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Incidence and prevalence of infectious and non infectious diseases in paediatric patients in Warangal region

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Abstract
Introduction: Paediatrics is the sole discipline concerned with all aspects of the well-being of infants, children, and adolescents, including their health; their physical, mental, and psychologic growth and development; and their opportunity to achieve full potential as adults. An infectious disease can be defined as an illness due to a pathogen or its toxic product, which arises through transmission from an infected person, an infected animal, or a contaminated inanimate object to a susceptible host.
Materials and Methods: A prospective Observational study was conducted for a period of 6 months in Sri Venkateshwara Children's Hospital and Mahatma Gandhi Memorial Hospital after obtaining the approval from the Institutional Ethical Committee. Children's with Infectious and Non infectious diseases of age below 12 years were included in this study. Exclusion criteria include the children of age above 12 years.
Results: A total number of 480 paediatric population was included in the study. The prevalence of Infectious diseases was found to be 77.08 % and non-infectious diseases was found to be 22.9 %. 61.04 %belong to rural areas and 38.95 % belong to urban areas.
Conclusion: Our results conclude that the prevalent and frequently occurring infectious and non-infectious diseases in paediatrics is more in case of pneumonia and neonatal jaundice in non-infectious diseases. The prevalence of both infectious and Non infectious diseases are greater in Rural areas than in urban areas. Clinical Pharmacist plays a major role in the reduction of infectious diseases.

Keywords: Infectious disease, non-infectious disease, pneumonia, neonatal jaundice

Introduction
Paediatrics is the sole discipline concerned with all aspects of the well-being of infants, children, and adolescents, including their health; their physical, mental, and psychologic growth and development; and their opportunity to achieve full potential as adults [1].
An infectious disease can be defined as an illness due to a pathogen or its toxic product, which arises through transmission from an infected person, an infected animal, or a contaminated inanimate object to a susceptible host. Lower respiratory tract infections, diarrheal diseases, HIV/AIDS, malaria, and tuberculosis (TB) are among the top causes of overall global mortality [1].
Infectious diseases also include emerging infectious diseases; diseases that have newly appeared (e.g., Middle East Respiratory Syndrome) or have existed but are rapidly increasing in incidence or geographic range (e.g., extensively drug-resistant tuberculosis (XDR TB) and Zika virus (Morse, 1995). Infectious disease control and prevention relies on a thorough understanding of the factors determining transmission [2].
Infectious diseases account for almost half of the 5.9 million children under 5 years of age who die each year. Infections such as pneumonia (16 %), diarrhoea (9 %), neonatal sepsis (7 %), and malaria (5 %) account for a large proportion of under-5 deaths worldwide. Importantly, of the 2.7 million neonatal deaths each year, 23 % are due to infection-related causes including sepsis (15.1 %), pneumonia (6 %), tetanus (1.3 %), and diarrhoea (0.6 %). However, in the late neonatal period, nearly half of the deaths are due to infection. With the progressive rise in antimicrobial resistance and growing incidence of emerging infections, infectious diseases continue to pose a considerable challenge to neonatal and child health [3].
A Non-Communicable Disease (or NCD) is generally agreed to be a medical condition or disease which is non-infectious, of long duration and generally slow progression. Sometimes referred to as "chronic diseases", NCDs threaten human health, development and the

achievement of the Millennium Development Goals. Worldwide, NCDs currently represent 63 % of global deaths (36 million deaths) and 80 % of these are in low and middle-income countries. Left unchecked, it is estimated that NCDs will be responsible for 73 % of all deaths by 2020. Most of this increase will be accounted for by emerging NCD epidemics in developing countries [4].

