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PREVALENCE OF ANTIBIOTIC USE IN PEDIATRIC INFECTIONS AND ENHANCING OPTIMAL ANTIBIOTIC UTILIZATION THROUGH PATIENT COUNSELING

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ABSTRACT

AIMS: To identify the prevalence of antibiotic use in pediatric infections and to counsel the patients or their representatives on the optimal use of antibiotics. METHOD: The study will be conducted in Government General Hospital, Guntur, a tertiary care teaching hospital. The sources of data will include the relevant medical records of the patient along with direct observation of the patient. Socio-demographics of the patient, antibiotic prescribing pattern and associated drug related problems will be considered during the process of data collection. RESULTS: A total of 300 prescriptions were studied to identify the prevalence of antibiotic use in pediatric infections and antibiotics were used in 296 (98.6%) prescriptions with none used in 1.33 % of the patient population. Based on their age, the patient population was divided into 4 groups with infants making the most of the population 37.6 percent (113), toddlers 8.6 percent (26), young child 27.6 percent (83) and child 26 percent (78). CONCLUSION: The study provides data on the use of antibiotics in pediatric population including their prevalence and pattern, the iatrogenic outcomes of antibiotic use in children and the role of patient representative counseling in enhancing improved antibiotic use. Further studies putting emphasis on patient representative counseling in improving antibiotic therapy could be done as the studies on the subject are rather sparse.

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BACKGROUND

When antibiotics were first discovered, they were the magic bullets that had the power to wipe off all existing infections and it held true for quite a period of time. However, if something is used indiscriminately, its power eventually fades away and this applies a lot to antibiotic resistance.

Because of several factors like easy access, overuse and patient ignorance about the appropriate use of antibiotics, the effectiveness of a lot of antibiotics has begun to wane and there may come a time when simple fevers cannot be cured by antibiotics anymore.

Children are more prone to develop infections owing to their repressed immune system. Infectious diseases are a significant cause of mortality and morbidity in the pediatric population. Infantile diarrhea in itself accounts to about 7, 60,000 (WHO – 2014) deaths and infections account for about 33% of child mortality.

Considering the rampant use of antibiotics and taking into view the emergent antibiotic resistance, it is essential to identify the aspects instrumental for the development of resistance and determine the measures necessary to curb it.

INTRODUCTION

Antibiotics discovered in the early 20th century [1,2] were essentially a boon to eradicate the ever growing infectious diseases and put a stop to life threatening conditions such as Tuberculosis. Antibiotics are one of the most commonly used drugs in children and their inappropriate use has led to a certain amount of harm in the form of resistance.

The discovery of antibiotics was no doubt a milestone in the field of science but the inappropriate use of antibiotics has led to the cause of the global crisis that is antibiotic resistance. [3]

PATTERN OF ANTIBIOTIC USE:

Assessment of drug use pattern using WHO prescribing indicators at a Teaching Hospital in south Ethiopia showed that the antibiotics most prescribed were amoxicillin, ampicillin (15%), gentamicin and chloramphenicol. [4]

Shruthi K et al., observed the prescribing pattern of drugs in paediatric in-patients with lower respiratory tract infection at a tertiary care hospital Most commonly prescribed antibiotic was Amoxicillin + Clavulanic acid (57.33%) followed by Amikacin (40%). [5]

A retrospective study conducted in a tertiary teaching hospital revealed the average number of antibiotic per patient as 2.13 and the most prevalent disease among the group was acute gastroenteritis. The most frequently prescribed antibiotics were cefixime and gentamycin with the preferred route of administration being the intravenous route. [6]

ANTIBIOTIC RESISTANCE:

‘’The thoughtless person playing with penicillin treatment is morally responsible for the death of the man who succumbs to infection with the penicillin-resistant organism’- Alexander Fleming after winning Nobel prize in 1945

The antibiotic discovery in the early 19th century put an effective stop to a lot of life threatening infections rampant at that time and the situation is fairly unchanged even now. However, their effectiveness is slowly diminishing because of the unrestrained antibiotic use. Health experts over the world are now warning of the post-antibiotic era where minor infections will not be treatable by the available antibiotics anymore.

