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ORIGINAL ARTICLE

Utilization Review of Antibiotics in the Treatment of Urinary Tract Infection

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ABSTRACT

Aim: To evaluate the rationality of pharmacotherapy of UTI and to identify drug related problems (DRPs) in the treatment of UTI.
Methodology:, a prospective study was perfomed in Ayub Teaching Hospital Abbottabad Pakistan for a period of three months (December 2019 to March 2020) on 62 patients suffering from UTI. Data of patient disease and treatment was collected from patient medical chart record file and then pharmacotherapy was evaluated for accessing rationality and identification of DRP using standard book like British national formulary and standard treatment guidelines. Statistical analysis of the data was performed by using SPSS.
Results: Result of this study showed that prevalence of UTI was more in female (67.74%) than males (32.25%). Patients belonging to the age group of 20-40 years were more prone to UTI. The most frequent problems were presence of drug interactions, dosage problems cases, overprescribing cases, therapeutic duplication cases and lack of cost effectiveness cases. After analyzing the use of antibiotics it was found that most widely used antibiotics in the treatment of UTI was ceftriaxone, followed by levofloxacin and ciprofloxacin. Culture Sensitivity test for appropriate selection of antibiotics was not perfomed in 80% of cases. Wrong dose of antibiotics was prescribed in 27.4% cases; therapeutic duplication of antibiotics was found in 6% of patient prescription and over usage of antibiotics was observed in 18% of cases.
Conclusion: Irrational use of drugs especially antibiotics in the treatment of UTI can adversely affect desired therapeutic outcome, lead to therapy failure and emergence of resistance of antibiotics which is a major concern. Drugs for the treatment of UTI should be used rationally according to the need and standard prescribing protocol to improve patient therapeutic outcome and to decrease the adverse consequences of drug therapy. .
Keywords: Urinary tract infection, drug related problems and antibiotic use

INTRODUCTION

The presence of pathogens in the urinary tract may be identified as urinary tract infection (UTI). They are among the most common bacterial infections. UTIs is more common in females especially in pregnant women as a result of anatomical difference and the decrease level of urination during pregnancy (Shankar & Alshakka, 2019). It has been estimated that in most of cases of UTI such as about 80%-85% are caused by Gram negative bacteria while 15%-20% of UTI is caused by Gram positive bacteria (Ullah, Shah, Almugadam, & Sadiqui, 2018). Patients suffering from UTI are often hospitalized due to the severity and complication of infection of UTI and presence of co morbid diseases (Briongos-Figuero et al., 2012). Such patients are usually prescribed antibiotics for infections including cephalosporin's, amino glycosides, and quinolones (Noor, Ismail, & Khan, 2019). Treatment of UTI is second most popular reason for empirical antibiotic prescription. Due to antibiotic-resistant bacteria, the treatment of UTIs become empirical hard so raising the prevalence of infection (Ullah et al., 2018). Apart from the use of these drugs, a large number of other drugs are also prescribed in order to treat the associated symptoms such as antipyretics and co morbid illness such as antihypertensive ,ant diabetic etc. (Dhodi, Bhagat, Pathak, & Patel, 2014). Use of more number of drug increase the chances of occurrence of drug related problems such as drug interaction, adverse reaction dosage error etc (Noor et al., 2019).

Prescription monitoring is very necessary and drug utilization review will help recognize drug-related issues and provide recommendations to the prescriber and raise awareness against the irrational use of drugs. Evaluation of drug use helps to assess the irrationality and irregularities of urinary tract infections prescribing patterns and is an important means of modifying the prescribing pattern and is found to be useful for reducing resistance to antibiotics (Ghodse & Khan, 1988; Gidamudi et al., 2015; Hogerzeil, 1995).

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This study was designed to evaluate the rationality of pharmacotherapy of UTI, to identify drug related problems in the treatment of UTI and to investigate the current antibiotics prescription pattern in treatment of UTI.

