

# Patterns of physicians' knowledge, attitude and prescribing trends against upper respiratory tract infections in Lahore, Pakistan

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**Abstract:** Although viruses cause most of upper respiratory tract infections but still antibiotics are irrationally prescribed in mild infections, especially in upper respiratory tract infections. To identify gaps among prescribers, due to lack of standard guidelines and antimicrobial stewardship programs, it is needed to check knowledge, attitude, perception and current prescribing pattern of antibiotics. Based on the data recommendations can be specified to overcome the prescribing deficiencies and increasing rates of antimicrobial resistance. It is inevitable to educate patients about ineffectiveness of antibiotics in viral infections, and to develop guidelines for prescribing antibiotics, running continuing medical education and establishing antibiotic stewardship programs. We conducted a cross-sectional survey-based study by engaging physicians of public and private sector hospitals in Lahore, Pakistan. About 66% agreed for semi-structured interview and met the inclusion criteria. Fifty percent of physicians have an understanding that antibiotics should be prescribed in URTIs, otherwise symptoms may get worsen. The only encouraging thing is that 78.8% believe that antibiotics are being misused and are major cause of increasing rate of resistance. Most of prescribers have an understanding that antibiotics should be prescribed in upper respiratory tract infections. They are prescribing antibiotics ignoring Center for Disease Control guidelines for the treatment or prophylaxis of upper respiratory infections.

**Keywords:** Prescribing pattern, upper respiratory tract infections, antimicrobial resistance, antimicrobial stewardship.

## INTRODUCTION

Antibiotics are the 3<sup>rd</sup> most prescribed group of medicines (Veličkovic–Radovanovic *et al.*, 2015). The use of antibiotics for the therapeutic purpose with relevance to the rate of development of resistance has become major concern of the scientists across the world since decades (Suaihan *et al.*, 2012). Lack of physicians' knowledge, perception, attitude, patient expectations, manufacturer's influence and lack of culture sensitivity reports, such factors ultimately lead to irrational prescriptions and the development of AMR in microorganisms (Machowska and Stålsby Lundborg, 2019). Globally irrational use of antibiotics in the treatment of viral infections, inappropriate dosing and prolong use are major cause of AMR (Alhomoud *et al.*, 2017). Many studies indicated gaps among physicians while prescribing antibiotics (Md Rezal *et al.*, 2015). These are regarding knowledge, perception and increasing rate of AMR due to lack of prescribing guidelines and ASP (Sadiq *et al.*, 2018). Continuous medical education (CME) to physicians, and awareness about the rational use of antibiotics will decrease the irrational PP (Ajitha, 2018). Care-takers of patient greatly influence the physicians for inclusion of antibiotics in prescription, particularly in case of children (Abobotain *et al.*, 2013). The key to success of ASP depends upon updated knowledge, perception and attitude

of physician towards antibiotics PP (Kalungia *et al.*, 2019, Md Rezal *et al.*, 2015). AMR is a global problem but more prominent in developing countries like Pakistan (Shaikh, 2017). Previous studies suggest that upper respiratory tract infections (URTIs) are more prevalent in UK & USA (Gulliford *et al.*, 2014) and on an average at least occur three times a year among children and in these patients 30% parents expect antibiotics when they visit primary health care physician, regardless of the fact that most of the URTIs are viral in source (Alrafiaah *et al.*, 2017, Mortazhejri *et al.*, 2020). In Pakistan, some studies conducted formerly revealed that gap of communication between physician and care-taker and patient counseling are main causes of irrational use of antibiotics (Iftikhar *et al.*, 2019, Mustafa *et al.*, 2020). Prescribing behavior in URTIs is quite similar in different developing countries due unavailability of prescribing guidelines (Shaheen *et al.*, 2017). In Indonesia a physician prescribe approximately 3.5 antibiotic drugs in 85% patients of URTIs (Sakeena *et al.*, 2018) perhaps as per WHO it is 1.3-2.2 in few developing countries i.e. Africa. To change the prescribing attitude and practices, but the educational trainings are most attractive method rather than regulatory polices (Hwang *et al.*, 2016). Antibiotic resistance is directly linked with inappropriate prescribing rate of antibiotics among community (Ab Rahman *et al.*, 2016). The data available locally for community acquired problems is insufficient with relevant to developed countries (Ayukekbong *et al.*, 2017). Studies performed at

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lower scale by National Medical Care Survey revealed that antibiotics are frequently prescribed against URTIs in Malaysia (Teck *et al.*, 2016).

