Original Research

Rational Use of Antibiotics and Requisition of Pharmacist

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Abstract

Background: Direct consequence of microbes developing resistance against antibiotics is prolonged hospitalization, increased treatment cost and duration. Increased duration of hospitalization causes prolonged use antibiotics which results towards side effects.

Primary Study Objective: The purpose of antibiotics use is either to kill the microbes (bactericidal) or slows down their growth (bacteriostatic). Irrational use of antibiotics makes them does their exact opposite. Instead of killing microbes or slowing down their growth, it allows microbes to develop resistance against antibiotics.

Methods/Design: An observational concurrent study was performed in which data was collected. Individuals were interviewed using structured questionnaire. Percentage of rationality and irrationality of antibiotics use was observed. Additionally, percentage of prescribed class of antibiotics was also observed in patients.

Setting: Health care system includes: Quaid-e-Azam International Hospital Islamabad, Benazir Hospital Rawalpindi, CMH Rawalakot AJK, Amna Hospital Rawalakot AJK, DHQ Kotli AJK Pakistan.

Participants: This study was conducted on 100 patients of different health care systems, to whom antibiotics were prescribed. Most patients interviewed were female with UTI aged above 30 and adult's male with RTI or chest infection.

Intervention: Different patients were interviewed in different hospital settings to evaluate the rational use of antibiotics

Primary Outcome Measures: Rational use of antibiotics is using antibiotics according to the guidelines provided by WHO

Results: 47 percent of these patients were using antibiotics rationally and 53 percent were taking antibiotics medication irrationally. The most prevalent form of irrational use was patients without counseling about the antibiotics use. Patients with poor knowledge about the use of antibiotics were 84 among the 100. Irrational use of antibiotics in the form of pre-mature discontinuation was reported 56 patients among the 100. Patient who irrationally use antibiotics as OTC or Self medications were 38 among the 100.

Conclusion: Major form of irrationality found in the study was no proper counseling provided to the patients by specialist physician or Pharmacists. The reason we critically observed for this is the burden of patients on physicians due to which they are not able to guide patients properly.

Introduction

Antibiotics are medications that fight and help to stop bacterial infections. [1]. Selman Waksman conducted systematic study on microbes as producers of antimicrobial compounds and defined an antibiotic as*, a compound made by a microbe to destroy other microbes* [2]*.* They work by disrupting the processes necessary for bacterial cell growth and proliferation. It is done by keeping bacteria from copying themselves or by killing them. There are five basic mechanisms of antibiotics against bacteria [3]. Most common one is inhibition of cell wall synthesis and others are Inhibition of protein synthesis, Alteration of Cell Membranes, Inhibition of Nucleic Acid Synthesis and antimetabolite activity.

According to clinical needs to identify the type of infection or region of infection. If infection is due to gram positive bacteria (streptococci or staphylococci), then antibiotic should be use which is effective against gram positive bacteria like that the semi-synthetic penicillin or penicillinases resistance penicillin should be prescribed. There is no need to prescribe higher classes of antibiotics like amino-glycosides to maintain the rationality [4]. If infection is due to gram negative bacteria (E. coli, pseudomonas aeruginosa or Neisseria gonorrhoeae) then antibiotics should be used which is effective against gram negative bacteria like that of the cephalosporin and fluoroquinolones etc.

According to WHO guidelines for rational use of antibiotics: Dosage should be according to BMI (body mass index) and BSA (body surface area) and specifically according to severity of an individual's disease. [5]

Duration of antibiotic use should be prescribed according to the disease. For example, the duration of antibiotics use for patient with tonsillitis is 5 to 7 days or for the patient with typhoid disease 7 to 14 days. If the infection is severe, duration of antibiotics use can be prescribed for long term like in meningitis treatment duration is 14 to 21 days.

If antibiotics are used irrationally, against the guidelines provided by WHO, patient may face antibiotic resistance, ADRs, drug-drug interactions and super infection as a major consequence. Antibiotic resistance is simply bacteria becoming "super-bacteria" or "super-bugs", which means that antibiotics would now no longer work on these bacteria. [6, 7, 8].

