Original Article

Incidence of Bacteria Resistance to Antibiotics in Hospitals

Bacteria Resistance

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ABSTRACT

Objective: To study the incidence of Bacteria resistance to antibiotics in hospitals.
Study Design: Experimental study.
Place and Duration of Study: This study was conducted at Shaheena Jamil Teaching Hospital Abbotabad & Islam Teaching Hospital Sialkot from 1st January 2012 to 30th April 2013.
Materials and Methods: 100 cases of Bacteria resistance to antibiotics in hospital patients were selected by doing culture & sensivity test in labs of Shaheena Jamil hospital Abbottabad and Islam teaching hospital Sialkot.
Results: Bacteria resistant to Penciline was the most highest, 147 cases (36.75%) & the lowest incidence of bacteria resistant to Levofloxin, 20 cases (05%) as shown in table No.1. The incidence of bacteria resistant to antibiotics with relation to age was maximum at 1-10 years, 15 cases (3.75%) & maximum in age group 21-30 years, 105 cases (25.75%) as shown in table No.2. The incidence of bacteria resistant to antibiotics in females were, 207 cases (51.75%) & in male, 193 cases (48.25%) as shown in table No.3. The incidence of bacteria resistant to antibiotics was the highest in office servants & factory workers, 54 cases (13.50%) & 53 cases (13.25%) respectively & the lowest in students, 20 cases (05%) as shown in table No.4. The incidence of bacteria resistant to antibiotics was highest in middle class of peoples, 189 cases (47.25%),159 cases (39.75%) in low socio-economic group of peoples & 52 cases in high gentry, 52 cases (13%) as shown in table No.5. The incidence of bacteria resistant to antibiotics was more in peoples living in rural area, 221 cases (55.25%) as compared to peoples living in urban area. 179 cases (44.75%) as shown in table No.6.
Conclusion: The incidence of Bacteria resistance to antibiotics was rising day by day misuse of antibiotics, therefore the use of antibiotics should be only by a qualified doctor prescription.
Key words: Incidence, Antibiotics, bacteria, resistance, culture & sensivity.

INTRODUCTION

Antibiotic resistance is a form of drug resistance whereby some (or, less commonly, all) sub-populations of a microorganism, usually a bacterial species, are able to survive after exposure to one or more antibiotics; pathogens resistant to multiple antibiotics are considered multidrug resistant (MDR) or, more colloquially, superbugs. People do not develop resistance to antibiotics[1].

Antibiotic resistance is a serious and growing phenomenon in contemporary medicine and has emerged as one of the eminent public health concerns of the 21st century, particularly as it pertains to pathogenic organisms (the term is not especially relevant to organisms which don't cause disease in humans). In the simplest cases, drug-resistant organisms may have acquired resistance to first-line antibiotics, thereby necessitating the use of second-line agents. Typically, the first-line agent is selected on the basis of several advantages including safety, availability and cost; comparatively, the second-line agent is usually broader in spectrum, possesses a less favourable risk-benefit profile and may be more expensive or, in more dire circumstances, locally unavailable. In the case of some MDR pathogens, resistance to second and even third-line antibiotics is sequentially acquired, a case quintessentially illustrated by Staphylococcus aureus in some nosocomial settings. Some pathogens, such as Pseudomonas aeruginosa, additionally possess a high level of intrinsic resistance.

It may take the form of a spontaneous or induced genetic mutation, or the acquisition of resistance genes from other bacterial species by horizontal gene transfer via conjugation, transduction, or transformation. Many antibiotic resistance genes reside on transmissibleplasmids, facilitating their transfer. Exposure to an antibiotic naturally selects for the survival of the organisms with the genes for resistance. In this way, a gene for antibiotic resistance may readily spread through an ecosystem of bacteria. Antibiotic-resistance plasmids frequently contain genes conferring resistance to several different antibiotics. This is not the case for Mycobacterium tuberculosis, the bacteria that causes Tuberculosis, since evidence is lacking for whether these bacteria have plasmids[2]. Also. M. tuberculosis lack the opportunity to interact with other bacteria in order to share plasmids[2,3].

Genes for resistance to antibiotics, like the antibiotics themselves, are ancient[4]. However, the increasing

prevalence of antibiotic-resistant bacterial infections seen in clinical practice stems from antibiotic use both within human medicine and veterinary medicine. Any use of antibiotics can increase selective pressure in a population of bacteria to allow the resistant bacteria to thrive and the susceptible bacteria to die off. As resistance towards antibiotics becomes more common, a greater need for alternative treatments arises. However, despite a push for new antibiotic therapies there has been a continued decline in the number of newly approved drugs[5]. Antibiotic resistance therefore poses a significant problem.