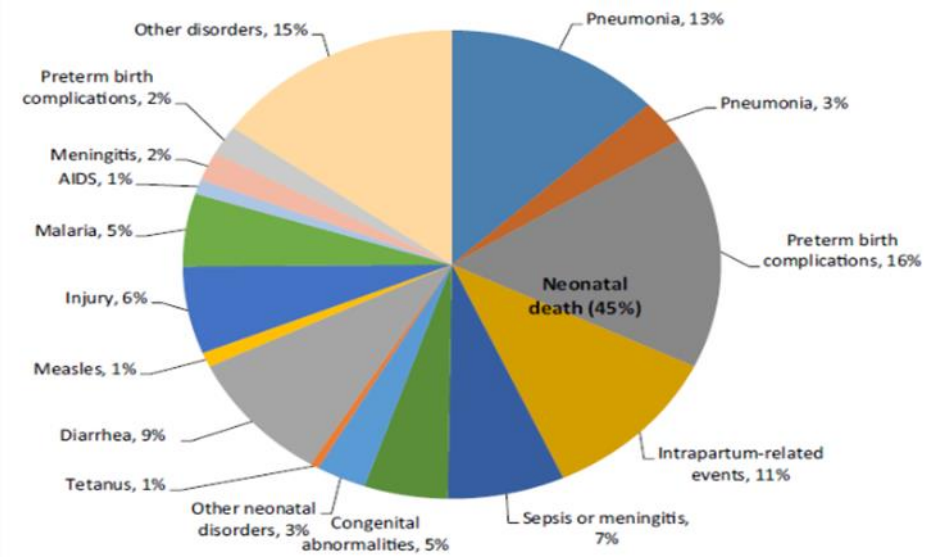

Fig 1: Shows Global causes of child deaths (low-and middle income countries). [3]

Of the annual burden of 10 million deaths among children under 5 years, a large proportion is associated with infectious diseases. These include 36 % of the 4 million new born deaths due to sepsis, pneumonia, diarrhoea, and tetanus. Among the post neonatal deaths due to infections, estimates and uncertainty bounds include: 22 % of deaths attributed to diarrhoea (14–30 %), 21 % to pneumonia (14–24 %), 9% to malaria (6–13 %), and 1% to measles (1–9 %). Some 42 countries alone account for almost 90% of the global burden of child mortality [5].

Most commonly occurring infectious diseases in paediatrics

Pneumonia

Pneumonia remains a major contributor to mortality and morbidity worldwide in all age groups and is the leading cause of death in infants and children globally, exceeding the combined mortality of malaria, tuberculosis and HIV infection. Pneumonia is generally more prevalent in low- and middle-income countries. Incidence is highest at the extremes of ages such as the elderly and infants. The overwhelming majority of pneumonia deaths in infants and young children occur in low-income settings [6].

Acute gastroenteritis

Diarrhoeal diseases are one of the leading causes of illness and death in children <5 years of age, particularly those in low-income countries, and cause >500,000 deaths per year globally. Before 1970s, the aetiologic agent in many cases of infantile gastroenteritis was not identified, but a breakthrough occurred in 1973 with the identification of virus particles in duodenal biopsy samples from children with severe diarrhoea and in faecal samples from children with acute diarrhoea [7].

Non infectious diseases in paediatrics

Neonatal jaundice

Neonatal hyperbilirubinemia is a common clinical problem encountered during the neonatal period, especially in the first week of life. Nearly 8 % to 11 % of neonates develop hyperbilirubinemia [8].

According to National Neonatal-Perinatal Database (NNPD) the incidence of neonatal hyperbilirubinemia in in-house live-births is 3.3 %, while in extramural admissions morbidity due to hyperbilirubinemia accounted for 22.1 %. In neonates, the dermal icterus is first noted in the face and when the bilirubin level rises, it proceeds to the body and then to the extremities. This condition is common in 50 %-60 % of new borns in the first week of life [8].

Materials and Methods

A prospective Observational study was conducted for a period of 6 months in Sri Venkateshwara Children's Hospital and Mahatma Gandhi Memorial Hospital after obtaining the approval from the Institutional Ethical Committee. Children's with Infectious and Non infectious diseases of age below 12 years are included in this study. Children. Exclusion criteria include the children of age above 12 years. Necessary information was collected from the case sheets and by interviewing the care takers and reviewing the case records.

