Innovators in
Medical & Health Sciences

Print ISSN:
Online ISSN:

RESEARCH ARTICLE

Risk assessment and systematic evaluation of self-medication

Tashfa Aftab, SuraiyaJabeen* and Hooria Zahid

Institute of Environmental Studies, University of Karachi, Karachi 75270 **Pakistan**

Self-medication is a practice performed globally by almost every well-being. The purpose of the current study is to determine the attitude, knowledge and ideas of self-medication and its related toxic responses among the people of Karachi, Pakistan. Responses have been taken by the aid of Google forms and self-administered questionnaires covering demographic information along with the questions relating to the motivating factors of self-medication, public attitude concerning advantages and disadvantages of self-medication and the role of pharmacist in the self-medication of the non-prescribed medicine purchased over the counters. The qualitative analysis has been done on the toxicity risk likely to occur via self-medication. Awareness regarding the harmful effects of self-medication is also given through the self-accessed questionnaires. One hundred and fifty one respondents were aged from 17 to 60 years. The most common type of medicine consumed is Analgesics. People mostly prefer community pharmacies to obtain the drugs. They also prefer to consider the type of medicine and its indications for use while selecting the medicine. The selection of medicine is mostly based on the previous experience. Paracetamol is the most consumed OTC drug and through literature findings its cons are being added to the discussion. Findings of this study proves that people do not consider self-medication as a harmful practice and believe that they could successfully treat common diseases by themselves.

Keywords: toxicity, awareness, analgesics, over the counter, public attitude

Edited by:
Farhat Yasmeen
Peer Review policy:
Double-blind
Correspondence:
Suraiya Jabeen
sujabeen@uok.edu.pk
Specialty section:
*This article was submitted to Infectious Diseases, a section of the journal "**Innovators in Medical and Health Sciences**"*
Received: *23 January 2022*
Revised: *21 April 2022*
Accepted: *23 April 2022*
Published: *25 April 2022*
Citation:
Aftab et al., (2022) Risk assessment and systematic evaluation of self-medication. Innt. Med. Health Sci. 2(1):01-10. Uoi: 01-10-02(1)2022MHS21-119

Peer-reviewed
Open access
Journal by Innovative Scientific Information & Services Network

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INTRODUCTION

A "doctor" prescribes the medications for the treatment of a person (Shankar et al., 2002), in case when someone does not trust an authorized person and let oneself treat you that is when the problem arises which is "self-medication". Although it is common for people to feel unwell, and human beings have an inherent tendency to use herbs, potions, medications, etc. for treating themselves (James et al., 2006). Considering previous checkups and medicinal experience or the suggestion of a family member, friends or any pharmacist is not enough to treat oneself as it is a matter of health which is a blessing from God. Self-medication is the use of medicine, either modern or traditional, for self-treatment. Studies on this topic reveal that it is a common practice, mainly in economically depressed communities. It is a rising trend of 'self-care' which has its both negative and positive aspects (Geissler et al., 2000).

Self-medication is a well-recognized topic of interest and is often discussed in the medical literature (Aljinoviæ-Vuèiæ et al., 2005). It masks symptoms and the signs of the underlying disease and consequently it complicates the problem, creates drug resistance, and delay diagnosis (Bauchner and Wise., 2000; Calabresi and Cupini.,2005). Nowadays, great number of symptomatic patients tend to use not only prescribed medicines but also the non-prescribedones (i.e., OTC medications), which are simply available in pharmacies for the purpose of self-treatment (Trumic et al., 2012; Alić et al., 2011).

In Pakistan, around every pharmacy sells drugs with no prescription; a common practice seen in lots of developing *countries (Chang and Trivedi. 2003). Consequently, antibiotics and potentially addictive medicines are easily accessible to the common* man. This together with the lack of awareness leaves the layman ignorant towards the lethal effects of some of these drugs. Also, the need of a good primary health care system along with cost issues cause the common public to move towards other doors instead of a doctor's to seek out help for a problem. In spite of this, there is a lack of literature regarding self-medication in Pakistan and no actions have been taken to concentrate on this problem (Zafar et al., 2008).