As per latest stated data by the center for disease prevention and control, Greece has highest antibiotics prescribing rate among European countries (Ventola, 2015), (Prestinaci *et al.*, 2015). In Pakistan antibiotic PP is worse and rate of AMR is much higher than other developing countries, but exact contributing factors needed to be discovered for developing some guidelines for prescribing of antibiotics in URTIs (Harbarth *et al.*, 2015).

## **MATERIALS AND METHODS**

### ***Study design and study settings***

A cross sectional study was conducted and the collection period was 6-month; June 2018 to Dec 2018. Out of 100 physicians, 66 participated in the semi-structured interview and met the inclusion criteria (table 1). Data obtained were sectioned into seven main divisions, i.e., General Demographics (age, gender), Basic Knowledge about antibiotics, knowledge about Antibiotic Resistance, Antibiotics Utilization Trends, Physicians PP in URTIs as standard guidelines and mechanisms of development of resistance against antibiotics. Later, comparison was made between public/private sector and GPs, ENT and General Medicine physicians.

### ***Inclusion criteria***

All subjects up to 80 years of age, irrespective of gender, socioeconomic status and willing to participate were included in the study.

### ***Exclusion criteria***

Physicians didn't confirmed through consent and not willing to participate were excluded from study.

### ***Data collection***

Data collection was done by interviewing physicians and observing their perception, attitude towards PP as per division in questionnaire designed. The reliability of the questionnaire was evaluated with Cronbach's alpha (0.78) using SPSS version 22. Face validation of the questionnaire was done by conducting a pilot study on 5 physicians and the physicians' feedback was incorporated in the final data collection form. The data obtained during the pilot study was not included in the final analysis. The questionnaire was outlined into the following sections:

1. General demographics (age, gender)
2. Basic Knowledge about antibiotics
3. Knowledge about antibiotic's resistance
4. Antibiotics Utilization Trends in URTIs
5. Physicians PP in URTIs
6. PP in URTIs as standard guidelines

7. Mechanisms of development of resistance against antibiotics

### ***Rational prescribing pattern***

Questions asked from the physicians helped us to evaluate their behaviour and attitude in prescribing antibiotics in common cold, sore throat, pharyngitis, tonsillitis and otitis media (Panagakou *et al.*, 2011)

## **STATISTICAL ANALYSIS**

The data were analyzed using SPSS (IBM, version 22), unless otherwise stated. Descriptive crosstab and Pearson's chi-squared analysis were performed to estimate the percentages and frequencies. The Pearson's Chi-square values of <0.05 were considered statistically significant (*p-values* are mentioned on the top of graphs in all the figures).

### ***Ethical approval***

The study was approved by the Ethical Committee on Human Research, University of Baluchistan, Pakistan, ref #.2002/UB-2016/R-376 and Institutional Review Board (IRB), ref# 5330 of the hospital.

## **RESULTS**

### ***Awareness of basic clinical knowledge among physicians in public and private hospitals***

The study was conducted by interviewing doctors; general physicians (GP), ENT and General Medical Specialist (MD) on basis of saturation level. 64.3% GP believes body can fight mild infections on its own, but 36.1% MD believe it depends upon exposure and type of infection. Most doctors believe antibiotics are freely available without prescription only few 18.2% assume only available against prescription and 56.1% strongly agree that currently antibiotics are being misused. GPs 28.6% have firm believe that antibiotics are helpful for treating flu, cold and pharyngitis, 44.4% MD said antibiotics should be only used if it is due to bacterial infection. A persistent cough longer than two weeks 28.6% GPs believe should be treated with antibiotics perhaps ENT and MD differ in opinion. Only 13.6% believe that antibiotics should be used for sore throat while 16.7% for sinusitis or runny nose and 25.8% for tonsillitis to avoid complications but at the same time 25% ENT & MD believe antibiotics must be used in common cold when sputum becomes colored. Many physicians 27.3% treat otitis media in children with antibiotics however 48.5% know very well that excessive use of antibiotics will decrease efficacy with the passage of time (fig. 1).

