

Study of Antibiotic Use in a Tertiary Care Hospital in Tabuk City, Northern West, Saudi Arabia

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Background: Inappropriate use of antibiotics is known as an important risk factor in the development of antibiotic resistance, which increases the morbidity and mortality. We aimed to determine the prevalence and characteristics of antibiotic use in a Tertiary Care Hospital in Tabuk city, Northern Saudi Arabia.

Methods: A cross sectional study was conducted in a Tertiary Care Hospital in Tabuk city, during October 2017. **Results:** A total of 120 participants, 107 of them had antibiotics in their prescriptions with antibiotic use prevalence 89.2%. Most of patients were males (62.6%) and children and adolescents (0-19 years) constituted 4.8%. The most attended department was internal medicine (32.7%). 21 diseases were identified, upper respiratory tract infection (URTI), followed by urinary tract infection (UTI) 8.4%. Among the antibiotics, ampicillin, cephalosporin and metronidazole were the most prescribed antibiotics as each of them was found in 16.8% of cases, followed by quinolones in 12.1% and macrolides in 11.2%. In addition, Augmentin (9.3%), aminoglycosides (7.5%) and chloramphenicol (1.9%). Regarding the combined therapy, 31.8% of patients received combination of two antibiotics, 4.7% received three antibiotics and only one antibiotic was prescribed in 68% of patients. The most common route of administration was the oral tablets in 48.6% and syrup in 14% of patients. **Conclusion and recommendations:** The prevalence of antibiotic use in Tabuk Tertiary Care hospitals was very high (89.2%) which could be a risk factor for the development of antibiotic resistance. We advocate public health measures targeting healthcare providers on the use and misuse of antibiotics.

Key words: Prevalence, Antibiotics, Tertiary Care hospital, Tabuk, Northern Saudi Arabia.

INTRODUCTION

Antibiotic are the molecules that science discover and applied for treatment of infectious disease. Antibiotic are perceived as strong, efficient drug and it plays an important role in decreasing certain forms of bacterial diseases, infectious diseases and it's complications and treatment. So it decreases morbidity and mortality rate in individuals which occur due to infectious disease [1].

Inappropriate antimicrobial drug use is associated with adverse events in hospitalized patients and contributes to the emergence and spread of resistant pathogens. Targeting effective interventions to improve antimicrobial use in the acute care setting requires understanding hospital prescribing practices [2].

The disappearance of certain forms of serious bacterial diseases, the decrease of common infectious disease complications, the treatment of infectious diseases are largely attributed to antibiotic [3].

Excessive and/or inappropriate use of antibiotics brought the development and expansion of bacterial resistance to these products [4]. Antibiotic resistance reduces the effectiveness and treatment options and increases the morbidity and mortality risks [5,6].

Antimicrobials are prescribed in up to a third of hospital inpatients, often inappropriately and

more than two thirds of critically ill patients are on antimicrobials at any one time [7].

Improper use of antibiotic which lead to bacterial resistance can occur due to misbehavior of patient in taking it. Clinical study indicate that under dosing may lead to promote drug resistance during therapy [8].

Physician prescribe a broad spectrum antibiotics which are recent and expensive that make pressure which accelerate gain of resistance factor [9].

It is found that there is a monitoring system found in developed countries that monitor any appearance of bacterial resistance to antibiotic and it was found in United State that 75% of the patient has bacterial resistance [10].

Bacterial resistance can spread easily in hospitals so we should control improper use of antibiotics.

The objectives of the current study was to determine the prevalence and characteristics of antibiotic use in a Tertiary Care Hospital in Tabuk city, Northern Saudi Arabia.

METHODOLOGY

This was a cross-sectional study conducted in a Tertiary Care Hospital in Tabuk city, Northern Saudi Arabia. Our study was conducted in a period from 1 to 31 October 2017.

From the selected hospital, a nurse or a doctor, was selected to help in data collection.

The selected patients were those hospitalized for at least 24 h and who were present in the hospital's services on the days of the survey. Our sample excludes patients hospitalized for less than 24 hours.