The aim of the current research is to discuss the toxic effects that are likely to occur by self-medication and analyze the relationship between the advantages and disadvantages along with the fact that either this practice could be compromised by viewing its advantages or is highly risky to continue it as a healthy practice. The World Health Organization (WHO) has emphasized that self-medication must be properly taught and restricted in order to evade drug-related problems such as antimicrobial resistance which has now become a recent problem globally, mostly in developing countries where antibiotics are frequently offered without prescription. Therefore, this common practice is an alarming act of consumers to their health.

By analyzing the data and further calculations, it will be seen that how many people take this practice as a serious issue, which medicine is highly common among the people of Karachi and how public behavior affects environment.

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MATERIALS AND METHODS

Study design

A self-administered descriptive questionnaire based survey has been conducted with an aim to analyze the risk of the toxicity that is likely to occur through self-medication among the participants. A questionnaire was distributed and the Google forms were also sent online to study self-treatment behavior of the subjects (participants).

Study population and sites

The study population comprises of one hundred and fifty participants including official working staff, some aged people, young generation of different educational institutes and universities with the departments of pharmacy, sociology, environmental studies, agriculture studies and others.

There was no age limit, neither any selected workplace nor institute for the collection of data. The obtained responses contain the views of an 18 year old to the 40 and above aged person. The data is taken in Karachi, the biggest city of Pakistan with a population of over 13 million.

Data collection

Although the sample size is not very large but the data concluded will be beneficial for further studies. A questionnaire carries demographic information and the reasons of the consumption of over the counter drugs, the dosage of drugs, and name of the drugs and the frequency of its consumption among the subjects.

Interest development

For the purpose of study, participants were introduced with the topic and the motive of the study on the subject was explained. It helps in developing interest of the participants and to let them cooperate with us. Advantages and disadvantages were also mentioned to enlighten the actual picture of self-medication among the participants. They, too, shared their ideas and highlight some merits and demerits they consider. Overall survey went productive with the comments of participants and suggestions as well.

Operational definition

Self-medication is defined to be a selection and consumption of medicines by individuals to treat self-recognized illness or symptoms (Abay and Amelo., 2010). Antipyretics are the medicines used to reduce fever. Analgesic is another name for pain killer.

Statistical analysis

In this section questionnaire based data is statistically analyzed for the study purpose. The study is conducted to estimate the reactions of respondents and to analyze the risk of toxicity among respondents. Overall eleven variables were used include age, gender, education, type of medicine, intake of medicine, reason of taking medicine, basis of medicine selection, criteria of selecting medicine, amount of medicine intake, intake of medicine for probable treatment and perspective of respondents.

The different tests which were applied include descriptive statistics (mean, standard deviation, variance, range, minimum statistics, maximum statistics and standard error mean) and frequencies (mean median, mode, sum, frequency, percent, cumulative percent and valid percent) for this statistical analysis.

RESULTS

The total subjects of the study (n=151) responded potentially to the survey. With the respective participants consisting 34.4% males and 65.6% females, it has been seen that approximately 85.4% of them admitted to self-medication practice. The type of medicine which is most common among the subjects is Analgesics (60%) following Antipyretics (22.7%), Antibiotics (12.7%) and Antiseptics (4.6%) Table1. The most common reasons of self-medication is easy access to the medicine following other reasons like economic convenience, lack of trust in prescribing by a doctor and others. Fig. 1 Subjects possesses the habit of self-medication usually because of

aches and pains (46%) following the other complaints, fever (28%), skin wounds (3.3%), Diarrhea and vomiting (2%), and others (20.7%). 59.6% of the participants have done self-medication more than three times in past one year. The participants select medicines on the basis of various factors and their consideration criteria while selecting any medicine is given in Table 2. Most of the subjects obtain medicine from community pharmacist. The dosage selection of the medicine by the respondents is given in Table 3. Out of 148 respondents, 73% takes single tablet at a time. 18.2% takes two tablets and 8.8% takes more than two tablets at a time. Panadol is the most common medicine among them.

