11)
T63.001A	Animal bite	81	34	115 (3.99)

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	Snake envenomation	27	7	34 (1.18)
	Unknown bite	54	27	81 (2.81)
T50.901A	Accidental poisoning	45	21	66 (2.29)
W69.XXXA	Near drowning	5	6	11 (0.38)
R50.84	*AUFI	259	154	413 (14.33)
	Scrub Typhus	44	29	73 (2.53)
	*CNS infections	43	20	63 (2.19)
	Enteric fever	20	9	29 (1.00)
	UTI	19	13	32 (1.11)
	Sepsis	33	20	53 (1.84)
	Dengue	2	4	6 (0.21)
	Malaria	1	0	1 (0.03)
	Undefined fever	97	59	156 (5.41)
A15-A19	Tuberculosis	12	11	23 (0.80)
E43	*SAM	0	2	2 (0.07)
Y83.9	Surgical disorders	49	36	87 (3.01)
	Total	1869	1013	2882 (100)

***HAD – hyperactive air way disease, AGE – acute gastroenteritis, UTI – urinary tract infection, AUFI – acute undifferentiated febrile illness, CNS – central nervous system, and SAM – severe acute malnutrition.**

In terms of outcomes, 80.78% of the children were being sent home after making satisfactory progress, while 15.37% (n=443) were admitted to the PICU for further monitoring and treatment. Transfer to a different health-care facility for super speciality treatment, and LAMA were detected in 2.15% (n=62) and 1.70% (n-49) of patients, respectively (Table 3).

Table 3: Shows pattern of outcome among hospitalized children

Pattern of outcome	Number	Percentages (%)
Discharged home	2328	80.78
Transfer to PICU	443	15.37
Referred to elsewhere	62	2.15
LAMA	49	1.70
Total	2882	100

All children with critical conditions were relocated to the PICU, therefore there were no deaths on the paediatrics ward. The average length of stay in the ward was 4.11±4.46 days, with a minimum of 1 day and a maximum of 63 days. The bed occupancy rate (BOR) was reported to be 81.86%.

V. DISCUSSION

We are all aware that illness is the result of a complex interplay between the environment, the host, and the agents. Any changes of these variables can have a substantial influence on a person's health. Environmental factors, rapid urbanisation, changes in human activities, changes in an individual's socioeconomic status, and parental cultural beliefs and practises all have an impact on children's health, and an estimate of the burden of various diseases may be useful to a health planner in allocating resources on a priority basis. To our knowledge, there are just a few studies in the nation that estimate the illness burden among children. With these concerns in mind, we undertook the first retrospective analysis of its kind since the medical college's establishment in 1956 in this western part of West Bengal.

From September 1, 2020, to February 28, 2021, we studied 2882 children who were admitted to BSMCH's paediatric department with various medical conditions. There were 65.03% males (n=1869) and 34.97% females (n=1013) among the 2882 children. The male to female ratio was 1.85:1, which is close to a Nepalese research by Adhikari P et al. [8], which found a male to female ratio of 1.8:1. Male prevalence has also been documented by other researches too [5,9,10, 11]. The greater rate of male child admittance might be attributable to parental gender preference of health-seeking behaviour in favour of son, disparities in children's activities, male kid’s genetic predisposition to be impacted, and last but not least, community gender imbalance. Infants made up 52.39% (n=1510) of the total admissions in our research, excluding

new-borns. This is in line with the findings of Verma S et al. and Panda P et al., who found that infants are more susceptible to sickness than children of various ages [5,12]. In terms of children under the age of five, our research found that they accounted for 82.37%(n=2374) of overall admissions, whereas Verma S et al. reported 73.40% [5].This variance might be related to a variety of factors, including environmental differences, parental cultural attitudes and practises, and variation in prevalence of diseases in the community. Because of their underdeveloped immune systems, infants are more vulnerable to various health risks such as infections. They're also vulnerable to non-infectious health risks, such as protein energy malnutrition (PEM), which puts a vulnerable one at risk of infection. PEM can be caused by a variety of factors, including a lack of understanding regarding exclusive breast feeding, both early and late weaning, inter-current infections, and adaptation to faulty feeding practices.

In terms of involvement of respiratory system, pneumonia, bronchiolitis, hyperactive airway disorders, and nCovid-19 were detected in 31.12% (n=9897), 4.02% (n=116), 7.14% (n=206), and 0.075 (n=2) of total admissions, respectively, in our research. These four together accounted for 42.36% (n=1221) of all cases, which is comparable to the findings of Venketesh et al.[13] and Adhikari P et al [8], who found that acute respiratory tract infections (ARI) were responsible for 42% and 38.5% of morbidity, respectively. Even though there is a large gap in research time, Venketesh S et al. did their study about 35 years ago, revealing that ARI morbidity is as high as in our study and the study of Adhikari P et al. This observation led to the conclusion that, despite improvements in all spheres of the health sector, including infrastructure, good coverage of vaccines against vaccine-preventable diseases, inventions of new drugs and biotechnologies aimed at patient care, and improvements in individuals' level of education and socioeconomic status, we were still seeing the problem that Venketesh S et al had seen, and that it could be due to environmental pollution of different sources. Henceforth, ARI is still a public health issue as a result of these factors working together and requires in-depth investigations further.