The data were collected from patients' records using a check list including the following variables: The age, the gender, the prescribed drugs (antibiotics and others drugs), and if the patient received one antibiotic or combination of two antibiotics or three.

Regarding the antibiotic used (identity, name and its related group of antibiotics, routes of administration, dose) and the diagnosis of the case to show the therapeutic indications of its use.

The prevalence was calculated as a ration between the number of the patients receiving at least one antibiotic for their treatment and the number of all hospitalized patients.

Statistical Analysis

All the data were analyzed using statistical package for social sciences (SPSS Inc.) version 16. Descriptive statistics for the prevalence and quantitative variables were used.

Ethical considerations

Data collectors explained the aims and significance of the study to the participants to get their consent. Confidentiality was considered along with the study.

The study was done after approval of ethical board of King Abdulaziz University.

RESULTS

Table (1) illustrates the prevalence of antibiotic using among the studied patients. A total of 120 participants, of them 107 had antibiotics in their prescriptions with antibiotic prevalence 89.2%.

Table (2) shows the socio-demographic characteristics of the studied patient. It's found that prevalence of antibiotic use was more males subjects than females as they represented 62.6% of patient, and the highest frequencies (36.4%) of antibiotic use occur from 20 to 45 years but children and adolescents (0-19 years) were 44.8%. more than half (52.3%) of them were singles or children

Table (3) illustrates the diagnosis and the department of treatment of the studied patients.

We found that more than third of patients (34.6%) diagnosed of upper respiratory tract infection (URTI) infection, followed by urinary tract infection (UTI) 8.4%, and T.B is least diagnosed infection. About third (32%) of antibiotic use are reported from internal medicine department

Table (4) illustrates the type, dosage form, number of prescribed antibiotic and days of antibiotic use prescribed to the studied patients. Cephalosporin, Metronidazole, Penicillin and ampicillins are the most used types of antibiotics and they are used equally in the same value as each of them represent 16.8% of prescribed antibiotic. Antibiotics could be found in many forms but the most common form is tablets as more than half of the patients take it in tablet form, followed by IM injection 14% and syrup 14% too.

Only one antibiotic was prescribed in 68% of patients, combination of two antibiotics was found in 31.8% and combination of three in 4.7% only of patients. The period of antibiotic use differs according to the type of antibiotic and type of infection, most of antibiotics (75.7%) taken from 1-10 days, 19.9% from 11-15 days but 2.8% used for more than one month.

Table (1): prevalence of antibiotic use among the studied patients

Antibiotic	No. (n=120)	Percent
Yes	107	89.2
No	13	10.8

Table (2): Sociodemographic characteristics of the studied antibiotic using patients

Sex	No. (n=107)	Percent
Female	40	37.4
Male	67	62.6
Age group		
0-19	48	44.8
20-45	39	36.4
46-60	12	11.2
> 60	8	7.5
Marital status		
Single and/or child	56	52.3
Married	51	47.7

Table (3): Diagnosis and the department of treatment of the studied patients

Diagnosis of the studied patients	Number (n=107)	Percentage
URTI	37	34.6
UTI	9	8.4
Gastroenteritis	9	8.4
wound infection	7	6.5
O.M	6	5.6
Gingival abscess	4	3.7
Conjunctivitis	3	2.8
Meningitis	3	2.8
Pneumonia	2	1.9
Septicemia	3	2.8
Vaginitis	2	1.9
Cellulitis	2	1.9
Endometritis	2	1.9
Helicobacter	2	1.9
Prophylactic for surgical wounds	2	1.9
TB	1	.9
Others as osteomyelitis, diphtheria, carditis, typhoid, tetanus,	13	13.1
Department		
ENT	13	12.1
Eye diseases	6	5.6
Internal medicine	35	32.7
Maternity	7	6.5
Orthopedics	1	.9
Pediatrics	24	22.4
Surgery	14	13.1
Urology	6	5.6
Mouth and Teeth diseases	1	.9

