

# Evaluation of Antibiotics used and Treatment Outcomes in Postoperative Appendectomy Patients

Habibullah<sup>1\*</sup>, Faria Khurshid<sup>1</sup>, Mohammad Younus<sup>1</sup>, Noman ul Haq<sup>2</sup>, Yasir Saud Sadiq<sup>2</sup>, Mohammad Zahir<sup>3</sup>, Aqeel Naseem<sup>4</sup>

<sup>1</sup>Department of Pharmacology, Faculty of Pharmacy and Health Sciences, University of Balochistan, Quetta, PAKISTAN.

<sup>2</sup>Department of Pharmacy Practice, Faculty of Pharmacy and Health Sciences, University of Balochistan, Quetta, PAKISTAN.

<sup>3</sup>Pharmacist in Martin Dow Marker Pvt, Quetta, PAKISTAN.

<sup>4</sup>Department of Pharmacy, Balochistan Institute of Nephro-Urology, Quetta, PAKISTAN.

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\*Correspondence to:

**Dr. Habibullah, PharmD, M. Phil Scholar**  
Department of Pharmacology, Faculty of  
Pharmacy and Health Sciences, University of  
Balochistan, Quetta-87550, PAKISTAN.

Email: kxanhabib385@yahoo.com

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## Abstract

**Background:** Appendicitis is condition which describes and explain inflammation of appendix. Signs and symptoms of appendicitis are generally severe discomfort in lower right part of abdominal cavity, vomiting, nausea and loss of appetite while around 40% of people do not show these distinctive characteristics of appendicitis. For management of acute appendicitis appendectomy is required on urgent basis. The incidence of surgical wound infections or surgical sites infections are greatly reduced by administration of antibiotics prophylactically. **Methodology:** This cross sectional study was conducted for minor and major surgery patients of appendicitis at Sandman Provincial Hospital Quetta and Bolan Medical Complex Hospital Quetta. The study was carried out over period of 4 months between May 2018 and September 2018. Convenient sampling method was adopted for enrolling study patients A standardized data collection form was developed based on recommendations of Center for Disease Control (CDC) guiding principle for inhibition of SSI was used. Ethical approval was obtained from Ethical Committee of Faculty of Pharmacy and Health Sciences, University of Balochistan Quetta. **Results:** Results showed that majority of patients of appendicitis 133 (68.2%) were from age group 1 to 20 years. Majority of participants that had undergone surgery for appendicitis were male 114 (58.5%). Majority of respondents belonged to the urban area i.e 123. Outcomes on follow up showed majority of the patients had healed their wound which were using prescribed antibiotics for post-operative care. Only one patient reported the sepsis. Metronidazole was prescribed to most of the patient's i.e 183, Ceftriaxone to 162, Gentamicin to 155, Moxifloxacin to 19 among other antibiotics. **Conclusion:** The current study demonstrated that antibiotics are rationally prescribed in tertiary care hospitals of Quetta, also prophylactic and post-operative prescribing of antibiotics yield the desired outcomes.

**Key words:** Appendix, Post-Operative, Antibiotic, Treatment Outcomes, Quetta, Pakistan.

## INTRODUCTION

Appendicitis is condition which describes and explain inflammation of appendix.<sup>[1]</sup> Signs and symptoms of appendicitis are generally severe discomfort in lower right part of abdominal cavity, vomiting, nausea and loss of appetite while around 40% of people do not show these distinctive characteristics of appendicitis.<sup>[2]</sup> The patients of perforated appendix may become complicated due to severe pain in inner lining of the wall of abdomen that causes severe inflammation which will lead to severe complications like sepsis resulting life threatening conditions for the patients of appendicitis.<sup>[2]</sup>

World Health Organization (WHO) latest information report published in 2017 on deaths due to appendicitis report that deaths in Pakistan due to appendicitis are 2,281 that is 0.19% of total deaths. In Pakistan age adjusted mortality rate is 1.74 out of 100,000 of population due to which Pakistan is ranked at twenty one in the world.<sup>[3]</sup>

Agents which are the main causes of appendicitis are solid mass of indigestible food called bezoares, trauma, presence of worms and foreign bodies in intestine, inflammation in lymph nodes and most general cause is deposition of calcified mass in feces which is known as fecalith or appendicolith.<sup>[4,5]</sup> The existence of blocking fecaliths got consideration since their occurrence in people having appendicitis is progressive in developed

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nations than in emerging nations.<sup>[6]</sup> In adding an appendiceal fecalith is generally related with more complex appendicitis.<sup>[7]</sup> Movement of feces and capture may show a role, as confirmed by people having acute appendicitis and having less bowel movements per week related with well controls <sup>[5,8]</sup>

For management of acute appendicitis appendectomy is required on urgent basis as appendectomy is the foundation for controlling acute appendicitis because of difference in illness and death rates between perforated and non-perforated appendicitis. Prompt operation outcomes in the approval of finding of appendicitis and prevention of sepsis deprived of the danger of becoming recurrent appendicitis.<sup>[9]</sup>

The incidence of surgical wound infections or surgical sites infections are greatly reduced by administration of antibiotics prophylactically. For all types of surgical procedures such as dirty, contaminated and clean contaminated, the usage of antibiotics prophylactically is considered optional for most of clean procedures. The administration of antibiotics as prophylaxis is recommended to reduce the risk in patients that requires clean surgical procedures to follow the criteria systematically.