METHODOLOGY

A prospective study was conducted on 61 patients suffering from UTI admitted in the Urology and medical ward of Ayub Teaching Hospital (ATH), KPK, Abbottabad and District Head Quarter Hospital, Haripur, KPK, Pakistan during the time period of December 2019 to March 2020.This study was started after approval from the Ethics Committee of District Head Quarter Hospital, Haripur and Ayub Medical Complex Abbottabad. Patients' consent was obtained before participation in this study. Case histories of patients suffering from UTI that contain disease description and full treatment record were collected from urology and medical wards of respective hospitals and data was collected in well designed form. Prescription data along with treatment of every single case history were assessed for rationality and identification of drug related problems in detail using standard books like British national formulary and standard treatment guidelines. Descriptive statistics such as frequencies and percentages were used to represent gender, age group and drug related problems.

RESULTS

Result of this study showed that UTI was more common in females (67.74%) than male (32.25%). Prevalence of UTI was found more in the age group of 20-40 years as shown in table 1.
Usage frequency of different therapeutic classes of drugs for treatment of UTI: It was observed that antibiotics were the major class of drugs used for treatment of UTI fallowed by NSAIDS as shown in table 2.
Antibiotics utilization pattern in the treatment of UTI: After analyzing the usage pattern of antibiotics it was observed that Cephalosporin's were the most frequently used the class of antibiotics followed by fluoroquinolones. Analysis of

appropriateness of dose antibiotics showed that 72(72%) of antibiotics were prescribed in right dose while overdose of antibiotics was observed in 9(9%) of antibiotics, under dose was observed 13% of antibiotics and dose was not mentioned in 5% of antibiotics. It was observed that antibiotics were prescribed without culture sensitivity test in 81% of cases. The detail of above stated fact is given in table 3.

Therapy related problems in the prescriptions of UTI: Result of this study showed that different drug related problems were observed in the treatment of UTI. The most frequent DRPs were presence of DDI cases, followed by dosage error cases, therapeutic duplication cases, poly pharmacy cases and lack of cost effective cases.

Table 1: Baseline characteristics of patients in the study

Study population	**n**
Male	62(100%)
Female	
Age group	
20-40 years	20(67.74%)
41-60 years	42(32.25%)
61- 80 years	11 (17.1%)
80-100 years	3 (4.8%)

Table 2: Class wise distribution of drugs given to the patients

Class of drugs	**Frequency**
A`ntibiotics	42
NSAIDS	22
Anti-pyretic	14
Urine Alkalinizer	12
Analgesics	08
Anti-diabetic	07
Anti-emetic	06
Proton pump inhibitor	06
Anti-hypertensive	06
Normal saline & ringer lactate	05
Multi-vitamins	04
Diuretics	03

Table 3 Antibiotics utilization pattern in the treatment of UTI:
Therapeutic classes of antibiotics prescribed for treatment of UTI

Group	**Drugs**	**Frequency%**
Cephalosporin'	Ceftriaxone (IV)	30 (30.3)
	Cefixime (IV)	3(3.03%)
	Cefixime (Oral)	1(1%)
Piperacillin Beta Lactam Antibiotics	Amoxicillin+Clavulanic Acid (Oral)	3(3%)
	Piperacillin + Tazobactam (IV)	5(5%)
Fluoroquinolones	**Ciprofloxacin (IV)**	4(4%)
	Ciprofloxacin (Oral)	4(4%)
	Levofloxacin (IV)	13(13%)
	Levofloxacin (Oral)	5 (5%)
Sulfonamides	Sulfamethoxazole (IV)	3(3%)
Aminoglycosides	Amikacin	5(5%)
Nitroimidazole	Metronidazole (IV), Tinidazole (Oral)	

Table 4 Therapy related problems in the prescriptions of UTI: Drug Interactions:

Interacting Drugs	**Frequency of interaction**	**Description of Interactions**	**Severity**
Ceftriaxone+Calcium Chloride	2	Concurrent use of both agents causes precipitates & contraindicated in neonates.	Major
Calcium Chloride+Levofloxacin	2	Concurrent use of both agents may result in decrease oral levofloxacin effectiveness.	Moderate
Glimepiride+Levofloxacin	1	1Concurrent use of these 2 agents causes hypo or hyperglycemia.	Major
Metronidazole+Acetaminophen	1	Concurrent use of these 2 agents causes increased effects of acetaminophen.	Minor
Levofloxacin+Diclofenac	1	Concurrent use of levofloxacin and NSAIDs causes CNS stimulation	Moderate
Levofloxacin+Diclofenac	1	Concurrent use of levofloxacin and NSAIDs causes CNS stimulation	Moderate
Levofloxacin+Diclofenac	1	Concurrent use of levofloxacin and NSAIDs causes CNS stimulation	Moderate
Ciprofloxacin+Domperidone	2	1)Concurrent use of these 2 agents causes QT interval prolongation.	Major
Ciprofloxacin+Sucralfate	2	1) Causes QT interval prolongation. 2) Concurrent use of these 2 agents causes decreased ciprofloxacin effectiveness.	Moderate
1)Levofloxacin+Prochlorperazine	1	1) Concurrent use of these 2 agents causes CNS & Respiratory depression.	1)Major

Over Prescribing (n=14)

Drugs	**Frequency**
Over Prescribing of Antibiotics	9
Over Prescribing of other classes of drugs	6
Total	14

Therapeutic Duplication (n=5)

Therapeutic class of drugs	**Recommendations**	**Frequency**
Therapeutic duplication of antibiotics	(Cefixime & Cefadroxil)	03
Therapeutic duplication of analgesic and antipyretic NSAID	(Diclofenac & Nalbuphine)	2
	Paracetamol (Tablet + Infusion)	1

DISCUSSION

Study result showed that UTIs was more common in female which is consistent with two other studies perfomed on patients suffering from UTI (Ahmed, JAKRIBETTU, KOYAKUTTY, Arya, & Shakir, 2012; Gidamudi et al., 2015).Most Commonly prescribed drugs for treatment of UTI were antibiotics such as fluoroquinolones and cephalosporins this findings is accordance with other similar studies(Gidamudi et al., 2015; Sharma & Oommen, 2018). As the results of the study Pargavi B. et al.,19% study also shows E. coli was the most commonly isolated organism in urine culture. Total DRPS were observed in this study. The most commonly observed drug related problems observed in this study was presence of Drug interactions (70% cases) this finding was higher than the study perfomed on drug interaction in UTI which state that DDI were identified in 62.3% of UTI patients treatment (Noor et al., 2019). fluoroquinolones were the most common antimicrobial group used in this study wherein the study by J. Mohan et al.21 reveals amikacin is the most commonly used antimicrobial and study perfomed by Gidamudi et al showed that ciprofloxacin is widely used antibiotics for UTI (Mohan et al., 2011). This study showed overuse of fluoroquinolones for UTI such as for uncomplicated UTI which is consistent with study performed by Chardavoyne & Kasmire, 2020) (Chardavoyne & Kasmire, 2020). Therapeutic duplication of antibiotics was observed in three cases a similar study also showed that 2 therapeutic duplication of antibiotics were observed in treatment of UTI(Chalise et al.). Analysis of appropriateness of dose antibiotics showed that 72(72%) of antibiotics were prescribed in right dose while study perfomed by Chardavoyne & Kasmire, 2020 showed that about in about 80% cases appropriateness of dose antibiotics was prescribed (Chardavoyne & Kasmire, 2020).

CONCLUSION

Irrational use of drugs especially antibiotics in the treatment of UTI can adversely affect desired therapeutic outcome, lead to therapy failure and emergence of resistance of antibiotics which is a major concern. Drugs for the treatment of UTI should be used rationally according to the need and standard prescribing protocol to improve patient therapeutic patient outcome and to decrease the adverse consequences of drug therapy. .

Conflict of interest; il

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