Table (4): Type, dosage form, number of prescribed antibiotics and days of antibiotic use prescribed to the studied patients

Type of antibiotic	Number (n=107)	%
Cephalosporin	18	16.8
Metronidazole	18	16.8
Penicillin and/or ampicillin	18	16.8
Quinolones	13	12.1
Macrolides	12	11.2
Augmentin	10	9.3
Aminoglycosides	8	7.5
sulfa drugs	4	3.7
Nitrofurantoin	2	1.9
Chloramphenicol	2	1.9
Fucidin	1	.9
Anti TB drugs	1	.9
No antibiotics		

Dosage form of antibiotics		
Tab	52	48.6
IM	15	14.0
Syrup	15	14.0
IV	14	13.1
Ointment	6	5.6
Drops	5	4.7
Number of prescribed antibiotics		
One	68	63.6
Two	34	31.8
Three	5	4.7
Days of antibiotic use		
1-10	81	75.7
11-15	21	19.6
16-30	2	1.9
>30	3	2.8

DISCUSSION

The disappearance of certain forms of serious bacterial diseases, the decrease of common infectious disease complications, and the treatment of infectious diseases are largely attributed to antibiotics [11]. In this study, we aimed to determine the prevalence and characteristics of antibiotic use in a Tertiary Care Hospital in Tabuk city, Northern Saudi Arabia. A cross sectional study was conducted in a Tertiary Care Hospital in Tabuk city, from 1st to 31st October 2017. The data were collected from patients' records using a check list including the following variables: The age, the gender, the prescribed drugs (antibiotics and others drugs), and if the patient received one antibiotic or combination of two antibiotics or three. Regarding the antibiotic used (identity, name and its related group of antibiotics, routes of administration, dose) and the diagnosis of the case to show the therapeutic indications of its use.

In the current study, a total of 120 participants, 107 had antibiotics in their prescriptions with antibiotic prevalence 89.2%.

Among 107 participants used antibiotics, 40 (37.4%) were females and 67 (62.6%) were males, children and adolescents (0-19 years) were 44.8%. Only 8 (7.5%) of the participants were above 60 years old, 12 (11.2%) were between 46 to 60 years, 39 (36.4%) from 20 to 45 years. In similar study in Butembo [11], prevalence of antibiotic use was 68%, among 476 patients, the prevalence of antibiotic use was slightly higher in females 59.1% than males (40.9%), and 24.3% among children 0-15 years and 46.2% among children young people 16-30 years. The current study revealed that, among the antibiotics, ampicillin, cephalosporin and metronidazole was the most prescribed antibiotic as each of them was found in 16.8% of

cases, followed by quinolones in 12.1% and macrolides in 11.2%. In addition Augmentin (9.3%), aminoglycosides (7.5%) and Chloramphenicol (1.9%). In a study done by Wambale JM in Butembo^[11], the ampicillin, and penicillin is prescribed by 35%. But the results found in Mali by Toure^[12], also present ampicillin (57.54%) followed by gentamicin(23.13%), metronidazole (6.5%), lincomycin (2.6%) as the first choice of prescribers.

Another study revealed the predominance of the penicillin G (39.5%), followed by cotrimoxazole (22%), chloramphenicol (12.24%) and penicillin G (6.39%)^[13]. However, the difference between the prevalence of antibiotics use found in this study and in previous studies does not necessarily mean that there is miss use of antibiotics, as this difference could be due to the difference in the type and prevalence of infectious diseases in Tabuk city population.

In the present study, more than 62% (48.6% tablets & 14% syrup) of the antibiotics were prescribed by oral rout, which is in line with the results obtained by Jarno and Piednoir^[14] and Ouedrago^[15], while the results obtained by Sissiko^[16] showed a higher frequency antibiotic prescribed by intravenous route.

In the current study, more than 60% of the participants had one antibiotic, 31.8% were treated with two antibiotics and only 4.7% had a combination of three different antibiotics. These results are similar to those obtained by Jarno and Piednoir^[14] who showed a frequency of 76% for patients on a single antibiotic therapy and 20.5% for patients on two antibiotic therapies.