### ***Knowledge of antibiotics utilization trends among physicians in Pakistani public and private hospitals***

About 43.9% physicians believe that antibiotics may be prescribed in otitis media > four days and sore throat > one

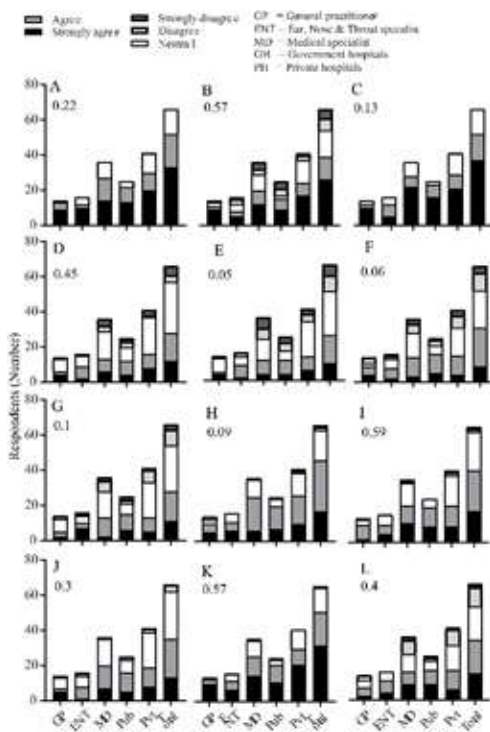


Fig. 1: Basic clinical knowledge about antibiotics.

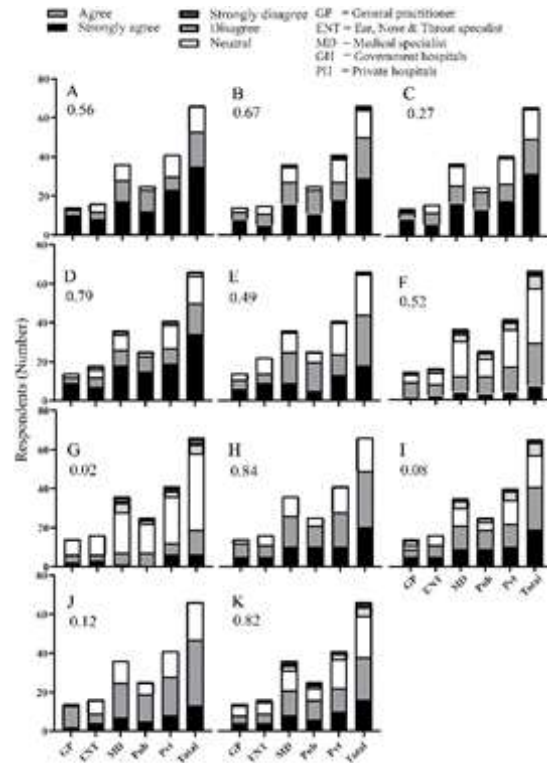


Fig. 3: Knowledge about antibiotics resistance.

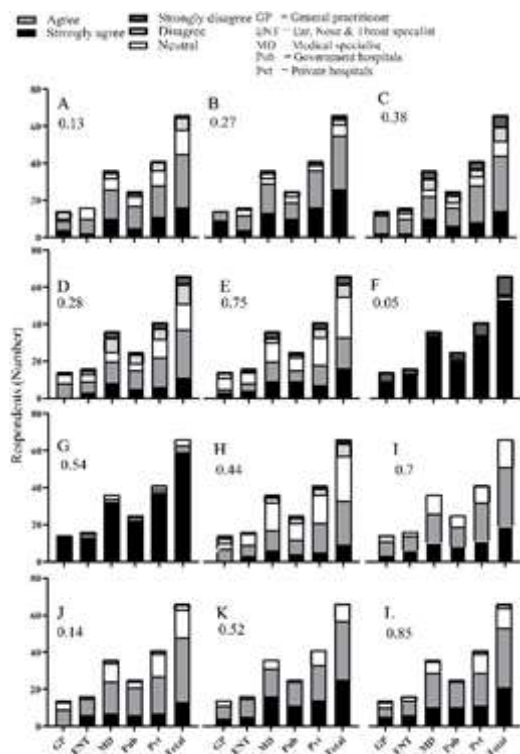


Fig. 2: Antibiotics utilization trends in upper respiratory tract infections.

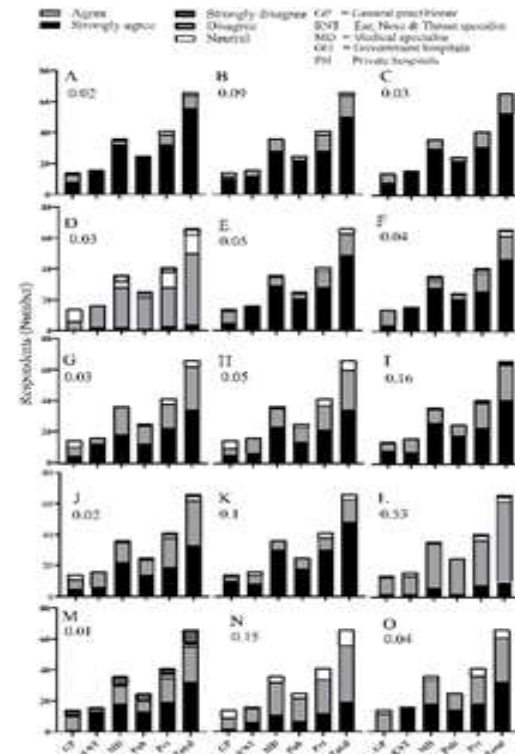


Fig. 3: Development of Resistance against antibiotics.