Among 88 respondents, 63.6% agree that pharmacist take part in a key role in the self-medication of non-prescribed drugs purchase over the counters 6.8% do not agree and rest of the 29.5% responded with may be. Some of the benefits of self-medication were provided in the questionnaire and it was being asked by them that which of the one they strongly agree with as given in Fig. 1.

For the purpose of awareness, disadvantages of self-medication were also given in the survey and participants were asked that either they are aware of them or not (Table 4). The views of the participants regarding the consumption of OTC drugs (Fig. 2).The descriptive statistics in given in table 5. The statistics of age of respondents is shown in table 6, the education statistics is given in table 7. Gender statistics is shown in table 8. The statistics of type of medicine used is tabulated in table 9. Self-medication is presented in table 10.

Table 11 has shown the cause of taking medicine statistics, Table 12 indicates the Medicine Intake for Probable Treatment of Diseases.

Furthermore, it is been assessed that among all of the 151 responses, 52.3% of them are fully sure that they can treat common diseases with self-medication successfully by their selves. Rest of the 32.5% was not sure and 15.1 % were fully negative.

Another view of the participants is taken that according to them either the doctor should inquire whether patient is self-medicating or not. 78.7% are positive, 10.1% negative and 11.2% responded with maybe. At the end of the survey, participants were asked to write any one advantage of self-medication they feel. Sixty five responses came and most of them are that it saves time and for a quick relief.

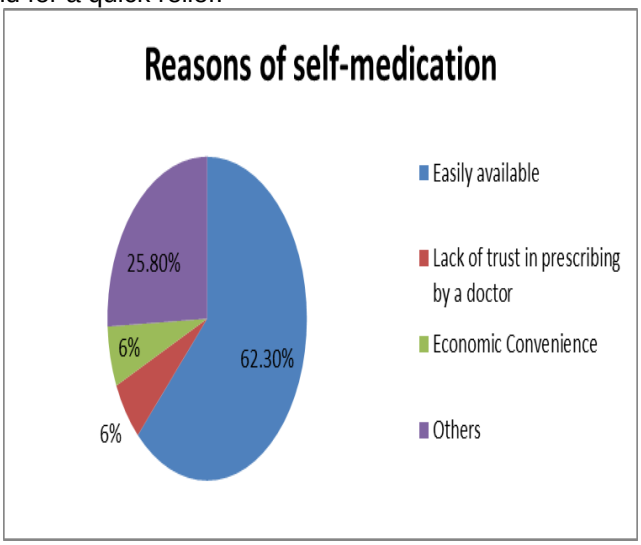

Figure1. Reasons of self-medication

Table1: Frequently used Medicines

Participants	Type of medicine used more frequently			
	Antibiotics	Antiseptics	Antipyretics	Analgesics
Number	19	7	34	90
Percentage	12.7%	4.7%	22.7%	60%

Table 2: Factors for Selection of Medicines

	Factors for the selection of medicine				Selection Criteria			
Participants	Recommendation by pharmacist	Opinion of family members/ friends	Previous experience	Previous doctor's prescription	Type of medicine	Brand of medicine	Price of medicine	Indications for use
Number	11	33	47	58	49	25	4	63
Percentage	7.4%	22.1%	31.5%	38.9%	34.8%	17.7%	2.8%	44.7%

Table3: Selection of Dosage of Medicine

	Selection of the dosage of medicine			
Participants	**Consulting pharmacist**	**Consulting family members/ friends**	**Previous Experience**	**Self-guessing**
Number	32	18	63	7
Percentage	26.7	15	52.5	5.8