Results

Out of 480 cases, 370 (77.08 %) were Infectious diseases and 110 (22.9 %) were non-Infectious diseases. Of 480 cases, the most frequently observed infectious disease was pneumonia (34.5 %) and least frequently observed infectious disease was measles (0.28 %), the most frequently observed Non-infectious disease condition was neonatal Jaundice (9.3 %) and the least prevalent Non infectious diseases was diabetes mellitus (1.81 %). Of 480 Pediatrics patients, 293 (61.04 %) belongs to rural areas and 187(38.95 %) belongs to urban areas.

Out of 480 pediatric patients, the age group of paediatrics who are more prevalent to both infectious and Non infectious diseases are Infants 193 (40.2 %) and the least prevalent are Neonates 77 (16.04 %).

Of 370 infectious diseases, different infectious diseases are pneumonia 166(44.86 %), Acute GE 62 (16.72 %), LRTI 41(11.08 %), Neonatal Septicemia 30 (8.10 %), UTI 10 (2.70

%), Broncholitis 09 (2.43 %), Typhoid 09 (2.43 %), Meningitis 08 (2.16 %), Sepsis 08 (2.16 %), Dengue 06 (1.62 %), URTI 06 (1.62%), Mumps 05 (1.35 %), Viral Hepatitis 04 (1.08 %), GERD 03 (0.81%), TB 02 (0.54 %), Glomerulonephritis 02 (0.54 %) and Measles 01 (0.27 %) of 110 Non-infectious diseases, different non infectious diseases are neonatal Jaundice 45 (40.9 %), seizures 32 (29.0 %), asthma 12 (10.9 %), anemia 12 (10.9 %), CHD 05 (4,54 %) and diabetes mellitus 02 (1.81 %).

Of 77 Neonatal population, the most prevalent disease is Neonatal Jaundice 30 (38 %) and the least prevalent disease is Seizures 01 (1.2 %). Of 193 Infants population, the most prevalent disease is Pneumonia 77 (39.8 %) and the least prevalent disease is TB 01 (0.51%). Of 106 Young Children population, the most prevalent disease is Pneumonia 42 (39.6 %) and the least prevalent disease is TB 01 (0.94 %). Of 104 Child population, the most prevalent disease is Pneumonia 40 (38.4%) and the least prevalent disease is TB 01 (0.96 %).

Table 1: Distribution of data on different diseases

S. No	Disease	Number	Percentage
1.	Pneumonia	166	34.5 %
2.	G.E	62	12.9 %
3.	LRTI	43	8.5 %
4.	Seizures	33	6.8 %
5	Neonatal Jaundice	30	6.25 %
6.	Neonatal Septicemia	30	6.25 %
6.	Anemia	14	2.91 %
7.	Asthma	12	2.5 %
8.	UTI	12	2.5 %
9.	Broncholitis	09	1.8 %
10.	Typhoid	09	1.8 %
11.	Sepsis	09	1.8 %
12.	Meningitis	09	1.8 %
13.	Dengue	06	1.25 %
15.	URTI	06	1.2 %
16.	CHD	06	1.2 %
17.	Mumps	06	1.2 %
18.	Viral Hepatitis	05	1.04 %
19.	GERD	05	1.04 %
20.	Glomerulonephritis	04	0.8 %
21.	TB	03	0.6 %
22.	Diabetes Mellitus	02	0.4 %
23.	Measles	01	0.28 %

Table 2: Age wise distribution of data

S. No	Age group	Number of cases	Percentage
1.	Neonates (1 day- 1 month)	77	16.04 %
2.	Infants (1 month- 2 years)	193	40.2 %
3.	Young Child (2 years- 6 years)	106	22.08 %
4.	Children (6 years- 12 years)	104	21.6 %
Total		480	