The growing prevalence and incidence of infections due to MDR pathogens is epitomised by the increasing number of familiar acronyms used to describe the causative agent and sometimes the infection generally; of these, MRSA is probably the most well-known, but others including VISA (vancomycin-intermediate S. aureus), VRSA (vancomycin-resistant S. aureus), ESBL (Extended spectrum beta-lactamase), VRE (Vancomycin-resistant Enterococcus) and MRAB (Multidrug-resistant A. baumannii) are prominent examples. Nosocomial infections overwhelmingly dominate cases where MDR pathogens are implicated, but multidrug-resistant infections are also becoming increasingly prevalent in the community[6].

Escherichia coli and coliform group bacteria resistant to seven antibiotics were investigated in the Tama River, a typical urbanized river in Tokyo, Japan, and at a wastewater treatment plant located on the river. The percentages of antibiotic resistance in the wastewater effluent were, in most cases, higher than the percentages in the river water, which were observed increasing downstream. Since the possible increase in the percentages in the river was associated with treated wastewater discharges, it was concluded that the river, which is contaminated by treated wastewater with many kinds of pollutants, is also contaminated with antibiotic resistant coliform group bacteria and E. coli. The percentages of resistant bacteria in the wastewater treatment plant were mostly observed decreasing during the treatment process. It was also demonstrated that the percentages of resistance in raw sewage are significantly higher than those in the river water and that the wastewater treatment process investigated in this study works against most of resistant bacteria in sewage[7,8].

When penicillin became widely available during the second world war, it was a medical miracle, rapidly vanquishing the biggest wartime killer--infected wounds. Discovered initially by a French medical student, Ernest Duchesne, in 1896, and then rediscovered by Scottish physician Alexander Fleming in 1928, the product of the soil mold Penicillium crippled many types of disease-causing bacteria. But just four years after drug companies began mass-producing penicillin in 1943, microbes began appearing that could resist it[9,10].

The first bug to battle penicillin was Staphylococcus aureus. This bacterium is often a harmless passenger in the human body, but it can cause illness, such as pneumonia or toxic shock syndrome, when it overgrows or produces a toxin[11,12].

In 1967, another type of penicillin-resistant pneumonia, caused by Streptococcus pneumoniae and called pneumococcus, surfaced in a remote village in Papua New Guinea. At about the same time, American military personnel in southeast Asia were acquiring penicillin-resistant gonorrhea from prostitutes. By 1976, when the soldiers had come home, they brought the new strain of gonorrhea with them, and physicians had to find new drugs to treat it. In 1983, a hospital-acquired intestinal infection caused by the bacterium Enterococcus faecium joined the list of bugs that outwit penicillin[13].

Antibiotic resistance spreads fast. Between 1979 and 1987, for example, only 0.02 percent of pneumococcus strains infecting a large number of patients surveyed by the national Centers for Disease Control and Prevention were penicillin-resistant. CDC's survey included 13 hospitals in 12 states. Today, 6.6 percent of pneumococcus strains are resistant, according to a report in the June 15, 1994, Journal of the American Medical Association by Robert F. Breiman, M.D., and colleagues at CDC. The agency also reports that in 1992, 13,300 hospital patients died of bacterial infections that were resistant to antibiotic treatment[14].

MATERIALS AND METHODS

Blood sample of 100 patients were taken to study the culture & sensivity test on patients coming to Shaheena Jamil hospital Abbotabad & Islam Teaching hospital Sialkot to see bacteria resistant to different antibiotic used in both hospitals.

RESULTS

Bacteria resistant to Penciline was the most highest, 147 cases (36.75%) & the lowest incidence of bacteria resistant to Levofloxin, 20 cases (05%) as shown in table No.1. The incidence of bacteria resistant to antibiotics with relation to age was maximum at 1-10 years, 15 cases (3.75%) & maximum in age group 21-30 years, 105 cases (25.75%) as shown in table No.2.

The incidence of bacteria resistant to antibiotics in females were, 207 cases (51.75%) & in male, 193 cases (48.25%) as shown in table No.3. The incidence of bacteria resistant to antibiotics was the highest in office servants & factory workers, 54 cases (13.50%) & 53 cases (13.25%) respectively & the lowest in students, 20 cases (05%) as shown in table No.4. The incidence of bacteria resistant to antibiotics was highest in middle class of peoples, 189 cases (47.25%),159 cases (39.75%) in low socio-economic group of peoples & 52

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Table No.1: Incidence of bacteria resistant to different types of drugs.