CONCLUSION AND RECOMMENDATIONS

The prevalence of antibiotic use in Tabuk Tertiary Care hospitals was very high (89.2%) which could be a risk factor for the development of resistance in case of inappropriate use of antibiotics. Prescribing antibiotics without very strong and targeted indication is an issue that mandates a political intervention and implementation of the existing laws that prohibit it. We advocate public health measures targeting healthcare providers on the use and misuse of antibiotics.

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REFERENCES

- 1- **Montastruc J, Bagheri H, Geraud T et al. (1997):** Pharmacovigilance of self-medication. *Therapie.*, 52 (2): 105-110
- 2- **Shelley S, Jonathan R, Zintars G (2014):** Prevalence of Antimicrobial Use in US Acute Care Hospitals, May-September 2011. *JAMA.*, 312(14):1438-46.
- 3- **Agence du Médicament (1999):** Prescription et consommation des antibiotiques en ambulatoire. *Lettre Infectiologue*, 14:343-50.
- 4- **Fishman N (2006):** Antimicrobial stewardship. *Am. J. Infect. Control.*, 34(1):55-63.
- 5- **Magill SS, Edwards JR, Beldavs ZG, Dumyati G, Janelle SJ, Kainer MA, Richards K (2014):** Prevalence of antimicrobial use in US acute care hospitals. *JAMA.*, 312(14):1438-1446.
- 6- **Hecker MT, Aron DC, Patel NP, Lehmann MK, Donskey CJ (2003):** Unnecessary use of antimicrobials in hospitalized patients: current patterns of misuse with an emphasis on the antianaerobic spectrum of activity. *Arch. Intern. Med.*, 163(8):972-978.
- 7- **Vincent JL, Rello J, Marshall J et al.(2009):** International study of the prevalence and outcomes of infection in intensive care units. *JAMA.*, 302(21):2323–9.
- 8- **Ciofi Degli Atti ML, Raponi M, Tozzi AE, Ciliento G, Ceradini J, Langiano T(2008):** Point prevalence study of antibiotic use in a paediatric hospital in Italy. *Euro Surveill.*, 13(41):655-658.
- 9- **Toth NR, Chambers RM, Davis SL(2010):** Implementation of a care bundle for antimicrobial stewardship. *Am J Health Syst Pharm.*, 67(9):746–9.
- 10- **Hecker MT, Aron DC, Patel NP, Lehmann MK, Donskey CJ (2003):** *Arch. Intern. Med.*, 163(8):972-978.
- 11- **Wambale J, Iyamba J, Mathe D et al. (2016):** Point prevalence study of antibiotic use in hospitals in Butembo. *Int. J. Med. Med. Sci.*, 8(12):133-139.
- 12- **Toure S, Toure A, Koumar B et al. (1997):** Antibiothérapie-prévention des infections postopératoires en chirurgie A de l'hôpital Gabriel Touré. *Digest Mali. Bamako*, 4(1):29.
- 13- **N'DIAYE S (2003):** Utilisation des antibiotiques au service de maladies infectieuses de CHU de Fann à Dakar. – Thèse, pharm. Dakar. <http://www.keneya.net>
- 14- **Jarno, P, Piednoir, E (2010):** Enquête de prévalence de l'utilisation des antibiotiques 2009 dans les établissements de l'Inter-région Ouest. <http://docplayer.fr/47337569-Enquete-de-prevalence-de-l-utilisation-des-antibiotiques-2009-dans-les-etablissements-de-l-inter-region-ouest.html>
- 15- **Hedrick T , Evans H, Smith R et al. (2006):** Can we define the ideal duration of antibiotic therapy? *Surg Infect (Larchmt)*, 7(5):419–32.
- 16- **Sissoko R (2000):** Antibiothérapie dans le service de traumatologie de l'Hôpital Gabriel Touré–Thèse, pharm. http://indexmedicus.afro.who.int/iah/fulltext/Thesis_Bamako/05P71.PDF