Table 3: List of Diseases in Neonates and Infants

S. No	Disease	Number of cases	Percentage
1.	Pneumonia	84	31.1 %
2.	Acute G.E	31	11.4 %
3.	Neonatal Jaundice	30	11.1 %
4.	Neonatal Septicemia	30	11.1 %
5.	LRTI	30	11.1 %
6.	Seizures	17	6.29 %
7.	Anemia	08	2.96 %
8.	Meningitis	06	2.22 %
9	UTI	05	1.85 %
10.	URTI	05	1.85 %
11.	Brocholitis	04	1.48 %
12.	Asthma	04	1.48 %
13.	Sepsis	03	0.625 %
14.	CHD	03	0.625 %
15.	Mumps	02	0.74 %
16.	Typhoid	02	0.74 %
17.	Viral Hepatitis	01	0.37 %
18.	GERD	01	0.37 %
19	TB	01	0.37 %
20.	Dengue	01	0.37 %

Table 4: List of diseases in Young child and Child

S. No	Disease	Number of cases	Percentage
1.	Pneumonia	82	39.6 %
2.	Acute G.E	31	14.7 %
3.	Seizures	16	6.6 %
4.	LRTI	13	6.1 %
5.	Asthma	08	3.8 %
6.	Typhoid	07	3.3 %
7.	UTI	07	3.3 %
8.	Anemia	06	2.8 %
9.	Sepsis	06	2.8 %
10.	Broncholitis	05	2.3 %
11.	Dengue	05	2.3 %
12.	GERD	04	1.9 %
13.	Mumps	04	1.9 %
14.	Viral Hepatitis	04	1.9 %
15.	CHD	03	1.42 %
16.	TB	03	1.42 %
17.	Meningitis	02	0.94 %
18.	Measles	1	0.4 %
19.	URTI	1	0.4 %

Discussion

In a study conducted by Amira M Khan *et al.*, [9] the Infectious diseases account for almost half of the 5.9 million children under 5 years of age who die each year. Infections such as pneumonia (16 %), diarrhoea (9 %), neonatal sepsis (7 %), and malaria (5 %) account for a large proportion of deaths in children under the age of 5years worldwide. Importantly, of the 2.7 million neonatal deaths each year, 23 % are due to infection-related causes including sepsis (15.1 %), pneumonia (6 %), tetanus (1.3 %), and diarrhoea (0.6 %). In our study we observed 16 different infectious diseases and of which pneumonia accounts for 44.86 %, Acute gastroenteritis 16.75%, Lower respiratory tract infection 11.08 %, Neonatal septicaemia 8.1%, Urinary tract infections 2.70 %, Typhoid 2.42 %, Broncholitis 2.43 %, Meningitis 2.16 %, sepsis 2.16 %, Glomerulonephritis 1.81%, Urinary tract infections 1.62 %, Dengue 1.62% Mumps 1.35%, Gastroesophageal reflux disease 0.81%, Tuberculosis 0.64 % and Measles 0.27 % In 7 different non-infectious diseases such as Neonatal jaundice 40.9 %, Seizures 29 %, Asthma 10.9 %, Anaemia 10.9 %, Congenital heart disease 4.5 % and Diabetes mellitus 1.81% was observed.

Many studies have shown that rural areas as a risk factor for contracting an infections Leighton P *et al*. [10] In our study we not only found that rural areas as a risk factor for contracting an infections, but also found that children in rural areas are more prone to infections (61.04 %) when compared to children in urban areas (38.95 %) because of improper maintenance of hygiene condition, lack of awareness on health.

One study indicated that increased susceptibility to infections during infancy has been associated with quantitative and functional differences in the specific immune responses generated and a lack of pre-existing immunological memory in newborns compared with adults Maximilian Muenchhoff *et al*. [11] In our study we have observed that among neonates, infants, young child and child, infants are frequently hospitalized because of infections (40.2 %).

A Study conducted by Iyer *et al*. [12] concluded that majority of the patients were diagnosed with pneumonia (76.6 %) followed by bronchiolitis (6.9 %). Anaemia (61 %) was the most common concurrent condition followed by gastrointestinal complaints (5 %) and congenital heart disease (4 %). Our study supports authors conclusion which shows pneumonia 34.5 % (n=166) is most prevalent. The possible reasons could be seasonal changes (Winter season) and in a study done by pramil *et al*. [13] observed that winter has low humidity and high dust potentially damage immune barriers, carry pathogen risk.