ANTIBIOTIC RESISTANCE IN INDIA:

Antibiotic resistance is a global phenomenon and India is no exception. In a country like India, the difficulties associated with limiting the antibiotic resistance are complex and intricate requiring intense ground level work to identify the causes of resistance as well as the solutions to overcome the determined causes. While antibiotics are obviously needed to cure life threatening infections, their overuse can lead to significant problems in the future. Hence, antibiotics should be used judiciously and appropriate strategies need to be devised to address this problem. [7,8]

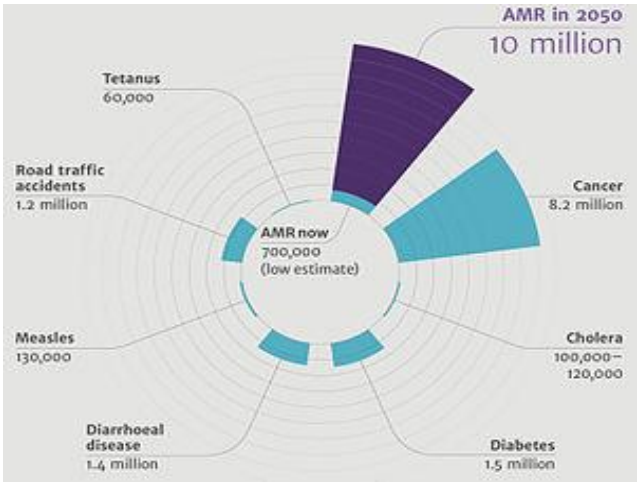

***Figure* 1: A figure predicting the extent of antimicrobial resistance in 2050.**

When Van Boeckel et al., [3] conducted a survey to estimate the global antibiotic consumption from 2000 to 2010 using national pharmaceutical sales data and found that Antibiotic consumption increased substantially in developing countries, with the highest rates shown in BRICS countries (Brazil, Russia, India, China, and South Africa) and French West Africa. 76% of the overall increase in global antibiotic consumption between 2000 and 2010 was attributable to BRICS countries. Meanwhile, only 33% of the overall increase in global population occurred in BRICS countries between these years. In BRICS countries, India was accountable for 23% of the retail volume sales increase.

Emergence of Pan-drug resistant, Multi-drug resistant (MDR) bacteria has been on the rise and if recent studies are anything to go by, India may yet face its struggle against the resistant microbes of the last resort antibiotics colistin and polymixin B. [9]

Being a highly populous country, India contributes to infection and subsequent deaths more so than any other country on the global scale. Suppressing these deaths and infections should lead to a consequent decrease in antibiotic demand thereby slowing the growth of antibiotic resistance [8,10]

Reasons for emerging antibiotic resistance in India:

Easy access or rather the lack of it:

- A country like India is plagued both by overuse and underuse.
- Although access to antibiotics is increasing for individuals who were previously unable to afford these life-saving drugs, many broad-spectrum antibiotic drugs (cephalosporins, fluoroquinolones, and carbapenems) are sold over the counter without presence of a documented clinical need. [3]
- While this easy access to wide spectrum antibiotics does present a problem in case of those who can afford it, the opposite is true for people of low socio-economic status.
- In 2005–2006, because of the lack of proper antibiotic treatment for pneumonia, a large number of infant and childhood deaths occurred. Only 13 percent of the one-third children seeking medical attention were treated with an antibiotic. The lack of access is attributable to socio economic status with many contributing factors like education levels, accessibility to nearby healthcare facilities and available medical practitioners.[8]

OVERUSE OF ANTIBIOTICS:

Antibiotics are overused in patients that do not actually require them. This overuse of antibiotics can be explained by a few reasons:

- Using antibiotics in patients suffering from cold, bronchiolitis or simply infections of viral origin.
- Patient expectations
- Patient exploitation by certain pharmacists and practitioners in hopes of making profit

PATIENT BEHAVIOUR AND UNDERSTANDING OF ANTIBIOTIC USE:

- Lack of patient understanding on the rational use of antibiotics also makes it difficult to purge the growing resistance.
- Patients often seek medical assistance for viral illnesses. In fact, upper respiratory infections, (the common cold), is one of the five most common diagnoses in ambulatory care physician office visits. In 1997, 818 billion prescriptions were written for respiratory tract infections, totaling approximately 75% of all prescriptions written worldwide. Furthermore, these respiratory illnesses have been caused by a virus in more than 90% of the cases. [9,11]
- The mentality of Indian population is quite convenient in advocating the widespread use of antibiotics. Often times, patients present to the hospital with a preformed mindset that an infection is haunting them and refuse to budge without a prescription. This compels the physician to prescribe an antibiotic even when the need is non-existent.
- Increasing patient knowledge may aid in the strategies to reverse bacterial resistance.

LACK OF MICROBIOLOGICAL SERVICES:

Microbiological services in India are either limited or non-existent. This sort of a situation makes it even harder to establish the resistance profile of the infecting organism.

ACCESS TO HEALTHCARE:

There exists a wide disparity in private and public sector spending on health care associated costs in India. Compared to developed countries like U.S and Canada, in India, spending on healthcare is 4–5 percent of gross domestic product (GDP), but the lion's share—80 percent—is out-of pocket spending, mostly for medicine[8]. Because of this disparity, procuring antibiotics, vaccines and other drugs for people of low socio economic status is quite difficult.