Use of antibiotics irrationally means increasing duration or dosage more than required or pre-mature discontinuation. Increasing the duration can result in bacterial mutation against antibiotics due to repeated exposure to it [9]. Efflux pump will develop, when antibiotic goes inside the cell, bacteria will be able to extrude it out of the cell, or resistance may develop in the form of changed cell membrane permeability, which won't allow antibiotics enter inside the cell. Or resistance may develop in the form of bacteria secreting such enzymes, which destroys antibiotics such as macrolide esterase that destroys the macrolides like erythromycin. More than required dosage can cause super infection and pre-mature discontinuation can lead to sub-therapeutic effect [10].

Rationality in antibiotics use is not only the concern of physician but it is also the concern of pharmacist and patients alike. [11].

The community on which we conducted this study, the major reason of irrationality in those 100 patients was the absence of pharmacists. Culture and susceptibility test for microorganism was not performed.

According to the journal of pharmacy practice and community medicine (Article published by the students of university of Lahore faculty of pharmacy). In Pakistan there are no proper guideline for antibiotic use in all private and government setups except international hospitals which are ISO (international standard organization) certified and strictly followed the WHO guidelines and self-made policies according to ISO [12]. According to the article published by students of Agha khan university department of Obstetrics & Gynecology, most hospitals and clinics, including Agha khan hospital, conventional antibiotic therapy is given usually for 7-10 days. In Agha khan hospital setting, therapeutic antibiotics were given injudiciously in multiple dosages at the consultant's discretion and personal choice, as there were no proper guidelines being followed.

There was no study found that is conducted in AJK (Azad Jammu Kashmir) region about the rationality rate. Also, there is a lack of studies about the role and requisition of pharmacists in Pakistan.

Methodology

A cross sectional study was conducted among patients at public and private hospitals in Pakistan and AJK. The group of individuals on which this study was conducted, consists of different gender and different age. The study was conducted for a period of 2 months and the data was collected from IPD and OPD patients in the month of April and May 2021. The study was performed on patients having different types of infectious diseases; for example, UTI, RTI, Skin infections and ENT infections etc.

We visited two Government hospitals, (Benazir Bhutto Hospital Rawalpindi and CMH Rawalakot) and Private hospital*s* (Quaid e Azam International Hospital Islamabad, Amana Hospital Rawalakot and DHQ Kotli AJK.)

Sample Size:

100 patients from different health care systems.

Study Tool:

A questionnaire for the survey was first designed having 5 sections: 1st section contain the patient demographics, 2nd section comprises the C/C (chief compliant) of the

patients, 3rd section provide information about illness of patients, 4th section contain the Laboratory data and 5th section designed with 12 questions which are believed to be important to ask from patients to assess the rational use of antibiotics.

Results and Discussion

By using arithmetic mean formula:

$$\frac{\Sigma x1+x2+\cdots xn}{n} \times 100$$

Here ∑x =Sum of the observations
        n= number of observations

Calculations	Percentages
568/1200 x 100	47% (Rationality)
632/1200 x 100	53% (Irrationality)

Rationality level in these 100 subjects was only 47 percent and irrationality were 53 percent. Among the 53 percent who were using antibiotics irrationally, 20 percent of the patients were using antibiotics without prescription or as an OTC. 80 percent were other reasons: such as no counseling or educating about the treatment, premature discontinuation, and no cultural or susceptibility test was conducted before the antibiotic therapy mention in figure no.2.

The major class of antibiotic that were prescribed to these patients was 2nd and third generation fluroquinolones. They were prescribed to 40% patients, because penicillin which is first priority in respiratory tract infection was ineffective due to resistance caused by irrationality. Cephalosporin was prescribed by physician to 28 percent patients who have typhoid and chest infection, however fluoroquinolones needed to be prescribed instead of cephalosporin because fluocinolones are effective in chest infection, but physician directly prescribed the higher class.