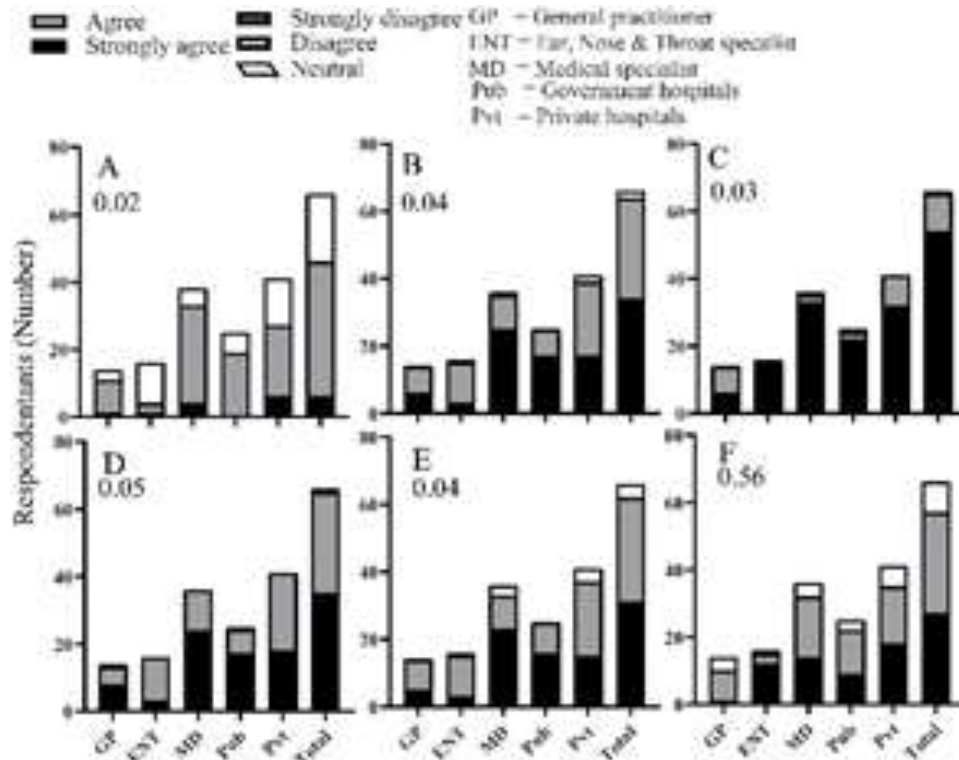


Fig. 4a: General Prescribing pattern in URTIs (PP).

