Research Article

A STUDY ON ESCHERICHIA COLI RESISTANCE TOWARDS ANTIBIOTIC IN KERALA STATE.

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ABSTRACT
The study on resistance pattern of microbes in respect to antibiotics, by observing the sensitivity pattern was conducted on 1000 patients reported with infection in Kerala population. The observation made, reveals that the maximum number of patient showing up with some sort of infections belonged to middle age group or geriatric group, particularly the age between 41 to 80 years. The female patients representation (70.3%) was observed as the highest when compared to the males (29.7%) with infection. On observing the type of samples which usually make up for sensitivity test or analysis, it was found that the urine sample with 81% female representation indicated higher urinary infections. On analysing the E. coli involvement in developing disease it was estimated to be 57%. The drugs like Amikacin, ceftriaxone, ciprofloxacin etc. were some of the highly sensitive drugs and the drugs like Azithromycin, Cefoperazone-Sulbactum, Cephalexin etc. belonged to high resistant group indicating uselessness to treat infections.

KEYWORDS: Antibiotic resistance, E. Coli, Sensitivity pattern, resistance pattern, Infections.

INTRODUCTION
A substance which was known as "Wonder drug" till the year 1942, which was later known as Antibiotic a name coined by Selman Waksman, it was the single most important therapeutic discovery in the history of medicine. The year 1928 Sir Alexander Fleming marked a historical development by the discovered of penicillin, a potent antibiotic which changed the entire way of treating the infections and this particular drugs potency was later established by Florey and his team in the year 1941 leading the discovery to fetch the highest recognition in the form of Nobel Prize.[1]

This research finally took the human mankind to a new era of "Antibiotics an Wonder drug". With this research findings the entire perspective of research changed and the scientists started looking into every possible way to develop the antibiotics. With the passing time the wonder drug (antibiotics) started to attain resistance and thus the topic antibiotic resistance has attained top priority in recent years.[2]

Literature Review
An extensive literature review based on research article in various search engine was done to gain the knowledge about resistance and its pattern with respect to E. Coli.

Aim and Objective
To study the resistance pattern of E. Coli on various antibiotics, based on the culture and sensitivity pattern observed.

Study Design
The study involved a prospective observational collection of data based on the inclusion and exclusion criteria of the study.

Sample Size
The sample size prefixed were 1000 samples, irrespective of age or gender and type of sample.

Selection of Study Population
Inclusion Criteria
- All age group and sex
- All the patients with infectious disease doing culture and sensitivity test.
- All the culture positive infection cases.

Exclusion Criteria
- Patients whose culture report did not show any growth.

RESULT

Table 1: Age Distribution (N=1000).

Age in Years	No. of Patients	%
0 – 20	21	2.1
21 – 40	256	25.6
41 – 60	335	33.5
61 – 80	312	31.2
81 – 100	76	7.6
Total	1000	100

Table 2: Gender Distribution (N=1000).

Sex	Number	Percentage
Male	297	29.7%
Female	703	70.3%

Table 3: Sample distribution with infectious cases.

Sample Type	Male (N=297)	Percentage	Female (N=703)	Percentage
Urine	104	35.02	570	81.08
Sputum	138	46.46	91	12.94
Others	55	18.52	42	5.98

Table 4: E. Coli Resistance Pattern (N=570).

Antibiotics	Resistant to	Proportion	Z	P value	Inference
Cephalexin	540	0.9474			Ref
Ceftazidime	533	0.9351	-0.881	0.3781	FTR- H_0
Cotrimoxazole	526	0.9228	-1.683	0.0924	FTR- H_0
Amoxiclav	511	0.8965	-3.201	0.0014	R- H_0
Ofloxacin	505	0.8860			
Azithromycin	482	0.8456			
Levofloxacin	479	0.8404			
Tetracycline	476	0.8351			
Gentamycin	437	0.7667			
Netilmicin	317	0.5561			
Cefotaxime	291	0.5105			
Cefixime	273	0.4789			
Cefoperazone-Sulbactum	255	0.4474			
Ampicillin-Sulbactam	249	0.4368			
Ceftriaxone	244	0.4281			
Norfloxacin	206	0.3614			
Ciprofloxacin	196	0.3439			
Nitrofurantoin	161	0.2825			
Piperacillin-Tazobactam	120	0.2105	4.1501	0.0000	R- H_0
Amikacin	68	0.1193			Ref

