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Need for the Rational Use of Antibacterial in Paediatric Population

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Abstract

Necessary use of antibiotics helps to facilitate the treatment of numerous infectious diseases. With the expansion and the development of new antibiotics, the rising incidence of microbial resistance among pathogens is alarming. The efficacy of various effective antibiotics is questionable. We are continuously exposed with the challenge to provide useful regimen to our patients who do not further facilitate resistance. The purpose of this study was to evaluate common diseases, determining the ratio of conducting culture sensitivity tests and finding the correct consistency of antibiotics during the use by evaluating numerous parameters such as length of therapy, dose and frequency of dosing. We collected the data from various hospital settings of Karachi, Pakistan. Data was gathered from 90 paediatric residents during August to December, 2009. Results showed that acute gastro enteritis is the most common disease found among paediatric residents. Culture sensitivity test was not performed in majority of cases while inappropriateness related to the period of therapy and prescribed dose is mostly seen during the study as compared to frequency of dosing. It is essential that there should be a patterned guideline for the treatment of the common diseases that help the providers of health care team to treat different diseases and to suitably prescribed antibiotics.

Keywords: Antibiotics; Infectious Diseases; Culture Sensitivity Tests; Gastro Enteritis

Introduction

Antibiotics are one of the most significant therapeutic reserves of the medical history. Proper selection of antibiotics is a multifaceted process that required careful clinical judgment but unfortunately, selection and the use of antibiotics is made lightly without regarding to the therapeutic features of the drug and to the infecting microorganisms [1]. Optimized use of antibiotics can be facilitated by considering the pharmacodynamics and pharmacokinetic principles [2]. Children less than 12 years of age are among the most susceptible group of population which is more in contact with the illness; for this purpose antimicrobial agents particularly antibiotic are the commonly prescribed agents for the prevention and treatment [3,4]. In both hospital and community settings the ridiculous use of antibiotics has been illustrated throughout the world [5]. Even in teaching hospital settings antibiotics were used improperly in both developed and under developed countries which may produces unnecessary allergic responses, toxic reactions and interrupting the proper treatment [6,7]. This improper use of antibiotic leads to an increase in the occurrence of bacterial resistance [8,9] which is probable to cause collapse of treatment, prolonged infection, lengthy hospital stay and improved death rates [10]. Bacterial resistance is affecting every country of the world to some extent [11], facilitating the rise in financial burden of the patients. Microorganisms particularly, multi - drug resistant pneumococci is an emerging threat to paediatric population, emphasizing the need of optimal selection of antibiotics [12]. Antibiotics in combination enhanced the therapeutic assistance and they are recommended for precise clinical situations such as for the therapy of mixed bacterial and severe infections, improving antibacterial activity and for the avoidance of bacterial resistance[1].

Our objective of study is to evaluate the most common diseases found in paediatrics (neonates, infants and children), determining the frequency of conducting culture sensitivity test before prescribing antibiotics, evaluating the prescribed single and multiple antibiotics to the paediatric patients and examining the correct use of antibiotics among paediatrics population.

Experimental

Present study was conducted in various paediatric hospitals located in different areas of Karachi, from August to December, 2009. We collected the data from 90 paediatric residents, whose age was not more than 12 years. The age group were divided into three categories namely, neonates (1 day-1 month), infants (2 month- 1 year) and children (2 -12 year). Data collection was based on patient profiles in which all the patients are identified by names, age, sex, wards, diseases and other necessary information. We extracted the data from the medical records and diagnostic reports, microbiological data and culture sensitivity reports. Data were analyzed by percentages (%).

Results and Discussion

Providers of health care for paediatric population faced number of challenges during routine practice due to limited necessary use of antibiotics. In developing countries use of injectables are tremendous in treating paediatric population [12].

In the present study we categorized the paediatric population in to three categories i.e. neonates (1 day - 1 month, n= 9, 10 %), infants (2 month - 1 year, n=55, 61.11 %) and children (2 -12 year, n= 26, 28.88 %). From 90 patients, (n= 57, 63.33 %) were male and (n= 33, 36.66 %) were female as presented in figure 1 (a) and (b).