Poor surveillance and increasing resistance to antibiotics is another problem that plagues the problem of resistance in India. [8,11,12,13]

ANTIBIOTIC USE IN CHILDREN:

The unjustified use of antibiotics is currently one of the major public health issues worldwide. [14]

Children are more prone to develop infections owing to their repressed immune system. Infectious diseases are a significant cause of mortality and morbidity in the pediatric population. Infantile diarrhea in itself accounts to about 7,60,000 deaths and infections account for about 33% of child mortality and as such, antibiotics are one of the most commonly used drugs in children to treat various infections.

Their usage has significantly risen over the past decade [15] and India was the single-largest consumer of antibiotics in the world in 2010, followed by China and the United States. This increased consumption of antibiotics may be attributed to several factors of which inappropriate consumption of antibiotics for acute self-limiting diarrhoeal infections, infections of viral origin [16] where the use of antibiotics is not particularly effective and increased access to antibiotics especially in middle income countries like India where several of the broad spectrum antibiotics are sold over the counter without the prescription of a registered practitioner are significant in children.

Antibiotic resistance poses a threat to everyone, but children are at particular risk. Children are more vulnerable to bacterial illness than are adults, and this vulnerability is reflected in their higher disease rates. Infants under the age of one, for example, are 10 times more likely than adults to contract a Salmonella infection.

India is no stranger to this immeasurable growth of antibiotic resistance in children. Isolates of beta-hemolytic streptococci from throat swabs of 435 children treated at a North Indian medical university showed a high amount of resistance to co-trimoxazole, macrolides and tetracycline but were sensitive to chloramphenicol and penicillin G.[17] In a study conducted by Coles et al., to estimate the resistant pneumococci in South Indian infants, 87 percent of the isolates from infants were not susceptible to one or more antibiotics with co-trimoxazole having the unusual high resistance at 81 percent owing to its wide availability as an oral antibiotic.[18]

The antibiotic resistance in India is at an abysmal level. A shocking example is the Klebsiella pneumonia resistance to carbapenems at an appalling 57 percent where as it accounts to about 5 percent in Europe. Resistance to other bacterial species like E Coli, MRSA and ESBL- producing bacteria (Extended-spectrum beta-lactamases) means the number of people that would succumb to the infections is increased and the newborn are the most vulnerable group. A study conducted by Lancet indicates 58,000 infant deaths from bacterial infections in 2013. [8,19,20]

OBJECTIVES:

- To assess the prevalence of antibiotic use in pediatric infections.
- To determine the drug related problems prevalent in pediatric patients
- To assess the patient representative knowledge on appropriate antibiotic use and improving antibiotic therapy through counseling.

MATERIALS AND METHODS

STUDY DESIGN:

Prospective Observational Study

STUDY PERIOD:

The study is proposed to be conducted in the following 6 months period i.e., from January to June 2016

STUDY METHOD:

The study will be conducted in Government General Hospital, Guntur, a tertiary care teaching hospital. The sources of data will include the relevant medical records of the patient along with direct observation of the patient. Socio-demographics of the patient, antibiotic prescribing pattern and associated drug related problems will be considered during the process of data collection.

MATERIALS USED

- ❑ Patient consent form
- ❑ Patient data collection form
- ❑ ADR reporting form
- ❑ Therapeutic intervention form
- ❑ Patient counseling form and patient information leaflets.

INCLUSION CRITERIA:

- Patients below 12 years of age (Irrespective of Gender)
- Patients who are on antibiotic therapy.

EXCLUSION CRITERIA:

- Patients of more than 12 years of age
- Patients with compromised immune system (HIV)
- Prescriptions not containing antibiotics.

RESULTS

A total of 300 prescriptions were studied to identify the prevalence of antibiotic use in paediatric infections and antibiotics were used in 296 (98.6%) prescriptions with none used in 1.33 % of the patient population. Based on their age, the patient population was divided into 4 groups with infants making the most of the population 37.6 percent (113), toddlers 8.6 percent (26), young child 27.6 percent (83) and child 26 percent (78).