FTR- H_0 – Failed to reject the H_0
R- H_0 – Reject H_0
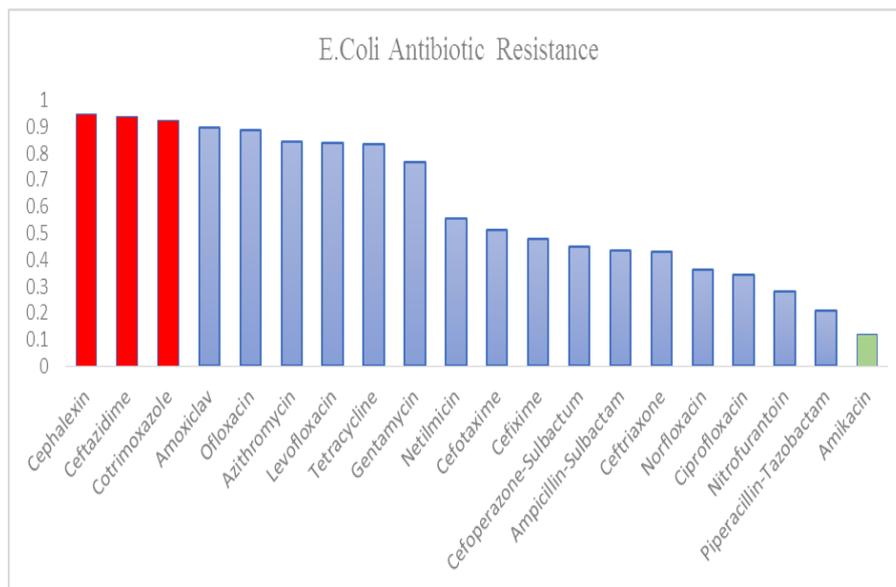Ref – Reference
P Value: 0.05

Figure 1: E. Coli Resistance Pattern.

DISCUSSION

The study was carried out at Chalakudy, a small town coming under Thrissur district in Kerala state. A randomly selected 1000 case were taken into consideration for the study on the basis of first come first selection. All the cases were the microbial growth was not detected were rejected from the study till we obtained 1000 cases.

Out of the total cases obtained, it was observed (Table 1) that, the highest representation belonged to the age group of 41 to 60 with an representation of 33.5% followed by the age group 61 – 80 with 31.2% representation. Indicating vast spread infection at middle and higher age group of the population.

On observing the gender based distribution (Table 2), it was seen that the highest representation was from the female sex with 70.3% and balance the male counterpart with 29.7%. It indicated that the infection was probably high in the female gender to that of males.

On observing the sample distribution, it was observed that the highest number of sample in male were detected in sputum with 46.46% case and followed by urine 35.2% out of the 297 cases. Showcasing the chest infection at the highest followed by the urinary infection. Where as in case of females the urinary infection cases were the highest at 81.08% followed by the sputum at 12.94%, which states the difference between both the population in infection development. Where the UTI based on the disease pattern infects more the female gender and thus the infectious population is highly reported from the female gender.

On further studying it was observed that only 570 cases (57%) out of the 1000 case selected were represented by infection caused by E. Coli and thus the further study only involved 570 cases. This also proves that the highest infection in an population is brought about by E. coli (57%) followed by other infectious microbes.

As per the results drawn it indicates from the proportional data that the most effective drug for treating E. Coli induced infections is Amikacin, where it was seen that out of 570 patients culture and sensitivity report 502 showed sensitivity towards the drug and only 68 patients were resistant to the drug.

On observing the proportion of effectiveness, it was observed that it stands out and its potentially the top listed drug among the group. So, the proportion observed for amikacin was taken as the standard reference to observe the P value and Z value. The values thus obtained indicates that, there are no other drugs available in the group, which is as effective as the drug Amikacin.

In the list of proportion of effectiveness, the drugs that followed were the drugs like Piperazine + Tazobactam (79% effective), Nitrofurantoin (72% effective), ciprofloxacin (65% effective), Norfloxacin (64% effective), Ceftriaxone (58% effective), Ampicillin-Sulbactam (57% effective), Cefoperazone + Sulbactum (56% effective), Cefixime (53% effective), Cefotaxime (49% effective) all indicating nearly 50% of the population may be effectively treated using the drugs as per the above mentioned study, even though the drugs does not fall under the criteria of effectiveness based on the P value calculated.

When we observe the most resistant drug that is showcasing the least effectiveness, we can see that the drug Cephalexin stood at the top of the table with a proportion of 0.9474 (or 94.74% resistant or only 5.26% effective). where it was seen that when a population of 570 were recorded only 30 patients culture and sensitivity test proved to be effective.

On comparing the Z and P value it was observed that a similar ineffectiveness was observed with the drugs like Ceftazidime (93.5% resistant) and Cotrimoxazole (92.3% resistant) with P value 0.3781 and 0.0924 respectively, indicating failure to reject the hypothesis set with the reference standard taken from cephalexin.

The drugs like Amoxiclav, Ofloxacin, Azithromycin, Levofloxacin, Tetracycline, Gentamycin even though as per the P value does not come under the estimate of ineffectiveness as compared to Cephalexin, they all require a reference as all the drugs showed ineffectiveness in above 76% of the population. Indicating that 3/4th of the population cannot be treated with the above drugs, which is relatively high.

The drugs which were effective in about 50% or above population were drugs like, Cefixime, Cefoperazone-Sulbactum, Ampicillin-Sulbactam, Ceftriaxone, Norfloxacin, Ciprofloxacin, Nitrofurantoin, Piperacillin-Tazobactam and Amikacin.

CONCLUSION
On comparing the effectiveness of the drugs irrespective of sensitivity exhibited by the drugs, we can conclude the study by stating that, the drugs like Amikacin, ceftriaxone, ciprofloxacin, Piperacillin-Tazobactam were more sensitive in Kerala Population. Whereas the drugs like Azithromycin, Cefoperazone-Sulbactum, Cephalexin, Cotrimoxazole, Levofloxacin, Nitrofurantoin, Ofloxacin were exhibiting high resistance.

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