Pakistani Public Perception about Non-prescription use of Antibiotics as a Potential Health Hazard

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Abstract- The use of antibiotics without a physician's prescription is common practice around the world, with a pooled predominance surpassing 75% in low and middle-income countries. The present study assesses whether the people who are concerned about their health still opt for non-prescription use of antibiotics. A quantitative research survey was conducted in five provinces of Pakistan, in November and December 2021. A validated questionnaire was used, and respondents were asked questions to underline public perceptions on medicine-related services in the country. The data was analyzed through non-parametric inferential statistics using SPSS that the respondents. Results revealed a significant statistical difference in the tendencies of respondents to buy antibiotics with or without the prescription of physicians. Females showed more responsible attitude towards the use of medicine in Pakistani society than males. Highly educated respondents less likely bought antibiotics without the prescription of physicians in comparison to relatively less educated ones. Respondents belonged to Baluchistan and KPK had higher tendencies to buy antibiotics without the prescription of physicians in comparison to inhabitants of Gilgit-Baltistan, Punjab and Sindh respectively. The study results concluded that the respondents, who are always concerned about their own and their relative's health, still prefer to buy antibiotics without the prescription of physicians. That means, the non-prescription use of antibiotic is not a health concern in public's mind.

Index Terms- Drug safety, irrational antibiotics, pharmaceutical care, self-medication, patient awareness

I. INTRODUCTION

Antibiotics are drugs used to treat infectious diseases, either by killing or inhibiting the growth of pathogens. In developing countries, antibiotics are ordinarily sold like general over the counter medicines [1]. People tend to misuse antibiotics by taking these agents without physician's prescription (self-medication) or on medical advice, but without complying with the physician's prescription, such as modifying the recommended dose, prolonging the treatment duration, and not taking them on the prescribed time. The utilization of antibiotics without a physician's prescription is notorious around the world, with a pooled predominance surpassing 75% in low and middle income nations, and arriving at 66% in certain areas of developed nations, such as the United States [2]. The increasing usage of antibiotics has been associated with antimicrobial resistance [3, 4], which is responsible for around 0.7 million deaths annually [2].

Pakistan places in the top third position for using antibiotics among low to middle income countries. It is reported that 35,000 patients consume antibiotics daily in Pakistan, and a large proportion is used without a legitimate prescription. An astonishing fact is that over 35% of non-prescribed antibiotics are sold by pharmacies [5-7]. Similarly, a survey unearths that non-prescribed antibiotics are the most sold form of medicine among all prescription-only-medicines (PoM) [8]. The irrational use of antibiotics is strongly connected with the absence of public awareness towards adverse consequences of non-prescribed use of antibiotics [9-11].

There is a need to comprehend general public perception about their health in association with non-prescription based antibiotics use. Since no studies have been reported in Pakistan that evaluate public perception about non-prescription use of antibiotics as a potential health hazard, the present study contributes to the existing literature by assessing the concerns of people towards their own and /their relatives' health in association with non-prescription use of antibiotics. It is hypothesized that people who are more concern about their own and /their relatives' health would prefer to avoid antibiotics without physician's prescription in comparison to those who are less concerned about their own and /their relatives' health.

II. METHODS AND MATERIAL

Quantitative research methods have used to conduct this study. A country-wide survey has designed (online) to

collect data from five provinces of Pakistan. Purposive and snowball sampling techniques are used to approach respondents. In November and December 2021, the survey has undertaken. KUST Ethics Committee has given ethical approval of the survey.

The respondents have given written information consent stating the objectives of study and ensuring them that their responses would be kept anonymous, and their identities will never be disclosed at any stage of research.

Questionnaire adaptation, piloting, and distribution

Public questionnaire

A previously validated questionnaire [12] has used to underline public perceptions on medicine-related services in the country. Respondents are asked various questions (mostly on three-point Likert scale) that constitute a series of statements defining pharmacy related attributes and practices of respondents. Respondents are given a list of medicine-related cognitive services, and they are asked to response how likely each one is in reality. For the inclusion of cross-sectionality, demographic variables are also included in the questionnaire, e.g., gender, age, ethnicity, and educational level.

Piloting

A small-scale survey has been planned as a pilot stage. Total twenty-five members of the general public and five pharmacists have been requested to participate in the pilot phase of survey. They have filled out online questionnaire that has provided adequate feedback on tool's usefulness, applicability, and convenience of use. This exercise has helped make certain changes in the questionnaire for the final run.

Distribution

The public survey has conducted online with general public, utilizing interviewer-assisted completion, in ten communities of Pakistan. Total 361respondents filled the questionnaire, constituting 24.09 % women and 75.9 % men. Nevertheless, people under the age of 18 and qualified or trained health-care professionals are excluded from analysis during screening process.