According to the study by Stephen RC Howie *et al*. [6] concluded that pneumonia is the leading cause of deaths in infants and young children between the age of 1 month to 5 years of age worldwide and a common cause of death in new-borns (<1 month of age). Pneumonia accounted for around one-fifth of deaths in children under the age of 5yrs globally in 2011 more than malaria, HIV and tuberculosis combined. In our study we observed that pneumonia is the most commonly occurred infection in both urban (41.1%) and rural areas (30.37%).

Igor Rudan *et al*.,[15] in their study concluded that paediatrics are frequently exposed to pneumonia because of Malnutrition, Low birth weight (< 2500 g), Non-exclusive breastfeeding (During the first 4 months of life), Lack of measles immunization (Within the first 12 months of life) high altitude (Cold air) and out- door air pollution. Our study supports the author's conclusion, which shows exposure to cold air, out-door air pollution and malnutrition is major risk factors for pneumonia in children.

Carolyn G. Scrafford *et al*. [8] shows that Worldwide, it is estimated that 10.5 % of live births require phototherapy for jaundice and Nepal estimates are in the range of 3–6 %. Research from a hospital-based study in Dharan (Eastern), Nepal found that 9.2% of infants admitted to the neonatal intensive care unit (NICU) had pathologic jaundice. Estimates from recent studies show 6.7% in Lagos, Nigeria and 10.5 % and 25.3 % in term and near-term (35–37 weeks) new-borns, respectively, in Turkey. In our study most frequently occurred non infectious diseases is neonatal jaundice 40.9 % which required phototherapy. A total of 110 patients were exposed to non-infectious diseases out of which 40.9% (n = 45) were having neonatal jaundice.

A study conducted by Kari Modalsli Aaberg, MD *et al*. [16] showed that approximately 1 out of 150 children is diagnosed with epilepsy during the first 10 years of life, with the highest incidence rate observed during infancy. In this nationwide child cohort, they found an incidence rate of epilepsy of 144

per 100,000 person-years in the first year of life and 58 per 100,000 person-years through the following years up to age 10 years. We have observed that epilepsy is second most frequently occurring disease. A total of 110 patients, out of that 29.0 % (n = 32) were exposed to seizures disorder which is one of the non-infectious disease.

A study conducted by Habib Farooqui *et al.* [17] concluded that the estimated incidence of severe pneumonia was 30.7 % per 1000 children per year in those less than 5 years of age. In our study we have observed that pneumonia is most prevalent infectious disease (34.5 %) in children of age less than 5 years. Ezeonwu BU *et al.* [18] in their study concluded that the children aged above 5 years had the prevalence of pneumonia (19 %). In our study we have observed that the prevalence of pneumonia in children aged above 5 years is 38.4 %.

Conclusion

In our study we found that the prevalent and frequently occurring infectious and non-infectious diseases in paediatrics are in case of pneumonia and neonatal jaundice. The prevalence of both infectious and non-infectious diseases are greater in rural areas than in urban areas. The age group of paediatrics population that are more prone to both infectious and non-infectious diseases are Infants (1 month-2years). Improvement of social and health system may help to reduce the incidence of both infectious and non-infectious diseases and their impact on the health of children. Providing information for parents and involving health care professionals and health administrators are necessary for preventing infections. Clinical Pharmacist plays a vital role in reduction of Infectious and non-infectious diseases in paediatric patients by creating awareness about maintaining hygiene conditions and counselling the patients and care takers about the diseases and life style modifications to be followed.

Abbreviations

AIDS: Acquired Immuno Deficiency Syndrome
CHD: Congenital Heart Disease
G.E: Gastroenteritis
GERD: Gastroesophageal Reflux Disease
LRTI: Lower Respiratory Tract Infections
TB: Tuberculosis
UTI: Urinary Tract Infections
URTI: Upper Respiratory Tract Infections

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