Acute gastroenteritis (AGE) was responsible for 8.40% (n=242) of morbidity in our research, which is comparable to the results of Adhikari P et al.[8] and Verma S et al.[5], who found 7.7 percent and 10.86% of morbidity attributable to gastroenteritis, respectively. Because the majority of AGE cases are treated in community, primary, and secondary health care facilities, this is not a realistic depiction of disease burden attributed by it. In our research, no one died from AGE, which was made feasible by improvements in hand and food cleanliness, safe water supply, uses of sanitary latrine, and knowledge of how to make and utilise oral rehydration salts.

In aggregate, respiratory tract infections (42.36%) and gastrointestinal infections (8.40%) accounted for more than half of overall morbidity (50.76%). We extrapolated from this observation that communicable illnesses are now prevalent in this section of our country.

AUFI accounted for 14.33% (n=413) of the morbidity in our research. Enteric fever, scrub typhus, malaria, dengue fever, urinary tract infection, septicaemia, meningitis and meningoencephalitis, and undefined fever are all included in the AUFI. Although nation-wide data is not available, scrub typhus is currently being reported from all sections of the nation, and its contribution in our research was 2.53% (n=73). Undefined fever was observed in 5.41% (n=156) of the participants in our research. Of the AUFI (n=413), undefined fever accounted for 39.47% (n=163), which is comparable to the studies done by different researchers, who reported that undefined fever ranges from 14.9% to 54.31% [14,15,16].

Malaria accounted for only 0.03 % of all admissions (n = 1) in the current study. Our findings contradict the observations of Srivastav S et al., who observed that 2.4 % of the study population had malaria [3]. This variance might be owing to a lack of mosquito breeding sites and infection reservoirs in this region of the nation.

In our current study, morbidity associated with nervous system involvement was found to be 11.31% (n=326), excluding CNS infections, which were classified as AUFI. Primary seizure disorder accounted for 6.59% of all hospitalizations (n=190), while febrile seizures accounted for 3.85% (n=111). This is comparable to Shinnar S's findings that febrile seizures affect 2 to 5% of children under the age of five, with a peak incidence in the second year of life [17]. We observed that children aged 1 to 5 years accounted for 72.07% (n=80) of the 111 cases of febrile seizure, whether simple or complex, in our current study. The remaining 27.92% (n=31) were between the ages of 6 months and one year. Vander Berg BJ found that 7.3 percent of children experienced febrile seizures in his research, which contradicts our findings [18]. In terms of total seizure disorder,

we found 10.44% (n=301), which is comparable to the 12.68% found in a research by Roy RN et al. from Kolkata [19].

Animal bites, particularly by snakes, and near drowning are also common health hazards in rural areas. Our findings revealed that 3.99% (n=115) of children had experienced animal bites, including snake envenomation, accounting for 1.18% (n=34) of morbidity, while near drowning accounted for 0.38% (n=11). These two findings were not only distinct, but they also supported the location of medical institution where the study was done.

Severe acute malnutrition (SAM) and nCovid-19 infection both contributed 0.07% (n=2) of overall morbidity in our research. SAM was only found in female children in our study, which might be owing to parental gender preferences in child rearing practises. The nCovid-19, a new threat to mankind, has been detected in male children, which is analogous to a research conducted by Bwire GM, which indicated why men are more prone to nCovid-19 infections [20].

Tuberculosis (both pulmonary and extrapulmonary), a disease that has been observed in humans for over 5000 years [21], accounted for 0.8% (n=23) of the overall morbidity in our research.

In our present study, so far as outcome is concerned, 80.78% (n = 2328), 15.37% (n = 443), 2.15% (n = 62), and 1.70% (n = 49) of the children in our research have been discharged home, transferred to PICU, referred to a higher centre, and received LAMA, respectively. Tyagi BB et al. from Uttarakhand conducted similar research and found that 65.5% of those treated were discharged as cured, 20.9% were relieved, 10.1% were LAMA, and 2.4% were referred [22].

The mean LOS in hospitals in our research was 4.11±4.4 days, ranging from 1 day to 63 days, which is comparable to 4.43 days reported by Adhikari P et al. [8]. It was 81.86% when it came to bed occupancy rate (BOR). In contrast to our study, Tyagi BB et al. reported a BOR of 135.3% [22], which is significantly higher than ours. This could be due to a difference in study centre level, i.e., our study location was at the tertiary level of care, whereas Tyagi BB studied at the secondary level of care, with different bed strengths.

Because this study focused on children admitted over a six-month period, from September 1, 2020, to February 28, 2021, the actual seasonal variation could not be ascertained, but brief epidemiological trends could be inferred, and it was observed that peak admissions occurred during the post-monsoon months of October and November. The maximum admissions were documented by Adhikari P et al. and Tyagi BB et al. in the months of August/September and May/June, respectively [8,22].

Strength of our study: This was the first study of its kinds from our department since the inception of this rural West Bengal medical college, and it was a study that showed animal bites and near drowning as patterns of morbidity supporting rural health hazards.

Limitation: First, because it is retrospective, it contains some recall bias and incomplete data, culminating in an interpretation error. Second, because this was a hospital-based study, it was unable to determine the true burden of a disease in a community. Third, because our study focused on children admitted throughout the course of six months of a calendar year, no genuine seasonal fluctuation could be detected.

VI. CONCLUSION

Respiratory illnesses and the most vulnerable children under the age of five have been highlighted as two separate groups that require special attention in terms of resource allocation and health-care facilities at all levels, from community to tertiary level of care.

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