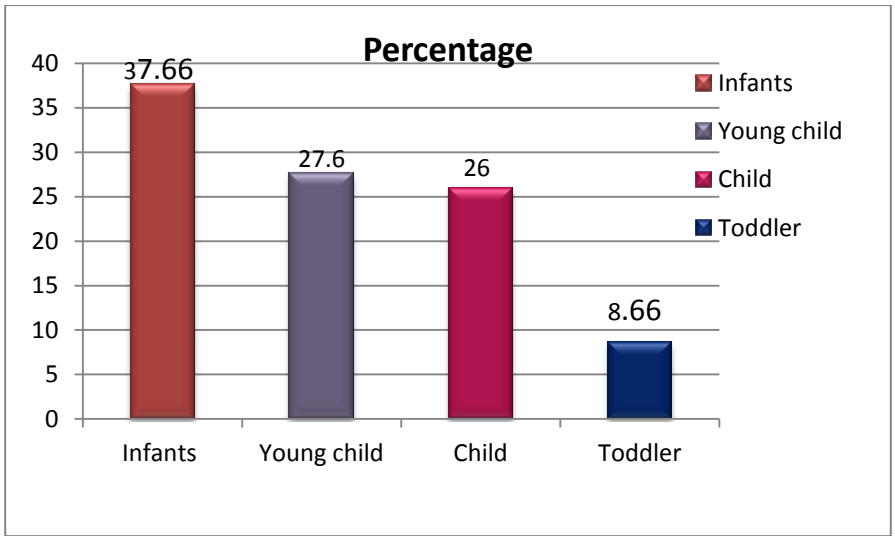

***Figure* 2: Distribution of age among the paediatric population.**

Gender characteristics

Male patients (57%) were more in number compared to the female patient population (43%).

Incidence of infections among the study population

Of the infections observed, lower respiratory tract infections were the most common which may be attributed to seasonal changes as most of these infections were observed in the months of January and February. Pneumonia and bronchiolitis were the most common of LRTI followed by intestinal infections and fevers. Mortality was not observed even though 2 percent of the patient population did present with sepsis.

***Table* 1: Table depicting the number of antibiotics per prescription.**

No. Of antibiotics per prescription	No. Of Prescriptions
1	161
2	94
3	31
4	6
5	4
None	4

The average number of antibiotics per prescription was 2.5 ± 1.7 (Mean + standard deviation). Amoxicillin and clavulanic acid was the most prescribed combination followed by Amikacin and ceftriaxone.

Meropenem, one of the last resort antibiotics belonging to the class carbapenems had to be prescribed to treat severe community acquired Pneumonia (CAP) when the patient showed no signs of improvement with other antibiotics. Vancomycin was prescribed to 7 patients (Meningitis, Severe bronchopneumonia and sepsis). Use of these antibiotics is evidence of the emerging antibiotic resistance that is plaguing the world.

Combination antibiotics were also in prevalence. (Amoxicillin + clavulanic acid, Piperacillin + tazobactam and sulphamethoxazole + trimethoprim combination).

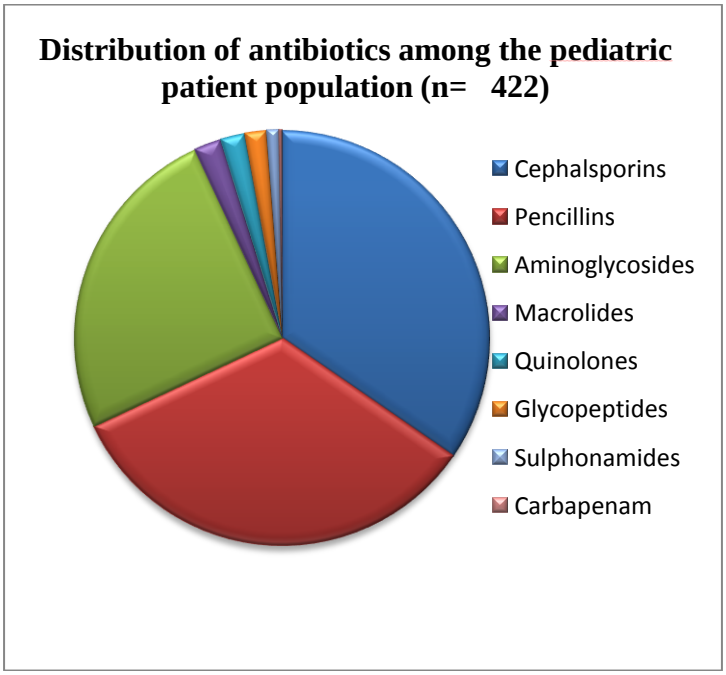

***Figure* 3: Distribution of various antibiotic classes among the study population.**

Cephalosporins were the most common class of antibiotics prescribed (34.6%) followed by Pencillins (33.4%), Aminoglycosides (25.11), Macrolide (2.1%), Quinolones (1.89), Glycopeptide (1.65%), sulphonamides (0.94%), Carbapenam (0.23%).

Route of administration:

Intravenous route of administration was the most preferred route (84.1%) followed by oral route in about 15.8 percent of the pediatric patient population. This higher incidence in IV route can be accustomed to the fact that the majority of the patient population involved infants (37.6%).