Sr. No	Types of drugs	Cases	Percentage
1	Penciline	147	36.75%
2	Streptomycin	30	7.5%
3	Erythromycin	39	9.75%
4	Septron	50	12.5%
5	Ammonal	40	10%
6	Levofloxin	20	05%
7	Ceporex	39	9.75%
8	Novidate	35	8.75%
	Total	400	100%

Table No. 2: Incidence of bacteria resistant with relation to age

Sr. No	Age	Cases	Percentage
1	1-10	15	3.75%
2	11-20	37	9.25%
3	21-30	105	25.75%
4	31-40	55	13.75%
5	41-50	47	11.75%
6	51-60	61	15.75%
7	61-70	50	12.50%
8	71-80	30	7.50%
	Total	400	100%

Table No.3: Incidence of bacteria resistant with relation sex.

Sr. No	Sex	Cases	Percentage
1	Male	193	48.25%
2	Female	207	51.75%
	Total	400	100%

Table No.4. Incidence of bacteria resistant with relation occupation.

Sr. No	Occupation	Cases	Percentage
1	Students	20	05%
2	Laborer	42	10.50%
3	Factory worker	53	13.25%
4	Office servants	54	13.50%
5	House wife	33	8.25%
6	Business man	56	16%
7	Farmer	49	12.25%
8	Doctors	33	8.25%
9	Nurses & paramedical staff	50	12.5%
	Total	400	100%

Table No. 5. Incidence of bacteria resistant to anti biotic with relation to Socio-economic status.

Sr. No	Socio-economic group	Cases	Percentage
1	Low	159	39.75%
2	Middle	189	47.25%
3	High	52	13%
	Total	400	100%

Table No. 6. Incidence of Bacteria resistant to anti biotic with relation to area.

Sr. No	Area	Cases	Percentage
1	Urban	179	44.75%
2	Rural	221	55.25%
	Total	400	100%

DISCUSSION

The incidence of bacteria resistant to antibiotics is globally rising day by day due to improper use of antibiotics even in developed countries. The incidence of bacteria resistant to antibiotics is much more in under developed countries like Pakistan, India, Bangladesh ,Countries of Africa & Sri lanka. The bacterial resistance is much more in even in hospitals. Doctors, Nurses & paramedical staff are also victims of bacteria resistance to antibiotics[15,16].

In our study Bacteria resistant to Penciline was the most highest, 147 cases (36.75%) & the lowest incidence of bacteria resistant to Levofloxin, 20 cases (05%) as shown in table No.1. The incidence of bacteria resistant to antibiotics with relation to age was maximum at 1-10 years, 15 cases (3.75%) & maximum in age group 21-30 years, 105 cases (25.75%) as shown in table No.2.

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Disease-causing microbes the antibiotics by interfering with their mechanism of action. For example, penicillin kills bacteria by attaching to their cell walls, then destroying a key part of the wall. The wall falls apart, and the bacterium dies. Resistant microbes, however, either alter their cell walls so penicillin can't bind or produce enzymes that dismantle the antibiotic.In another scenario, erythromycin attacks ribosomes, structures within a cell that enable it to make proteins[17].

Resistant bacteria have slightly altered ribosomes to which the drug cannot bind. The ribosomal route is also how bacteria become resistant to the antibiotics tetracycline, streptomycin and gentamicin[18]. Antibiotic resistance results from gene action. Bacteria acquire genes conferring resistance in any of three ways. In spontaneous DNA mutation, bacterial DNA (genetic material) may mutate (change) spontaneously (indicated by starburst). Drug-resistant tuberculosis arises this way[19]. In a form of microbial sex called transformation, one bacterium may take up DNA from another bacterium. Pencillin-resistant gonorrhea results from transfoMost frightening, however, is resistance acquired from a small circle of DNA called a plasmid, that can flit from one type of bacterium to another. A single plasmid can provide a slew of different resistances. In 1968, 12,500 people in Guatemala died in an epidemic of Shigella diarrhea. The microbe harbored a plasmid carrying resistances to four antibiotics[20.]

CONCLUSION

The incidence of Bacteria resistance to antibiotics was rising day by day misuse of antibiotics, therefore the use of antibiotics should be only by a qualified doctor prescription.

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