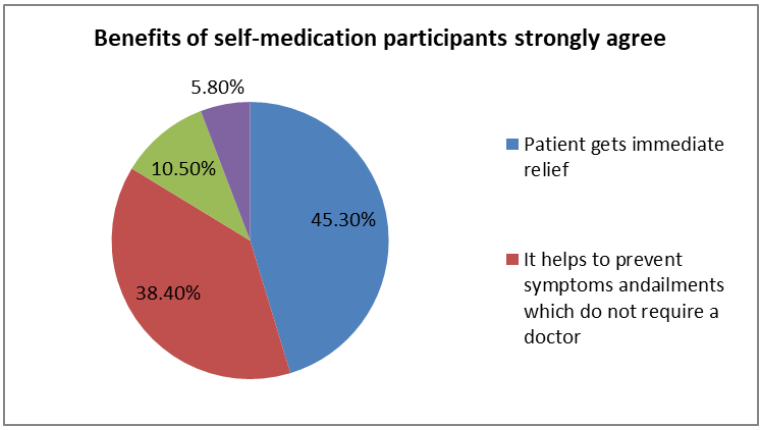

Figure 2: Benefits of self-medication participants strongly agreed

Table 4: Awareness level of Respondents

Disadvantages of self-medication	Total respondents	Respondents aware		Respondents not aware	
		Number	Percentage	Number	Percentage
Antimicrobial resistance	89	52	58.4%	38	42.7%
Contagious disease remain undetected	88	68	77.3%	20	22.7%
High chances of epidemic	87	54	62.1%	33	37.9%
Misdiagnosis	88	68	77.3%	20	22.7%
Addiction of drugs	88	62	70.5%	26	29.5%

Table 5: Descriptive Statistics

Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
age of respondents	151	4.00	1.00	5.00	1.5033	.07627	.93719	.878
education of respondents	151	2.00	1.00	3.00	2.0132	.05637	.69269	.480
gender of respondents	151	1.00	1.00	2.00	1.6556	.03880	.47674	.227
type of medicine	151	3.00	1.00	4.00	1.6026	.06974	.85697	.734
ever intake of medicine	151	1.00	1.00	2.00	1.1457	.02881	.35397	.125
reason for taking medicines	151	42.00	1.00	43.00	2.2252	.29208	3.58919	12.882
intake of medicine for probable treatment	151	4.00	1.00	5.00	2.2185	.12533	1.54010	2.372
basis of selection of medicine	151	2.00	2.00	4.00	2.5364	.06891	.84676	.717
criteria for selection of medicine	151	3.00	1.00	4.00	3.1126	.08433	1.03629	1.074
amount of medicines you take	151	2.00	1.00	3.00	1.3510	.05164	.63455	.403
perspective of respondents about self medication	151	3.00	1.00	4.00	2.3642	.07247	.89057	.793
Valid N (list wise)	151							

Table: 6 Age of Respondents

Age of respondents					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 25	105	68.2	69.5	69.5
	26-35	29	18.8	19.2	88.7
	36-45	8	5.2	5.3	94.0
	45-55	5	3.2	3.3	97.4
	above 55	4	2.6	2.6	100.0
	Total	151	98.1	100.0	
Missing	System	3	1.9		
Total		154	100.0		

Table: 7Education of Respondents

Education of respondents					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Hsc	35	22.7	23.2	23.2
	graduate	79	51.3	52.3	75.5
	post graduate	37	24.0	24.5	100.0
	Total	151	98.1	100.0	
Missing	System	3	1.9		
Total		154	100.0		

Table: 8 Respondents's Gender

Gender of respondents					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	52	33.8	34.4	34.4
	Female	99	64.3	65.6	100.0
	Total	151	98.1	100.0	
Missing	System	3	1.9		
Total		154	100.0		