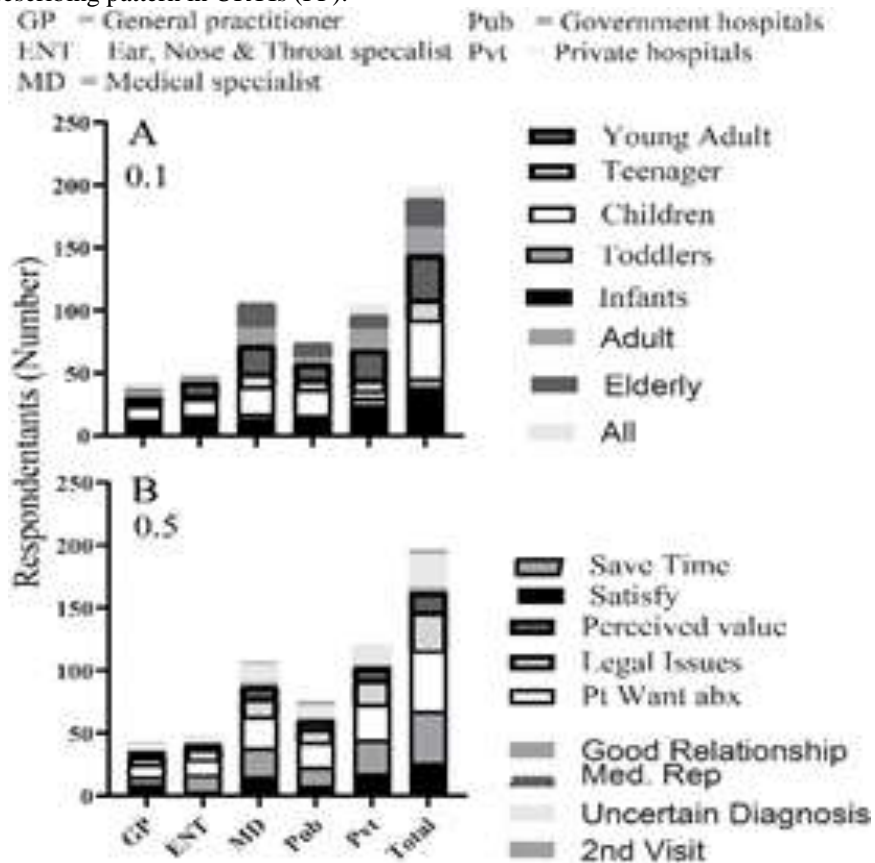


Fig. 5b: General Prescribing pattern in URTIs (PP)

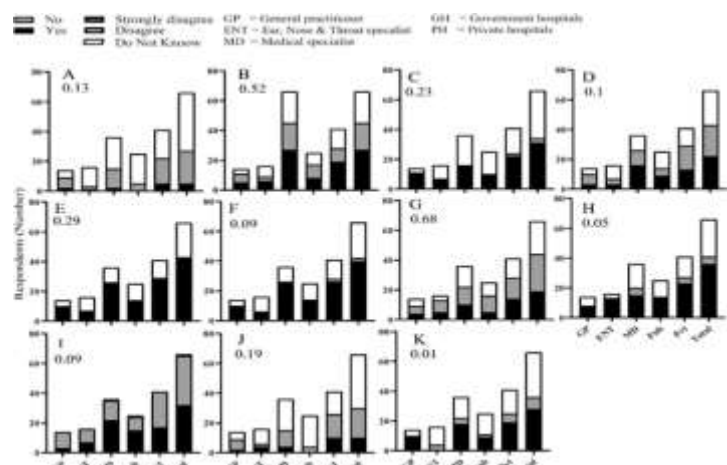


Fig. 5a: Doctors Prescribing pattern in URTIs (DPPa).

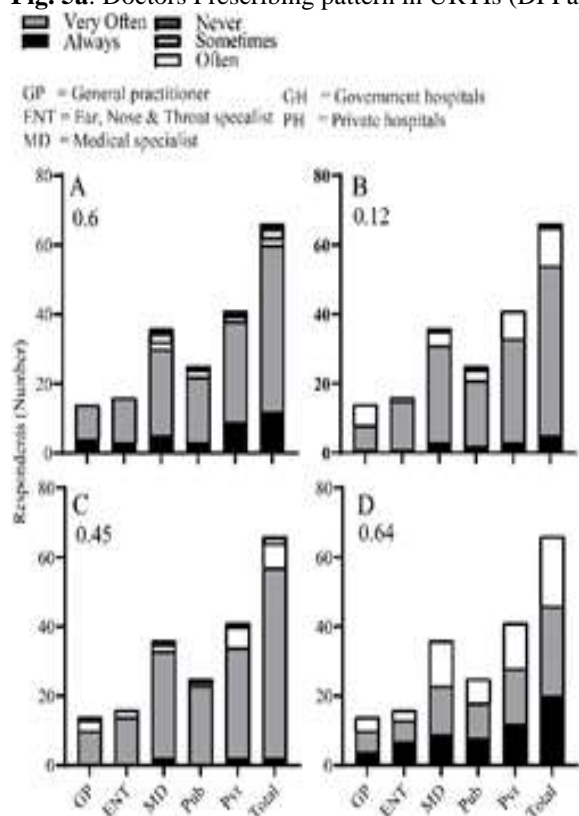


Fig. 6b: Doctors Prescribing pattern in URTIs (DPPb)

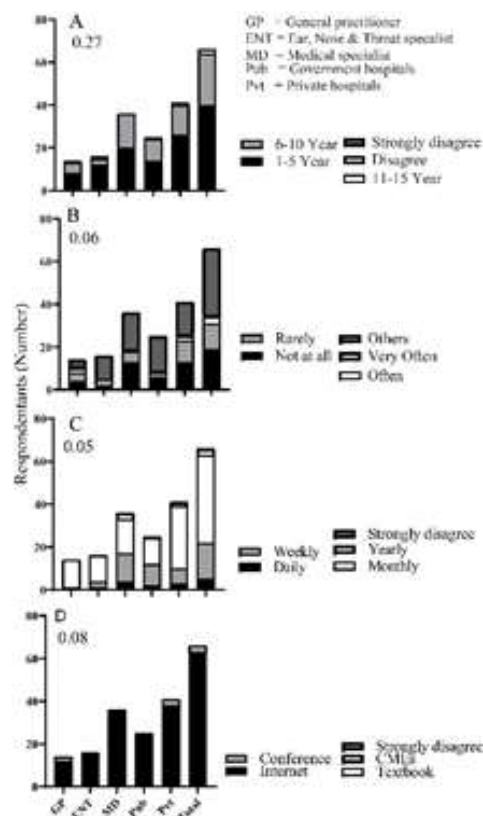


Fig. 6c: Doctors Prescribing pattern in URTIs (DPPcdef)