DRUG INTERACTIONS:

***Table* 2: Table depicting the major interactions.**

Major Interactions	No. of Patients	Interaction effect
Amikacin + Vancomycin	6	Nephrotoxicity, ototoxicity
Amikacin + Furosemide	3	Nephrotoxicity, ototoxicity
Ciprofloxacin + Azithromycin	1	QT Prolongation

Of the total 42 potential drug interactions observed, 10 (23.8%) were major, 4 (9.5%) were moderate and 29 (69%) were minor.

The major drug interactions between Amikacin + Vancomycin, Amikacin + Furosemide, Ciprofloxacin + Azithromycin were brought to the notice of the physician.

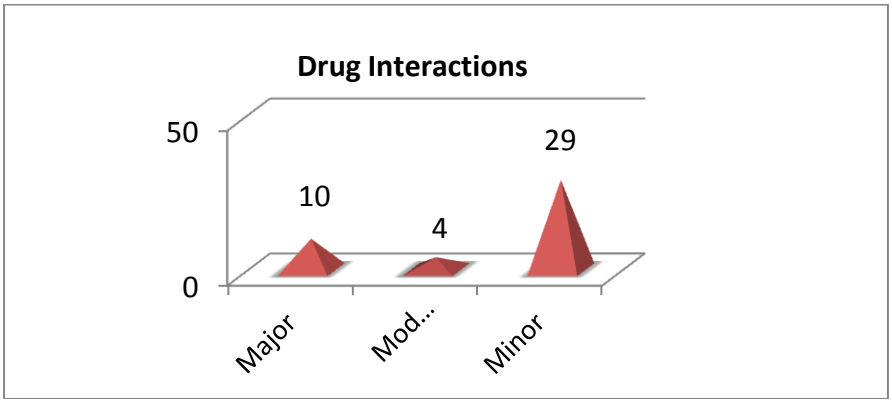

***Figure* 4: Distribution of interactions based on their severity.**

MEDICATION ERRORS:

70 administration errors and 3 duration errors (inappropriate duration) were observed. Most of the administration errors could possibly be attributed to not following the actual frequency mentioned in the prescription.

ADVERSE DRUG REACTIONS:

***Table* 3: Adverse drug reactions and causality assessment with WHO and Naranjo scales.**

Drug	ADR	Age	Diagnosis	Dose (mg)	Route	WHO Scale	Naranjo	Outcome
Amoxiclav	Diarrhoea	3m	LRTI	125	IV	Conditional	Probable	Recovered
Amoxiclav	Diarrhoea	1m	LRTI	125	IV	Unlikely	Probable	Recovered
Amoxiclav	Diarrhoea	11m	LRTI	125	IV	Possible	Probable	Recovered
Ampicillin	Diarrhoea	3m	LRTI	500	IV	Unlikely	Possible	Recovered
Cefotaxime	Rash	1y	Meningitis	1000	Oral	Probable	Probable	Recovered
Amoxiclav	Diarrhoea	3m	LRTI	125	IV	Conditional	Probable	Recovered
CTM	Urticaria	1y	LRTI	80	Oral	Unlikely	Possible	Recovered
Cefotaxime	Erythema	6m	G.E	500	IV	Possible	Probable	Recovered
Amoxiclav	Diarrhoea	3m	LRTI	200	IV	Possible	Probable	Recovered
Amoxiclav	Diarrhoea	3m	LRTI	150	IV	Possible	Probable	Recovered
CTM	Rash	11m	G.E	80	IV	Possible	Probable	Recovered
Amoxiclav	Diaper rash	3m	LRTI	200	IV	Possible	Probable	Recovered
Azithromycin	Rash	1y	LRTI	100	Oral	Possible	Probable	Recovered

Amoxiclav = Amoxicllin + Clavulanic acid; LRTI = Lower respiratory tract infections (Bronchiolitis and Bronchopneumonia); G.E = Gastroenteritis.