Authors reported that acute viral bronchiolitis is one of the common infectious paediatric diseases in South Africa [13]. Infections associated with respiratory system mainly tuberculosis and pneumonia

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affecting the health of children worldwide [14]. In this study, the most common disease found in neonates is acute gastro enteritis 3.33% followed by neonatal jaundice and pneumonia which were 2.22%, muconium aspiration syndrome and sepsis were 1.11%. In infants, acute gastro enteritis were 21.11% was the most reported disease followed by pneumonia 16.66%, diarrhoea 12.22%, bronchitis 5.55%, broncholitis 2.22%, cellulites, chronic lung disease and liver abscess were 1.11%. In children, acute gastro enteritis were 14.44% followed by urinary tract infection 4.44%, bronchitis, duodenitis and tonsillitis were 2.22%, chronic lung disease, diphtheria and pharangytis were 1.11% as presented in figure 2 (a), (b) and (c).

Improper use of antibiotics is a severe problem. The condition may become poorer as physicians performed less diagnostic tests and enhanced pressure exerted by the pharmaceutical industries to allow the easy availability of antibiotics without prescription in the developing world [15-18]. Table 1 presented that in (n=8, 9 %) cases culture sensitivity tests were performed while (n=82, 92 %) cases

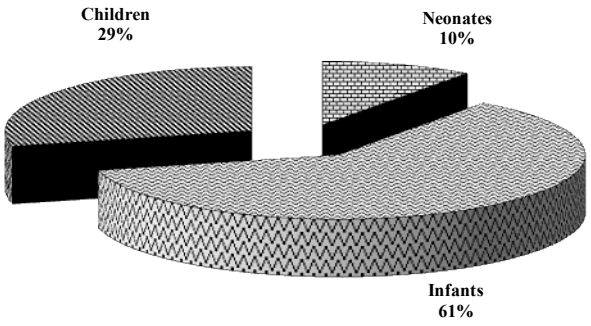

Figure 1a: Percentage of infants, children and neonates found infected in hospitals.

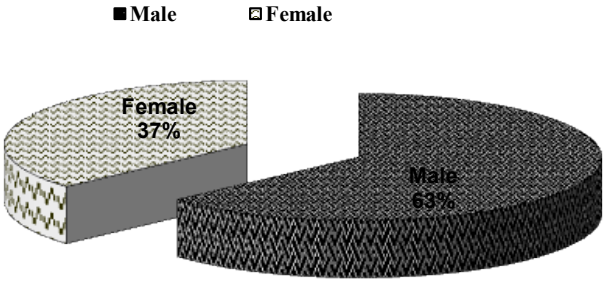

Figure 1b: Percentage of female and male paediatric patients.

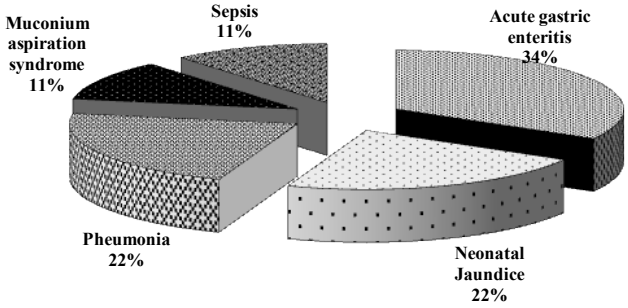

Figure 2a: Percentage of different diseases found in neonates.

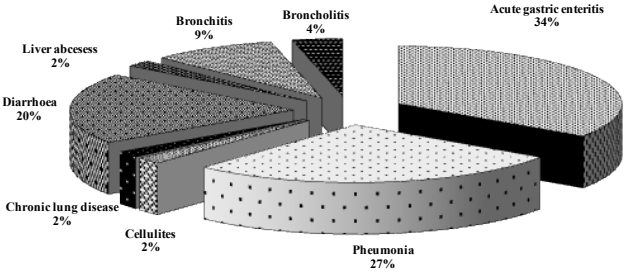

Figure 2b: Percentage of different diseases found in infants.

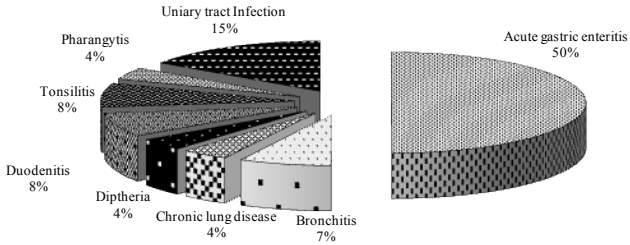

Figure 2c: Percentage of different diseases found in children.