Table 1: Study design and settings

S. No.	Name of institution	Affiliation (No. of participants)	No. of beds
1.	National hospital & medical Centre	Private N=41(62.2%)	250
2.	Doctor's hospital & medical Centre		250
3.	Hameed Latif Hospital		180
4.	Mayo Hospital	Public N=25(37.8%)	1600
5.	Jinnah Hospital		1200
6.	Lahore General Hospital		1200

week but more physicians prescribe antibiotics 26.8% in private practice as compared to public sector 20%. GPs 71.4% & 57.1% usually prescribe antibiotics in common cold >ten days & acute rhinosinusitis >18 Days respectively. Many MDs 25% strongly agree to prescribe antibiotics in acute cough greater than three weeks. However, 91.7% MDs strongly agree for prescribing amoxicillin in bacterial sinusitis as per CDC guidelines but many GPs 35.7% prescribe all antibiotics at the same time most of the physician 89.4% recommend sequence amoxicillin>cephalosporins>macrolides>clindamycin as per CDC. The most alarming situation arises when 36.4% of physicians did not agree with CDC guidelines that macrolides should not be prescribed frequently due to development of resistance in streptococcus pneumonia but 48.5% mildly agreed that amoxicillin and penicillin V should be kept as first line for treating bacterial pharyngitis, cephalexin, cefadroxil, clindamycin & macrolides should be only used in case of allergy to penicillin. 53% physicians strongly agreed that antibiotics should be recommended for 10 days (azithromycin five days) in group A streptococcal pharyngitis. In middle ear infections 62.5% prescribe antibiotics and 48.5% agreed that amoxicillin should be given at higher doses and cephalosporins, macrolides maybe used as second line respectively (fig. 2).

***Awareness of clinical knowledge about antibiotic resistance among physicians in Pakistani public and private hospitals***

Mostly physicians 53% and 43.9% strongly believe that resistance against antibiotics is developed due to inappropriate use of antibiotics in population and hospitals respectively However 48.5%, 51.5% and 27.3% strongly agree that resistance develops due to self-medication, incomplete antibiotics therapy & poor infection control measures respectively. Many physicians 42.4% & 59.1% do not believe that resistance develop due to sub therapeutic dosage & over use in animals respectively. However, 43.9% & 33.8% agree that it develops due to excessive use of broad-spectrum antibiotics & lack of antibiotics prescribing guidelines. At the same time 51.5% & 33.3% physicians believe that patient demand for antibiotics and influence of pharmaceutical companies increase the rate of development of antibiotics resistance (fig. 3).

***Awareness of clinical knowledge about antibiotic resistance among physicians in Pakistani public and private hospitals***

Mostly physicians;84.8% strongly believe that resistance developed against antibiotics due to inappropriate use of antibiotics while 75.8% understand that it is biggest threat to global health now a days. However, 80.3% believe that antibiotics resistance is the main cause of longer stay at hospital but 69.7% believe it may be due to lack of new antibiotics molecules. Encouraging is 74.2% assume the

use of antibiotics when that is not needed may develop resistance and may increase risk on use later for similar infectious agent. Mostly physicians 71.2% strongly agree that irrational use of penicillin& cephalosporins producing resistance in streptococcus aureus abruptly. Only 51.5% agree with four basic mechanisms of development of resistance and use of broad-spectrum antibiotics for mild infections rather to use narrow spectrum as first line while 62.1% agreed for use broad spectrum antibiotics empirically in serious infections. Only 50% & 15.2% physicians believe that formal trainings, CMEs and local guidelines on rational use of antibiotics may minimize rapid rate of development of resistance respectively, while 48.5% agreed that this issue could be controlled with culture sensitivity test and implementing ASP (fig. 4).

***Awareness of clinical knowledge about general trends among physicians in Pakistani public and private hospitals***

Mostly physicians 9.1%, 51.5%, 81.1%, 53%, 47% & 40.9% likely to prescribe antibiotics in URTIs especially when purulent nasal discharge, yellow green sputum, persistent fever greater than three days, tonsillar exudates, inflamed ear drum and lymphadenopathy occurs respectively (fig. 5a).