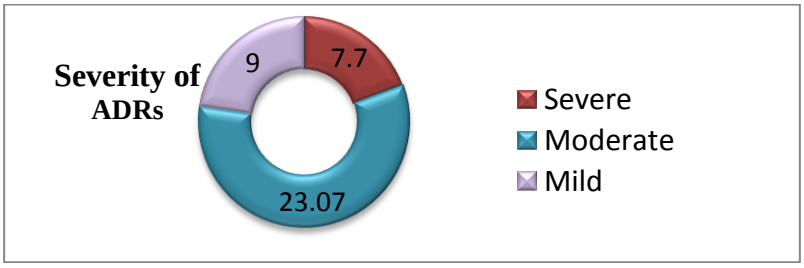

***Figure* 5: Severity of ADRs observed.**

Most of the adverse drug reactions reported were mild in severity with only 4 cases requiring further intervention to prevent the propagation of the event. Amoxicillin was the causative agent in 7 of the cases of which 5 were mild in severity. Irritant diaper dermatitis was observed in a patient which was induced by Amoxicillin + Clavulanic acid combination. The combination was immediately stopped and the patient was put on a topical formulation which eventually resolved the rash. In 3 cases of moderate severity (Azithromycin induced rash, Possible cefotaxime induced erythema and Amoxicillin induced diarrhea), just stopping the antibiotic ensured that the event did not propagate.

QUESTIONNAIRE:

As the study was conducted in a tertiary care government hospital, most of the study population involved patients from rural areas and as such, their knowledge on the use of antibiotics was perhaps significantly lower due to their lack of education. Moreover, some of them were not co-operative in responding to questionnaire and had to be excluded from counselling part of the study. 60 of the 300 patients in the study were not willing to respond to the questionnaire.

Initially, when presented with questions, most of them could not understand what an antibiotic was and we had to resort to simpler terms to get an answer out of them. Their knowledge was poor but they were able to identify that taking the antibiotic significantly improved their child's health**.**

ASSESSMENT OF QUESTIONNAIRE:

***Table 4*: Questionnaire.**

Question	BEFORE		After	
	Yes	No	Yes	No
1. Do you know that your child has been prescribed with an antibiotic?	20 (8.33%)	220 (91.6%)	145 (60.4%)	95 (39.5%)
2. Do you know why it was prescribed?	15 (6.25%)	225 (93.75%)	135 (56.25%)	105 (43.75%)
3. Have you been made aware of its usage?	41 (17.8%)	199 (82.9%)	90 (37.5%)	150 (62.5%)
4. Do you know the frequency of your antibiotic?	24 (10%)	216 (90%)	140 (58.33%)	100 (41.6%)
5. Did your child feel better after taking the antibiotic?	125 (52.08%)	115 (47.91%)	150 (62.5%)	90 (37.5%)
6. Did you notice any difficulty while on therapy?	6 (2.5%)	234 (97.5%)	26 (10.8%)	214 (89.16%)
7. Do you stop your child from taking the antibiotic after he/she feels better?	94 (39.16%)	146 (60.83%)	150 (62.5%)	90 (37.5%)
8. Will you ever take an antibiotic for common cold?	124 (51.66%)	116 (48.33%)	95 (39.58%)	145 (60.4%)
9. Will you ever take an antibiotic without prescription?	90 (37.5%)	150 (62.5%)	70 (29.1%)	170 (70.83%)
10. Do you believe oral antibiotics are inferior to parenteral antibiotics in terms of efficacy?	102 (42.5%)	138 (57.5%)	80 (33.3%)	160 (66.66%)

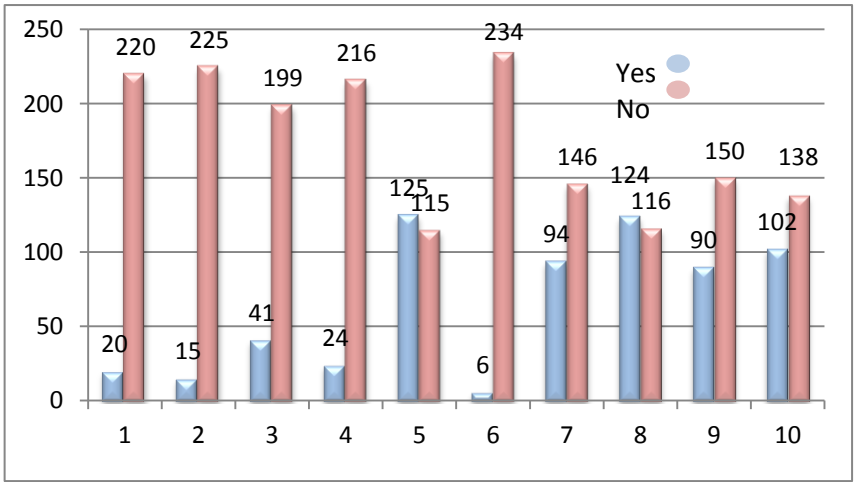

***Figure* 6: Figure depicting questionnaire before study.**

After assessing their knowledge and identifying key issues to be addressed, patient representatives were counselled on the appropriate use of antibiotics using patient information leaflets for most commonly used antibiotics, counselling forms etc.,

A good improvement was seen in their understanding compared to before and they were able to identify the significance of antibiotic in treating their child's infection, the importance of continuing the antibiotic therapy and not to use antibiotic unless otherwise it was prescribed to them.