The patients of appendicitis treated operatively must be considered for selecting, duration and route of administration of antibiotics to reduce antibiotic resistance. However, there will be highlighted problem with antibiotic resistance among disease causing agents of bowel pathogens.<sup>[10,11]</sup> It will be causing high costs, prolonging hospital stay leading to high mortality rates because of resistance of bacteria towards different types of antibiotic agents used in surgical procedures. The aim of this study is to provide information of optimized postoperative use of antibiotics for patients of appendectomy and to see whether evidence-based recommendations by health care professionals could be proposed.

## MATERIALS AND METHODS

### Study Design

A cross sectional study was conducted targeting patients of minor and major surgery type whose surgery was performed in Quetta at Sandman Provincial Hospital Quetta (SPH) and Bolan Medical Complex Hospital Quetta (BMCH). The study locations are the two large and old tertiary care hospitals in Balochistan which is the largest province of Pakistan by area. SPH has a capacity of 780 beds with 488 doctors and have various departments among which the surgical department is consisted of further four subunits. BMCH is a teaching hospital with a 750 bedded capacity and 510 doctors that provide medical services in all major health departments. Thus, these are two hospitals have a wide catchment area of the whole province and borderline areas of Afghanistan.

### Duration of Study

The study was carried out over period of 4 months between May and September 2018.

### Study Population and Eligibility Criteria

The study includes all those patients irrespective of age, gender, type and site of surgery, who underwent surgery at the study sites during the study period. Patients with compromised immunity like HIV positive patients and those who were not ready to take part in the study were omitted.

### Sample Size Calculation

Sample size was estimated on the basis on the prevalence of SSI's (13%) in a tertiary hospital of Pakistan and calculated by using Daniel's sample size

calculation formula given below

$$N = Z^2 P (1-P)/d^2$$

Where:

N = sample size

Z = statics for a level of confidence = 1.96

P = Expected prevalence of SSI in surgical patients = 13% [13/100=0.13]

d = precision (in proportion of 1 if 5%) so d = 0.5

The calculated sample sizes

$$N = (1.96)20.13(1-0.13) / (0.05)^2 = (3.8416)0.13(0.87)/0.0025$$

$$= (3.8416) (0.1131) 0.0025 = 0.43448496 / 0.0025, \text{ so}$$

$$N = 173.79 \sim 174$$

### Sampling Method

Convenient sampling method was adopted for enrolling study patients until the required sample size was achieved.

### Research instrument

A purpose developed standardized data collection form based on recommendations of Center for Disease Control (CDC) guiding principle for inhibition of SSI was used to collect the data. The data collection form consisted of three phases. The initial phase was about the socio-demographic features of the study. The next phase was about the clinical and surgical characteristics of the patients. The last is third phase which was about the CDC guidelines recommended practices for the prevention of SSIs. This section included questions about bath before surgery, pre-operative measurement of body temperature, blood glucose and blood pressure. Furthermore, this section also contained questions about the pre-operative prophylactic use of antibiotic and type of antibiotic prescribed, use of skin cleaning antiseptics and use of topical antimicrobials and triclosan sutures and post-operative use of antibiotics.

### Statistical analyses

Data analysis was carried out using SPSS (Statistical Package for Social Science, IL, Chicago, USA) version 20. Categorical data was presented as frequencies and percentages, whereas, continuous data was presented as mean + standard deviations (SD). Chi-square and Fisher exact tests (wherever applicable) were used to find association between patients' characteristics and prophylactic use of antibiotics. Multivariate binary logistic regression analysis was conducted to find out the final factors associate with the prophylactic use of antibiotics. All those variables which had a *p*-value <0.20 were entered multivariate analysis. To each guideline adherent practice score of 1 was assigned and the scores were then summed up. Mann-Whitney U and Kruskal Wallis tests (wherever applicable) were used to evaluate the difference in the guidelines practices adherent scores based on patients' characteristics. A *p*-value of <0.05 was considered statistically significant.