Table: 9 Types of Medicine

Type of medicine					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	analgesics	91	59.1	60.3	60.3
	antipyretics	35	22.7	23.2	83.4
	antibiotics	19	12.3	12.6	96.0
	antiseptics	6	3.9	4.0	100.0
	Total	151	98.1	100.0	
Missing	System	3	1.9		
Total		154	100.0		

Table: 10 Medicine Intake

Ever intake of medicine					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	129	83.8	85.4	85.4
	No	22	14.3	14.6	100.0
	Total	151	98.1	100.0	
Missing	System	3	1.9		
Total		154	100.0		

Table 11: Medicine Taking Reason

Reason for taking medicines					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Easily available	94	61.0	62.3	62.3
	Economic convenience	8	5.2	5.3	67.5
	Lack of trust in Prescribing by doctor	9	5.8	6.0	73.5
	Others	39	25.3	25.8	99.3
	Total	151	98.1	100.0	
Missing	System	3	1.9		
Total		154	100.0		

Table.12: Medicine taken for Probable Treatment

Intake of medicine for probable treatment					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Aches and pains	70	45.5	46.4	46.4
	Fever	43	27.9	28.5	74.8
	Diarrhea	3	1.9	2.0	76.8
	Skin wounds	5	3.2	3.3	80.1
	Others	30	19.5	19.9	100.0
	Total	151	98.1	100.0	
Missing	System	3	1.9		
Total		154	100.0		

Table 13: Respondents' perspective about Self Medicine

Perspective of respondents about self-medication					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	good practice	26	16.9	17.2	17.2
	acceptable practice	60	39.0	39.7	57.0
	not acceptable practice	49	31.8	32.5	89.4
	harmful practice	16	10.4	10.6	100.0
	Total	151	98.1	100.0	
Missing	System	3	1.9		
Total		154	100.0		

Table 14: Amount of Medicine Taken

Amount of medicines taken					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	single tablet	111	72.1	73.5	73.5
	two tablets	27	17.5	17.9	91.4
	more than two	13	8.4	8.6	100.0
	Total	151	98.1	100.0	
Missing	System	3	1.9		
Total		154	100.0		

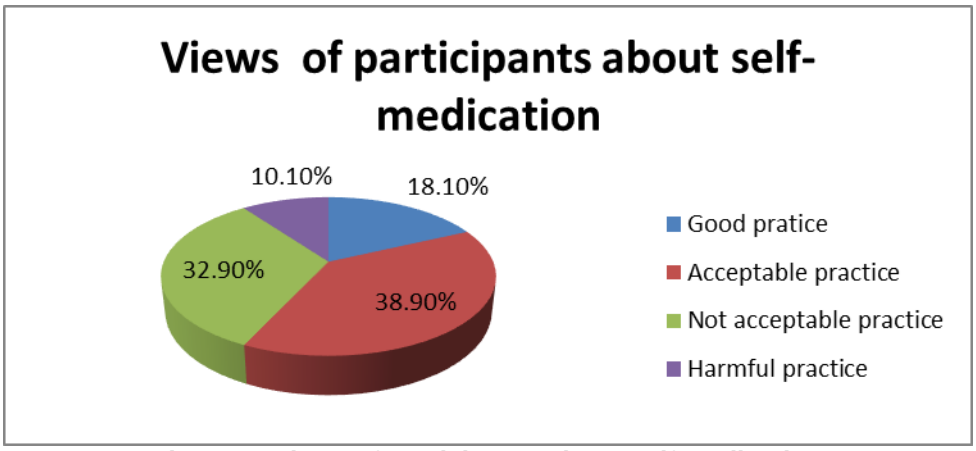

Figure 3: Views of Participants about Self Medication

DISCUSSION

In this survey, it has been reported that most of the people in Karachi are highly reliant on self-medication. The most common type of medicine consumed by the tested population is Analgesics, similar results were present in the study of Zafar et al., 2008; James et al., 2006 and Sankdia et al., 2017. Lessenger and Feinberg (2008)[14] designed a list of physical findings of nonmedical use of abused OTC products, noting agitation with nicotine gum, caffeine and ephedra, priapism with ephedrine and pseudoephedrine, psychiatric effects with dextromethorphan, euphoric psychosis with Coricidin and chlorphenamine and gastrointestinal disturbances with laxatives. Likewise, in this class of direct harms, concerns were also raised up on chronic rebound headache linked with frequent usage of analgesics.