Of the 145 patient representatives that answered with a yes, 70 of them received secondary education. Compared to before when most of them couldn't answer why the antibiotic was prescribed to them, the majority after counselling were able to answer the question with significant improvement.

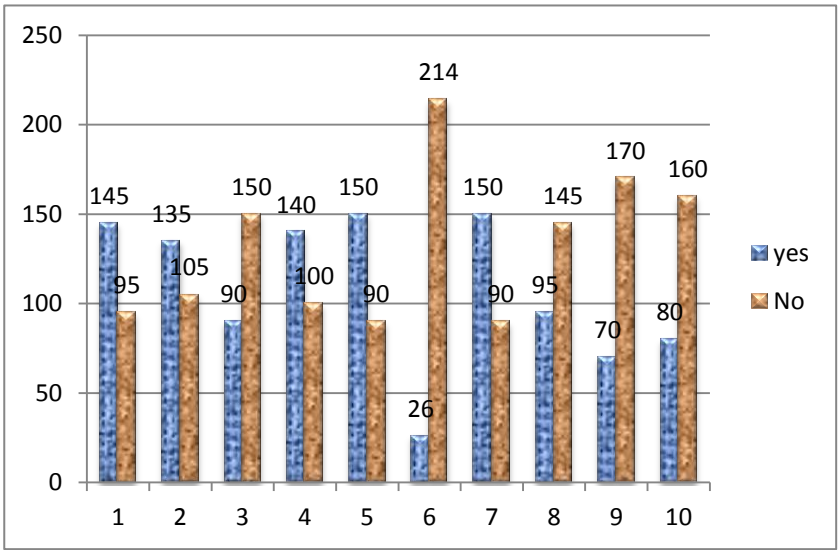

***Figure* 7: Figure depicting questionnaire after study.**

Even though, patients were properly counselled on the use of antibiotics, they could not necessarily comprehend the question of ‘’have you been made aware of its usage?’’ and most of them answered in the negative.

Compared to before, there was a good response on the frequency of their antibiotic use and patients were able to answer the question but it is worth noting that even though their answer was a ‘’yes’’, the frequency of the antibiotic mentioned in the prescription differed from their answer.

Compared to before, there was a significant improvement in the patient representative understanding on the importance of continuing the antibiotic therapy for its prescribed duration as well as not using antibiotics carelessly for common cold or infections of viral origin. Additionally, some of the patient representatives (44) expressed a favourable opinion that they would not compel the physicians in prescribing an antibiotic for treating their cold.

There was an opinion among the patients before counselling that parenteral antibiotics were more effective in treating their child’s infection compared to oral antibiotics. After explaining to them the importance of both oral and intravenous therapy, their opinion changed to a good degree.

Paired T- test data:

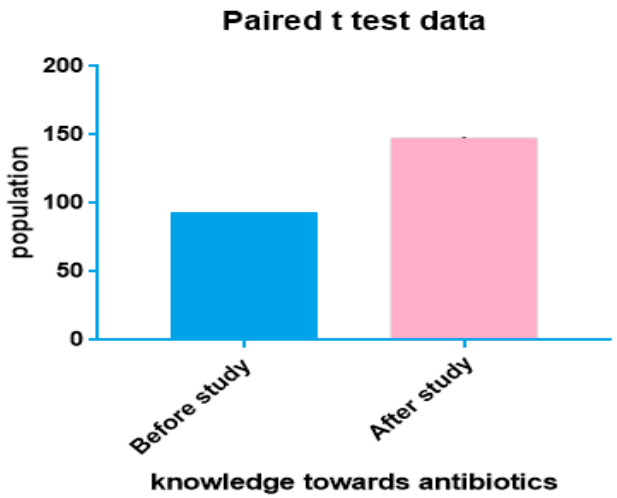

***Figure* 8: Paired T – test data comparing knowledge towards antibiotics before and after study.**

P value: 0.0094***
Mean difference: 54.2 ± 24.55

DISCUSSION

A total of 300 patient case sheets were analysed to define the prevalence of antibiotic use. In our study, the total percentage of male paediatric population was 57% which was comparatively more than that of female paediatric patients constituting to 43%. Palikhe et al, 2004, and Kanish et al, 2014 reported similar findings in their studies.[21,22]

Our study results revealed that the most common infections were infections of lower respiratory tract followed by intestinal infections and fevers. These results are in agreement with studies conducted by Hersh et al. 2011 [23], Bharathiraja et al. 2005 [24] and Elshout et al. 2012. [25]

The most common infections for which antibiotics were prescribed in our study were bronchopneumonia, bronchiolitis (LRTI) in agreement with Khaleed et al. 2014 study[27]. However, it differed from a study conducted by Otters *et al.* 2004 [26] where acute otitis media was the most important diagnosis for which antibiotics were prescribed, followed by acute bronchitis. This discrepancy may be attributed to the time period in which these studies were conducted as the incidence of certain infections (LRTI for example) varies with seasonal changes.