Data analysis

We have analyzed data through non-parametric inferential statistics using SPSS.

III. RESULTS AND DISCUSSION

Table 1: Use of Antibiotic without Prescription and Health Preferences

	Are you concerned about your health?					
	Not at all		*Sometimes*		*Always*	
Do you take antibiotics without physician's prescription?	N	Mean	N	Mean	N	Mean
	43	156.2	171	183.7	156	195.4

The Kruskal Wallis statistics H (2) = 7.01, P = 0.03 reveal a significant difference in the use of antibiotics without physician's prescription with respect to respondent's level of concern about their own and their relative's health. Moreover, Mann-Whitney U test is computed to underline significant difference between three response categories, e.g., not at all, sometimes, always.

Table 3: Education and Use of Antibiotic without Prescription

	Education Level of Respondents					
	0-12 Years		*13-16 Years*		*17+ Years*	
Do you take antibiotics without physician's prescription?	N	Mean	N	Mean	N	Mean
	65	197.9	173	184.1	22	165.9

The statistics indicate solely a significant difference in the responses of respondents, i.e., 'not at all' and 'always' $U = 2645$, $p = .00$. This infers that the respondents, who are always concerned about their own and their relatives health, always buy antibiotics without the prescription of physicians. These inferences are astonishing and offer following possible explanations.

Table 2: Gender and Use of Antibiotic without Prescription

	Gender of Respondents			
	Male		*Female*	
Do you take antibiotics without physician's prescription?	N	Mean	N	Mean
	274	188.94	87	156.00

We have computed again the Mann-Whitney U test statistics to see if gender of respondents makes any difference in the use of antibiotics with or without the prescription of physicians. The results show a significant statistical difference U = 9744, P = .00 in the tendencies of male and female respondents to buy antibiotics without the prescription of physicians. Mean values infer that females less likely buy antibiotics without the prescription of physicians in comparison to male population.

Kruskal Wallis statistics ws computed to see if education level of respondents makes any difference in the use of antibiotics with or without the prescription of physicians. The results show a significant statistical difference H (2) = 6749, P = .03 in the tendencies of respondents having 0-12, 13-16, and 17+ years of education buy antibiotics without prescription of physicians. Further Mann-Whitney U test results $U = 3263$, $p = .01$ reveal merely a significant difference in the responses of respondents having 0-12 and 17+ years of education for buying antibiotics without the prescription of physicians. Highly educated respondents less likely buy antibiotics without the prescription of physicians in comparison to relatively less educated ones.

Table 4: Provincial Affiliation and Use of Antibiotic without Prescription

	Provincial Affiliations									
Do you take antibiotics without physician's prescription?	***KPK***		***GB***		***Punjab***		***Sindh***		***Baluchistan***	
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean Rank
	133	193.1	42	181.9	96	156.9	30	152.5	67	222.8

In the similar lines, we have also computed Kruskal Wallis statistics to see if provincial association of respondents makes any difference in the use of antibiotics with or without prescription of physicians. The results show a significant statistical difference H (4) = 28531, P = .00 in the tendencies of respondents to buy antibiotics without prescription of physicians in five different provinces. Further, Mann-Whitney U test results help distinguishes every province based higher tendencies to buy antibiotics without the prescription of physicians. *First*, test statistics $U = 5123$, $p = .00$ reveal a significant difference in the responses of respondents belonged to KPK and Punjab province for buying antibiotics without the prescription of physicians. Respondents belonged to KPK have higher tendencies to buy antibiotics without the prescription of physicians in comparison to inhabitants of Punjab. *Second*, test statistics $U = 1553$, $p = .01$ manifest a significant difference in the responses of respondents belonged to KPK and Sindh province for buying antibiotics without the prescription of physicians. Respondents belonged to KPK have higher tendencies to buy antibiotics without the prescription of physicians in comparison to inhabitants of Sindh. *Third*, test statistics $U = 3726$, $p = .01$ manifest a significant difference in the responses of respondents belonged to KPK and Baluchistan province for buying antibiotics without the prescription of physicians. Respondents belonged to Baluchistan have higher tendencies to buy antibiotics without the prescription of physicians in comparison to inhabitants of KPK. *Fourth*, test statistics $U = 1092$, $p = .00$ reveal a significant difference in the responses of respondents belonged to Gilgit-Baltistan and Baluchistan province for buying antibiotics without the prescription of physicians. Respondents belonged to Baluchistan have higher tendencies to buy antibiotics without the prescription of physicians in comparison to inhabitants of Gilgit-Baltistan. *Fifth*, test statistics $U = 2074$, $p = .00$ reveal a significant difference in the responses of respondents belonged to Punjab and Baluchistan province for buying antibiotics without the prescription of physicians. Respondents belonged to Baluchistan have higher tendencies to buy antibiotics without the prescription of physicians in comparison to inhabitants of Punjab. *Sixth*, test statistics $U = 623.5$, $p = .00$ reveal a significant difference in the responses of respondents belonged to Sindh and Baluchistan province for buying antibiotics without the prescription of physicians. Respondents belonged to Baluchistan have higher tendencies to buy antibiotics without the prescription of physicians in comparison to inhabitants of Sindh.