The most frequently achieved result of the reasons of self-medication is 'easy access to the medicine' which might be due to the fact that people do not bother to visit a doctor for minor aches and pains. Although sometimes when it persist than they might take a visit to the doctor. In the findings of Abay and Amelo., 2010, the main reasons of self-medication are past experience and non-serious attitude of the consumers about illness which is correlated to the one achieved in this survey. The easy access thing is way too close to the non-serious behavior of the people who habitually doself-medication.

In order to analyze the frequency of self-medication among the participants, it has been asked that how many times they have treated themselves in the past one year. Around 60% of them have admitted to treat themselves more than three times in the past one year. This shows that the rate of self-medication among the population of Karachi is very high. Therefore, in a country where it is so

easy to 'act like a doctor' it makes sense that even the students affiliated to medical colleges are indulge in this activity. Hence, the seriousness of issue is clear and it's consequences will might be in high international significance as it certainly leads to different problems which includes the surfacing of organisms which are multidrug resistant (Zafar et al., 2008). Also, the non-prescribed medications among youth, particularly in learners are being highly distorted because of their huge interest towards advertisements and media. Conclusively, it has now become a serious situation rising the distress of improper diagnosis as well as drug reactions (Sankdia et al., 2017).

The common selection criteria of the medicine are its indications for use which could be the ones ingested like Paracetamol. Paracetamol is mostly favored by older consumers, however the interest of youth is more towards NSAIDs (Stosic et al., 2011).

Paracetamol can be tolerated if it is taken according to the suggested dose (up to 4000 mg/day); facts from prospective studies which involves around 30000 patients or more shows that repetitive practice of a right satisfying paracetamol dosage is not allied with hepatic failure (Dart and Bailey., 2007). Therefore it is significant for consumers to understand the need to maintain dosage in accordance with the recommendation and avoid taking extra products containing Paracetamol at a time (Stosic et al., 2011).

The most common source of OTC drugs found in this study is community pharmacies. In the work of Abay and Amelo., 2010, seventy-two percent of the practioners of self-medication have reported that their source of drugs is pharmacy or drug shops. This shows that most of the people (72%) had found drug-related info (when to take and what should be avoided with the drug) from the distributers. (Abay and Amelo., 2010).

Fifty two percent of the participants occasionally check the directions insert with package of medicines for self-practice whereas thirty six percent always check. In accordance with the results obtained, fifty five percent among them fully understand the instructions inserted and thirty eight percent partly understood. This is an over-confident behavior of the people because the instructions inside the package are rarely being checked. Although efficacy and safety were considered as the supreme product attributes, there was no perfect global consensus on the way according to which users can best guarantee their practice of self-medication. Responsible self-medication is motivated by two large aspects of drug safety: the key characteristics of the drug and how it can be used. Proper usage is dependent on the accessibility of information, and how simply it is likely to be consumed (Stosic et al.,2011). Fifty two percent of the survey population believes that they can treat common diseases successfully by their selves with self-medication.

People get to know the dosage of medicines most commonly by their previous experience. Previous experience can include the previous prescriptions and also their prior self-medication practice.