Cephalosporins were the most common class of antibiotics prescribed (34.6%) followed by Pencillins (33.4%) and Aminoglycosides (25.11), Macrolide (2.1%), Quinolones (1.89), Glycopeptide (1.65%), sulphonamides (0.94%) and Carbapenam (0.23%). In present study most commonly prescribed antibiotic was third generation cephalosporin and this result was comparable with other studies like Choudhury DK [28], Kanish et al [22] and Van Houten MA study [29]. Contrary to this a study by Kamaldeen et al. 2013 [30] indicated that penicillins (Amoxicillin) and metronidazole were prescribed the most. Variations in prescribing habits among different hospitals or among the different physicians could explain these findings.

In our study we have observed that infants were prescribed with more number of antibiotics (47.6%) compared to other groups. Amikacin (33.4%) was the most prescribed in infants followed by Amoxicillin + clavulanic acid combination (24.6%). In contrast, a study conducted by DK Choudhury et al [31] observed that paediatric patients having age group 5-12 years had received more number of antibiotics compared to infants.

Most of the patients in our study received single antibiotics (55.7%). In contrast, most of the studies have shown the varying percentage of antibiotics prescription to Paediatric patients (Palikhe, 2004 [21]; Van Houten *et al*., 1998 [29]). Similarly, one of the study conducted in the district of Ghana have shown the variation in average percentage of patients receiving at least one antibiotic, which was 41%, 45%, 79% and 98% in different health care centers (Bosu, 1997) [32]. These variations in antibiotic prescription to Paediatric patients may be caused due to difference in clinical setting and hospital protocol from one region to another.

In our study, most of Paediatric patients received antibiotics through parental route. Similarly, several studies have shown the varying percentages of antibiotics were prescribed parenterally (Palikhe, 2004 [21]; Orrett et al., 2010). [33] The reason for this higher use of parenteral antibiotics may be attributed to the fact that the majority of the study population involved infants.

Of the total 115 medication errors identified, 87 were significant since the remaining 28 were minor drug interaction errors. The majority of the errors could be attributed to administration errors (60.9%) followed by drug-drug interactions (36.5%) and inappropriate duration (2.6%). This is comparable to a study conducted by Pavani et al.., 2012 [34] where out of 47 medication errors identified, inappropriate interval of drug administration (53.19%) was found to be the most commonly occurring error followed by drug-drug interactions (23.40%), over dose (14.89%) and incomplete prescription (8.51%).

The overall incidence rate of adverse drug reactions was 4.33%. This is comparatively better to a study conducted by Oehme RK et al., 2012 [35] where the overall incidence rate of ADRs was 13.1%.

Patient knowledge on antibiotics is a poorly studied domain on which we sought to focus on and expand the knowledge of patients or their representatives on the appropriate use of antibiotics. The results of this study indicated that patients, when given patient information leaflets and proper counselling on the use of antibiotics, their knowledge increased significantly (0.0094). This was comparable to a study conducted by Karen Niemchick. [36]

CONCLUSION

Though errors from the physician side were comparatively less to other studies, more insight is still needed to establish stringent antibiotic policies to reduce antibiotic resistance. It is acceptable to prescribe broad-spectrum antibiotics if a doctor thinks the clinical scenario warrants it but it would be more appropriate to opt for a more rational strategy while selecting an antibiotic taking in view the culture sensitivity results as well as the patient characteristics before following a regimen.

While assessing factors influencing the use of antibiotics in children, several variables were taken into consideration like the patient representative's knowledge, beliefs on antibiotic use and their demographic data. Antibiotic resistance is an ever growing phenomenon and this study confirms the same. Ensuring judicious use of antibiotics will safeguard the lifespan of existing antibiotics in fighting against infections.

The study provides data on the use of antibiotics in pediatric population including their prevalence and pattern, the iatrogenic outcomes of antibiotic use in children and the role of patient representative counseling in enhancing improved antibiotic use. Further studies demonstrating the factors contributing to antibiotic resistance putting emphasis on patient representative counseling in improving antibiotic therapy in pediatric patients could be done as the studies on the subject are rather sparse.

ABBREVIATIONS:

ESBL : Extended-spectrum Beta-lactamase
MRSA : Methicillin Resistant Staphylococcus Aureus
BRICS : Brazil, Russia, India, China and Africa

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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