IV. DISCUSSION

The present study aims first to evaluate public perception about their health regarding non-prescription based use of antibiotics as potential health concern in Pakistan. Similar to previous literature, this study reveals high incidence of non-prescription based use of antibiotics like other

developing countries [13-16]. The results show a significant difference in the use of antibiotics without physician's prescription with respect to respondent's level of concern about their own and their relatives' health status. The study infers that the respondents, who are always concerned about their own and their relative's health, always buy antibiotics without the prescription of physicians. These inferences are astonishing but can be explained further in the light of previous literature. Higher rates of antibiotic utilization are seen in European countries too [17]. Previous studies have showed that 50% of antibiotics are misused in hospitals, but a vital antimicrobial load is concerned with primary health care level [18]. Explorers from various nations have showed that 75% to 94% of all antimicrobials are utilized by out-patients [19]. There is a reasonable inclination towards misuse of antibiotics that is attributable to their frequent use in the treatment of viral and self-restricting bacterial infections. The general or often use of broad-spectrum antibiotics is usually baseless [20-22]. Self-medication or non-prescription based use of antibiotics is one of the types of its misuse. Individuals use antibiotics, some of the time self-prescribed, as an essential medication for different infections. Such uncontrolled consumption of antibiotics in general population may lead to a "post antibiotic era, (opposed to "pre-antibiotic era") soon, when infectious diseases will be almost impossible to heal once again because of antibiotic resistance [23, 24].

Nations with elevated degrees of antibiotic resistance frequently have non-prescription use of antibiotics. Non-prescription antibiotics usage has been hypothesized to assume a significant part in choosing and keeping up with these elevated degrees of antibiotic resistance [25-28]. The causes of non-prescription use of antibiotics are varied. Poor guideline of antibiotics results from missing strategies or, even more regularly, from missing implementation of approaches, as happened in southern European nations [29-33]. Development of web trade gives virtual overall admittance to non-prescription antibiotics; those accessible on the web are assorted and by and large appear to start in nations in which non-prescribed antibiotics are accessible [34]. Non-prescription utilization of antibiotics is innately connected with little direction regarding suitable antibiotic choice for individual disorders and safe practices to limit adverse drug reactions (in any event, when given by a pharmacist). Rational use of antibiotics is complex and should be founded on local susceptibility designs. In regions where antibiotics susceptibility information is inaccessible, antimicrobial determination is troublesome, in any event, for skilled providers. Uninformed population or undertrained local drug store or pharmacy staff seldom approach fundamental data with respect to fitting antimicrobial use and don't see the value in the intricacy associated with choices encompassing medication determination [35]. So, the general public using non-prescribed antibiotics commonly lacks full information regarding their rational use (i.e., the dosages and possible side-effects). A previous study in Pakistan reported that the prevalence of non-prescribed antibiotics among rural areas of Sindh is very high i.e., 81.25%. The possible reasons of self-medication of antibiotics were economic reasons i.e. 88.0% and majority of the participants i.e. 74.7% didn't know about the phenomena of antibiotic resistance associated with misuse of antibiotics [6].

The intersectionality of our inferences also shed light on important and interesting side of phenomenon. *First*, the results reveal a significant statistical difference in the tendencies of male and female respondents to buy antibiotics without the prescription of physicians. Mean values infer that females less likely buy antibiotics without the prescription of physicians in comparison to males. It infers that females show more responsible attitude towards the use of medicine in Pakistani society. *Second*, the results reveal a significant statistical difference in the tendencies of respondents having varying level of education (e.g., 0-12, 13-16, and 17+ years) for buying antibiotics without prescription of physicians. The difference is merely observed in the responses of respondents having 0-12 and 17+ years of education. Highly educated respondents less likely buy antibiotics without the prescription of physicians in comparison to relatively less educated ones. These inferences do not differ to past literature from other parts of the world. For instance, a study reports from Jordan, that relatively less educated males have higher tendency to consume non-prescription antibiotics, especially those who belong to (18–25 years) age group. Like our findings, more educated and more knowledgeable respondents have more responsible attitude towards using antibiotics.