***Awareness of clinical knowledge about general trends among physicians in Pakistani public and private hospitals***

Many physicians 23% prescribe antibiotics in children 6-12 years of age followed by 18% in young age 18-26 years. However 24% of physicians prescribe antibiotics in URTIs to those patients who desire antibiotics at any cost, 21% to save time and 16% in fear to patient condition get worsen (fig. 5b).

***Awareness of prescribing pattern among physicians in Pakistani public and private hospitals***

About 33.3% prescribe antibiotics due to availability freely in the market. 48.5% are unaware about standard antibiotics prescribing guidelines and 40.9% automatically prescribe antibiotics when patient is suffering from fever. The most alarming thing is that 34.8% never use culture sensitivity testing for prescribing antibiotics while 54.6% prescribing antibiotics on the bases of their observation & previous experiences and quite unaware about rapid rate of development of AMR. The positive evidence is that 60.6% update their knowledge about antibiotics through current practices and most of them 62.1% likely to update once in a month, 95.5% update only through internet rather conference or current practices. In spite of update of knowledge 48.5% are in opinion to prescribe antibiotics are helpful for URTIs i.e., cold, flu, etc and only 18.2% try to convince patients that antibiotics are not helpful in URTIs as most of them are viral in source. However, 84.8% do not

receive any guidelines from the health department govt. of Punjab, and 42.4% are ready to implement any issuance (fig. 6a).

#### ***Awareness of prescribing pattern among physicians in Pakistani public and private hospitals***

Mostly physicians 72.7% usually counsel patients about use of antibiotics in viral infection but at the same time many of them 74.2% frequently prescribe antibiotics in sinusitis, pharyngitis & tonsillitis but 83.3% avoid antibiotics in flu by convincing patients. Only 30% physicians guide patients about improper dosages of antibiotics may develop resistance in microorganisms. (fig. 6b).

#### ***Awareness of prescribing pattern among physicians in Pakistani public and private hospitals***

About 60.6% physicians prescribing antibiotics have less experience only 1-5 years and 28.8% do not prescribe antibiotics for prophylactic purposes. Only 25.8% update their knowledge weekly about current antibiotics prescribing practices, moreover 95.5% update knowledge from internet source (fig. 6c).

## **DISCUSSION**

In this study we evaluated the knowledge, attitude, perception and current practices regarding treatment of URTIs among physicians of Public & Private hospitals of Lahore, Pakistan. The response rate is 66%, which is satisfactory although physicians of private sectors are more responsive. We evaluate the basic knowledge of physicians, 50% of physicians have strong believe that antibiotics should not be used in mild infections and as one's immune system can fight such infections, antibiotics should be avoided in acute infections due to rapid development of resistance (Laxminarayan *et al.*, 2013). Private sector physicians 42.4% still believe that cold, flu and pharyngitis can be recovered speedily by using antibiotics and 46.9% said without antibiotics especially in sore throat patient's condition may get worsen. Most of the physicians believe that antibiotics must be used in URTIs i.e sore throat, tonsillitis, pharyngitis, common cold, flu, cough, sinusitis and runny nose, despite of that most of the URTIs are of viral in source only few physicians 22.7% agree that antibiotics should be used only in case of change in color of sputum. The basic knowledge of physicians about URTIs is not appropriate that's why prescribing antibiotics abundantly similarly study was carried out in Malaysia (Hassali *et al.*, 2015), In Korea 58.9% GPs believe that antibiotics can help in early recovery from URTIs (Teixeira *et al.*, 2015), In Malaysia 45% of physicians use antibiotics in secondary URTIs infection in spite of knowing antibiotics are not beneficial (Mohamed, 2015), furthermore 55% Physicians of Singapore (Pan *et al.*, 2016) & 47% of Korea believe that antibiotics reduce the risk of

complications in URTIs (Zhang *et al.*, 2016). The encouraging thing in the study is that 78.8% believe that antibiotics are being misused among the community (Bokhary *et al.*, 2020) and major source of increasing rate of resistance in microorganisms, In USA 97% physicians were more aware and agreeing with our statement (Klepser *et al.*, 2015).