### Ethical considerations

Ethical approval was obtained from the Research and Ethics Committee of Faculty of Pharmacy and Health Sciences, University of Balochistan Quetta. Written and oral consent (in case of illiterate patients) was obtained from the patient after a thorough explanation of what the study entailed. The patient was adequately informed that he/she was at liberty to withdraw from the study at any particular time without any penalty or consequence. The risks, benefits and confidentiality issues were conveyed before consenting to participate in the study. The data collection instrument did not bear patient name, hospital registration number and the patient were only identified

**Table 1: Demographic Characteristics of Appendectomy Patients.**

Demographic Characteristics	Frequency <i>n</i> =195	Percentage
<b>Age Group</b>		
1 to 20	133	68.2
21 to 40	54	27.7
41 to 60	7	3.6
61 to 80	1	0.5
<b>Gender</b>		
Male	114	58.5
Female	81	41.5
<b>Marital Status</b>		
Married	63	32.3
Unmarried	132	67.7
<b>Education</b>		
Educated	104	53.3
Uneducated	91	46.7
<b>Occupation</b>		
Government Servant	10	5.1
Private Servant	31	15.9
Unemployed	143	73.3
Self-employed	11	5.6
<b>Income</b>		
Not Mentioned	40	20.5
No Income	108	55.4
Less than 10000	3	1.5
10000 – 20000	27	13.8
More than 20000	17	8.7
<b>Locality</b>		
Urban	123	63.1
Rural	72	36.9

by the study numbers.

## RESULTS

### Demographic Characteristics

Appendectomy patients were placed in four age groups starting from 1 to 20 years, 21 to 40 years, 41 to 60 years and 61 to 80 years. This study shows that majority of patients of appendicitis from age group 1 to 20, *n*=133 (68.2%) got surgery. Table 1

Majority of participants in this study were male *n*=114 (58.5%) while female *n* = 81 (41.5%). Regarding their marital status majority of participants were unmarried *n*=132 (67.7%) and married *n*=63 (32.3%), while 104 (53.3%) of participants were educated and 91 (46.7%) of participants were uneducated. Majority of respondents were unemployed *n*=143(73.3%) with majority of respondents having no income. Majority of respondents were from urban area *n* = 123 (63.1%) and respondents of rural area were *n* = 72 (36.9%) in this study. Demographic characteristics of appendectomy patients are displayed in Table 1.

Outcomes on follow up are showed in Table 2 majority of the patients had healed their wound which were using different aforementioned antibiotic drugs. Whereas only one patient reported the sepsis. The only patients that

**Table 2: Drugs – Outcomes on Follow up.**

Drugs Used	Outcomes on Follow up		Total
	Wound Healed	Sepsis	
Metronidazole	183	0	183
Ceftriaxone	162	1	163
Gentamicin	155	0	155
Imipenem	5	0	5
Enoxacin	1	0	1
Moxifloxacin	19	0	19
Cephadrine	3	0	3
Amoxicillin+Clavulanic acid	2	0	2
Cefixime	1	0	1
Penams	1	0	1
Meropenems	1	0	1
Piperacillin+Tazobactam	1	0	1

reported was using Ceftriaxone. However, 162 other patients who were also on Ceftriaxone had healed.

## DISCUSSION

According to World Health Organization Report the appendicitis is responsible for 2,281 of total deaths worldwide. In Pakistan age adjusted mortality rate is 1.74 out of 100,000 of population due to which Pakistan ranked at 21 in the world. The incidence of surgical wound infections or surgical sites infections are greatly reduced by administration of antibiotics prophylactically. It is an effective mode to prevent the chances of hospital acquired infections and is preferred for the same reason. Surgical infections have a possibility to aggravate and produce sepsis if they are left unattended in the absence of an antibiotic medications. The sepsis is a life-threatening condition that arises as a response of the body to a infected wound. The sepsis may progress to cause septic shock which is fatal and cause multiple organ damage.

Present study offered an information of the prescription trend and postoperative use of antibiotics for patients of appendectomy that were being treated in Sandman Provincial Hospital Quetta and Bolan Medical Complex Hospital Quetta and outcomes of antibiotic use. Appendicitis is seen more of an urban phenomenon because majority of the patients reported belonging to urban households as compared to the patients from rural background. Consequential to the administration of Flagyl, Ceftriaxone and Gentamicin, the operated patients reported the healed wound on the follow up visit. None of the patients developed sepsis except one. Therefore, it could be stated that a rational trend of prescribing antibiotics is followed upon by the patients of appendectomy in Public Hospitals of Quetta.

## CONCLUSION

The current study demonstrated that antibiotics are rationally prescribed in tertiary care hospitals of Quetta, also prophylactic and post-operative prescribing of antibiotics yield the desired outcomes.

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