Conclusion

Results shows that the absence of pharmacist is the major factor contributing to the irrational use of antibiotics. Physicians have a lot of burden, so they just prescribe the medication. They were not able to properly counsel the patient about the prescribed treatment. And then there is major absence of pharmacists, so no proper guidance was provided during dispensing as well. After receiving prescription patient goes for prescription filling, and here is also the need of pharmacist, because during the prescription filling dispensers and technicians make dosage errors and mistakes in duration of use. If there were a pharmacist, he would have prevented dosage errors and would have kept in check the duration of use. Physician also prescribed the medication of high cost which was not affordable for the patient so they choose to buy antibiotics that have low cost or to reduce the cost,

patients buy prescribed antibiotic in low quantity. If patient were prescribed with 1 class antibiotic (quantity= 10 pills) by his physician, due to the cost factor they buy only 5 pills. But the main reason for not taking a full course of antibiotics was not economic constraint, but the purchaser's poor knowledge about antibiotics as the findings of study conducted.

All of these factors were greatly contributing to the irrational use of antibiotic in those 100 subjects. We found that the presence of pharmacist during prescription, prescription filling, prescription review and antibiotic utilization is vital to prevent irrationally in antibiotics use. Presence of Pharmacist will also ensure to prevent the prophylactic and OTC use of antibiotics during dispensing.

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Table No.1: General questions listed in questionnaire

	Questions asked	(YES) RATIONAL	(NO) IRRATIONAL
1.	Is there written justification for antibiotics used?	70%	30%
2.	Is antibiotics indicated for any infection?	66%	34%
3.	Were the proper culture taken?	10%	90%
4.	Was the initial culture positive? If the answer is yes, was the culture repeated?	0%	100%
5.	Was the susceptibility test done?	0%	100%
6.	Based on the patient's body weight, was the correct dosage prescribed?	72%	28%
7.	Was the Duration of therapy specified?	84%	16%
8.	Was the proper dosage regimen specified?	84%	16%
9.	Oral or IV administration?	60% (Oral)	40% (IV without need)
10.	Was proper counselling done by Physician /Pharmacist?	16%	84%

Table No.2: Number of Patients and their response

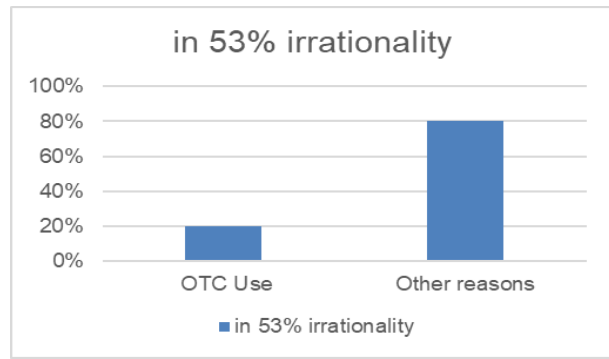| Total Patients	100
Questions asked / Patient	12
12x 100	1200
Answer YES	Answer NO
568/1200	632/1200

Figure 1: Represent the percentage of rationality and irrationality
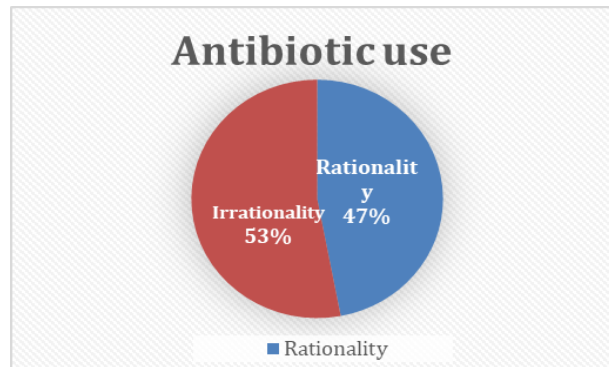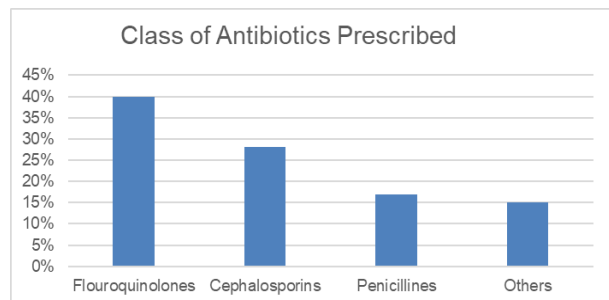

Figure 2: Represent the Reasons of irrationality

Figure 3: Represent the percentage of class of antibiotics prescribed