In Pakistan, according to previous studies, no legitimate prescription is required to consume antibiotics of any class. According to findings from a previous literature, 96.9% of medical stores or local pharmacies dispensed nonprescription antibiotics and 3.1% of local pharmacies refused to dispense nonprescription antibiotics. Only 25.2% of local pharmacies staff guided patients about antibiotics use [36]. Survey from Pakistan showed that 61.5% respondents had poor knowledge and attitudes towards use of antibiotics, 56.6% respondents declared that antibiotics can treat all kinds of infections, and so low

health literacy, level of education, and nonprescription antibiotics are responsible for its irrational use [9]. Another study revealed that 81.5% of local pharmacies in Pakistan are involved in nonprescription dispensing of antibiotics while 34.5% of participants were reported recommending that patients should consume prescription antibiotics only. In this study, 44.9% of pharmacy retailers declared that they had appropriate knowledge about use of antibiotics and 61.8% believed that such dispensing practices had decreased patients' economic burden [37].

Third, we have also computed provincial association of respondents to underline any difference in the use of antibiotics without prescription of physicians. The results manifest that respondents belonged to KPK has higher tendencies to buy antibiotics without the prescription of physicians in comparison to inhabitants of Punjab. Respondents belonged to KPK have higher tendencies to buy antibiotics without the prescription of physicians in comparison to inhabitants of Sindh. Respondents belonged to Baluchistan have higher tendencies to buy antibiotics without the prescription of physicians in comparison to inhabitants of KPK. Respondents belonged to Baluchistan have higher tendencies to buy antibiotics without the prescription of physicians in comparison to inhabitants of Gilgit-Baltistan. Respondents belonged to Baluchistan have higher tendencies to buy antibiotics without the prescription of physicians in comparison to inhabitants of Punjab. Respondents belonged to Baluchistan have higher tendencies to buy antibiotics without the prescription of physicians in comparison to inhabitants of Sindh.

Similar to our findings, in comparison to KP and Baluchistan, a previous literature from Punjab province have shown a small proportion of non-medical respondents (24.5%) consumed nonprescription antibiotics. The reason was lack of knowledge about rational use of antibiotics and also 3/4 of the respondents knew that side effects are related with the misuse of antibiotics. While more than 66% of previous respondents, in any case, knew about the maxim "anti-microbial resistance," and under 66% realize that the unconventional utilization of antibiotics will prompt expanded antibiotic resistance, while the rest were denied of the information about the irrational utilization of antibiotics and antimicrobial resistance [38].

A research study from Lahore, Punjab reported 95% of nonprescription antibiotics utilization among the general population [36]. Another study performed at five medical stores or pharmacies in Islamabad and Rawalpindi uncovered that more than 35% of antibiotics were conveyed without a valid prescription [39]. These previous outcomes can be relatable with our findings because our survey principally comprised of a non-clinical general individual and the expression "antibiotic resistance" is for the most part utilized in the clinical framework. Similar outcomes were found from the past literatures in Karachi, Sindh and Hazara division, KP [40, 41].

A cross sectional survey from Karachi among non-medical students revealed 47.6% of nonprescription consumption of antibiotics, 77.3% of students had knowledge about its adverse reactions and 63.1% had denied knowing about antibiotic resistance while 19.9% knew that misuse of antibiotics eventually ends in antibiotic resistance [41]. A study from rural areas of Sindh showed a high prevalence of self-medications in which nonprescription antibiotic utilization was 52%. The percentage of self-medication in respondents earning less than 50,000 PKR was high i.e., 61 % and was less i.e., 24% in respondents earning more than 50,000 PKR. Also this ratio was high (63%) for less educated respondents and low (22%) for educated respondents (graduation or above) [5]. These findings from rural dwellers of Karachi were quite similar with our results and the possible reasons to this could be lack of awareness, high cost of consultation and transport to health care facility.

V. RECOMMENDATIONS

Previous research has demonstrated that a pharmacist's involvement in the design of interventions, training of dispensing staff, public awareness campaigns, and government staff oversight are effective ways to lessen the occurrence of non-prescription sales of antibiotics [42]. Moreover, interventions should continue to be carried out for a sufficient amount of time [43]. Consistent instruction should be given to both dispensers and the general public. Regular oversight of the use of antibiotics without a prescription should be carried out by government employees. The importance of educating the public and pharmacists about the non-prescription usage of antibiotics [44, 45].

Public education and understanding about prescription medications should be increased in order to decrease public demand for over-the-counter antibiotics. Both traditional paper and online resources can be used to deliver effective instruction. The use of media like video,

music, and images to communicate information online should be considered. More importantly, teaching pharmacy workers on antibiotic prescriptions is essential to reducing antibiotic overuse [45]. Routine testing should be conducted in addition to the authorized pharmacist qualification assessment to update the information and expertise of pharmacists on a regular basis [46, 47]. The regulations against misuse of antibiotics should be strengthened and successfully implemented. The number of trained pharmacists in health setting should be increased; qualified pharmacists should be appointed in community pharmacies.

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