Culture Sensitivity Test	No. of Cases	Percentage (%)
Single Time	7	88
Multiple Time	1	13
Culture Sensitivity Test Performed	8	9
Culture Sensitivity Test Not Performed	82	91

Table 1: Percentage of Culture Sensitivity Test.

culture sensitivity tests were not performed. Data showed that (n=7, 88 %) cases culture sensitivity test was performed only single time and (n=1, 13 %) cases culture sensitivity test were performed multiple time.

Several authors found that prescribed antibiotics having more than one mode of action showed enhanced killing of microorganisms and lessened the extent of therapy [19,20]. Figure 3 showed that (n= 57, 63.33 %) patients were prescribed with a single antibiotic and (n= 33, 36.66 %) patients were prescribed with multiple antibiotics. Data showed that (n=30, 33.33 %) patients were prescribed two antibiotics, (n=2, 2.22 %) and (n=1, 1.11 %) patients were found to be prescribed with three and four antibiotics respectively. Medical records showed that most frequently prescribed single antibiotic was Ceftriaxone which was 43.85 % followed by ampicillin 15.78 % and cefotaxime 19.29 %, the most frequently prescribed two antibiotics were Cefotaxime + Amikacin 30 %. Most commonly prescribed triple and quadriple antibiotics were Cefotaxime + Amikacin + Ceftriaxone 50 % and Ampicillin + Cefotaxime + Gentamycin + Amikacin 100 % respectively. It was found that Cephalosporins were most commonly used [21].

Several studies presented that various diseases particularly diarrhoea and respiratory complaints were not treated according to the instructions [22]. It is preferable to prescribed fewer drugs since large number of combinations of antibiotics leads to an enlarged risk of antibiotics interactions [23] and expensive hospitalization [24].

Prescribing antibiotics is very important. Errors can occur during prescribing, drug administration and during dispensing [25]. Published data showed that these errors are found frequently among paediatric population than in adults [26]. Paediatrics is more prone to error related

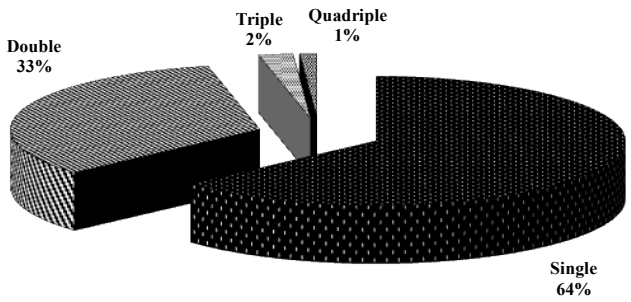

Figure 3: Percentage of antibiotics used alone or in combinations.

Prescribed	Appropriateness and Inappropriateness	No. of cases	Percentages (%)
Period of therapy	Appropriateness	68	75.55
	Inappropriateness	22	24.44
Prescribed Dose	Appropriateness	58	64.44
	Inappropriateness	32	35.55
Frequency of dosing	Appropriateness	75	83.33
	Inappropriateness	15	16.66

Table 2: Prescribed antibiotics with their appropriateness and inappropriateness.

to medication [27]. Calculations of dose are based on mass, body surface area and age. This may increase the risk associated with errors related with dosing [28]. By avoiding the prescribed under-dose or over- dose antibiotics, features associated with treatment failure were diminished [19]. In the present study all the prescribed antibiotics were admistered by intravenous injections. We also evaluated prescribing errors related to period of therapy, prescribed dose and frequency of dosing. Table 2 showed the inappropriateness related to the period of therapy in (n=22, 24.44%) cases, (n=32, 35.55%) and (n=15, 16.66%) cases showed the inappropriateness related to the prescribed dose and frequency of dosing respectively. So, in order to avoid these errors useful strategies should be made [29]. Several medical literatures reported that majority of treatments with antibiotics were found to be unsuitable [30] and the use of antibiotics is unobstructed [31].

Scientists reported different problems related with irrational pattern of prescribing antibiotics in children particularly occurrence of extensive adverse gastrointestinal (GI) side effects, increased incidence of antibacterial resistance, high ratio of development of chronic diseases and high costs of different of health services. Authors reported that multiple contributing factors particularly psychosocial and demographic factors (socio-economic) facilitated the inappropriate prescribing behaviour. They suggested that several strategies which should be adopted to reduce the incidence of misuse of antibiotics particularly improving health education, health policies and implementing multifaceted interventions to reduce the risks associated with misuse of antibiotics [32].

In conclusion there should be a programme to analyze the excessive and unnecessary use of antibiotics. There is a vital need to employ initiatives which ensures that patients obtained appropriate management for their health related problems.

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