Resistance against antibiotics is biggest threat to global health and 75.8% physicians believe that irrational use of antibiotics increasing the risk serious infections as stated in WHO report (Organization, 2014). However 51.1% strongly agreed upon that use of narrow spectrum antibiotics for mild infections (Mouhieddine *et al.*, 2015) while 62.1% agreed that we should use broad spectrum empirically only in life threatening infections the similar was described earlier (Thorpe *et al.*, 2018). The most encouraging is that 93.9% agreed that continuous medical education, local guidelines and implementation of antimicrobial stewardship program would be helping tools for overcoming of antimicrobial resistance as described the effectiveness of CMEs (Desai, 2017, Aranda and Mazzotti, 2010).

The attitude of physicians was not absolute as many of them blame patients for overuse of antibiotics and development of resistance, while 48.5% believe that resistance develop due to self-medication, similar studies conducted in Saudi Arabia, Sudan and other countries (Rather *et al.*, 2017 Bennadi, 2013). Somehow, 51.5% Physician Believe it is due to incomplete medication therapy, 66.7% poor measures of infection control & prevention, 75.8% lack of development of new molecules as described earlier (Fouhy *et al.*, 2012, Huttner *et al.*, 2013). Fewer 30% believe it is either due to lack of standard guidelines or excessive use of broad spectrum antibiotics while 71.2% believe it is due to expectation of patient or 24.2% influence of pharmaceutical companies similarly it was studied 65% GPs prescribe antibiotics to fulfill patient's expectations (Dekker *et al.*, 2015), (Gaarslev *et al.*, 2016, Mustafa *et al.*, 2014).

According to CDC guidelines antibiotics should be advised in otitis media if it persists more than four days but only 24.2% physicians agreed rest are prescribing antibiotics frequently it is in contrary to Dutch study (Mckay, 2017), similarly acute sore throat, pharyngitis & tonsillitis greater than one week only 39.4% agreed. Approximately 21.2% & 16.7% agreed that antibiotics should be prescribed in common cold & rhinosinusitis if persist more than two weeks respectively. It is alarming that fewer physicians are agree with standard guidelines issued by CDC for URTIs (Kunda, 2014). The only encouraging is that most of the 89.4% physicians follow standard regimen amoxicillin> cephalosporins> macrolides> clindamycin.

Only 13.6% were well aware that macrolides should not be recommended routinely due to high levels of risk of development of resistance in *streptococcus pneumoniae* (40%). Our study shows that most of the physicians are not well aware and prescribing antibiotics in contrary to guidelines issued by CDC about URTIs (Control and Prevention, 2013).

The most interesting part of study is the current PP in URTIs and most of the physicians 69.7% prescribe antibiotics when purulent nasal discharge, yellow/green sputum, persistent fever>3days, tonsillar exudates and cervical lymphadenopathy occur in URTIs. Many times, physicians prescribe antibiotics to satisfy patients (14%), save time (21%) and patient request (24%). About 89.9% respondent prescribe antibiotics in common cold & flu, the rate is very high even than USA which is 42% (Yong *et al.*, 2015).

The most alarming is that 28.8% physicians prescribe antibiotics prophylactically as described (Dallas *et al.*, 2015) and 48.5% never follow any guideline which is alarming for the entire community as such PP leads towards development of resistance in microorganisms. About 34.8% of physicians are very unaware that culture sensitivity should be performed before prescribing antibiotics but it is necessary for more precise diagnosis and accuracy of treatment as described earlier (Livorsi *et al.*, 2015) at the same time it is encouraging about 60.6% update their knowledge through internet but only 15.2% receive guidelines /material regarding safe use of antibiotics. We should educate our patient about ineffectiveness of antibiotics in viral infections and development of resistance by improper use of antibiotics. It has become necessary for the government of Pakistan to develop and issue guidelines locally to overcome this alarming situation of rapid rate of development of AMR.

## CONCLUSION

The results from the study identify that most of doctors have moderate awareness about antibiotic prescribing pattern in upper respiratory tract infection. In addition, many people have a positive attitude towards antibiotics, and are concerned about the rapid rate of resistance growth. But major issues are the prescribing of behavior, control of consumer & supplier and lack of local guidelines. Consequently, establishing educational activities, ASP and timely interventions can improve PP of antibiotics in URTIs in Lahore, Pakistan.

### Limitations of study

We are well aware about limitations of study, it includes low response rate, however, it is extremely difficult to get high response. However, we conducted an unbiased study with guarantee to keep responses confidential. We admit that we were not able to correlate physician's knowledge

and attitude with their actual practices in actual manner. Moreover, interviews were conducted only from physicians of Lahore. We acknowledge that there is no available local data to compare with. At the same time, we believe that findings of the study relatively good enough to compare with other international studies and recommendations can provide guidance to authorities of Punjab, Pakistan to establish local guidelines and ASP among public and private hospitals.

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