Among 148 responses, around nine percent takes more than two tablets at a time. This is, therefore, a very harmful practice. While going through the harmful effects of self-medication that could be the introduction of more than one drug in the body which might result in their chemical reactions inside the body. The reactions could be of four types; additive, synergistic, potentiating or antagonistic. If the reaction is synergistic, it would harm to the body instead of curing or preventing the disease. Self-medication has made people immune to the medicines especially to antibiotics. Diseases are no more cured by a single medicine instead some other disease is developed by the reaction. The resistance among pathogens against drugs is increasing with each passing day and diseases like typhoid, malaria, dengue has become an epidemic now. Self-medication in the context of health care has its own importance. A thought that a person is treating himself with "drugs" and guessing its dosage by himself shivers doctor and any educated person who has awareness about the drugs and its reactions inside the body.

Sixty four percent agree that pharmacist play a key role in self-consumption of the non-prescribed OTC drugs. This fight of monitoring and to control the OTC misuse and abuse is to attain the required maximum level of user safety for the few ones who are at risk, while not to restrict the access to OTC products for the people who carry on its safe use. A simple suggestion is to monitor this habit of certain OTC products, as well as record data and education, protected and operative consumption of such drugs can be promoted (Wazaify et al., 2005).

Some beneficial aspects of self-medication were given in the survey to check that from which of the people strongly agree with. Most of them selected the immediate relief as a major benefit of this practice. But still without the advice of a doctor, a person if taking drugs is an enemy to him/herself. Proper checkup and examination of a doctor is really very necessary in order to know the nature, cause, symptom, treatment and prevention of a disease.

In the next portion of the survey, some disadvantages were given with an aim to create awareness and to analyze the public attitude towards it. The findings show that most of the people are aware of its harmful effects. Although only ten percent of the respondents consider it a harmful practice whereas thirty percent and eighteen percent considers it as an acceptable and good practice respectively. Thirty three percent said that it is not an acceptable practice. Several different complications and troubles related to the abuse of OTC medicines were recognized and consist of three wide categories. Firstly, the direct harms linked with the psychological or pharmacological sound effects of the drug which is being misuse or abuse. Secondly, the attendance of physiological harms associated with the hostile effects of

some other active constituent in a compound formulation. Both of these types are directed to worries about the presentation at emergency services and overdoses. Thirdly, there were other harmful effects correlated to additional consequences, for instance, progression to them is use of other substances, economic charges and special effects on social and personal life (Cooper, 2013).

Most participants believe that it is not essential to call a doctor for slight illnesses and it serves as a quick relief challenge. On the other hand, they believe that the risk of using drugs wrongly and misdiagnosing are demerits of self-medication.

Seventy nine percent respondents agreed that doctors should inquire whether patient is self-medicating or not. Fortunately, it's a good idea and doctors should put a check and balance on the self-medication behavior of a patient. During recent pandemic of COVID19 that emerged in 2019 and still persists in different parts of the world (WHO, 2020) due to unavailability of specific drugs to treat COVID 19, various methods/ways to treat COVID-19-associated complications are being assessed. Although vaccinations are now available yet some people around the globe still reluctant to get it and now new variants Delta and Omicron viruses are more resistant. Online doctors also available nowadays to avoid the close contact. The current study highlights the potential pros and cons of self-medications.

CONCLUSION

The rapid rate of self-medication is due to lack of awareness and non-serious behavior of the people and the mostly consumed medicines include Panadol, Paracetamol, Flagyl, Soften etc. The pros and cons of the increase consumption of OTC drugs were discussed and it has been concluded that although minor aches and pains are easily cured but sometimes the symptoms of the disease are not taken seriously which results in misdiagnosis and in some cases antimicrobial resistance. 31.5% people rely on their previous experience of the illness and 38.9% rely on previous doctor's prescription and therefore feel free to treat themselves for the sake of saving time and quick relief. Analgesics are mostly taken and the literature findings show the same pattern.

Hence following recommendations need to be considered:

Awareness regarding the harmful effects of self-medication should be provided.

Doctor should inquire either patient has taken any drug prior to the visit, or patient should tell the doctor about the drug prior taken.

To avoid antimicrobial resistance, a pharmacist should play a role by creating mass awareness and avoid giving the drugs like antibiotics without prescription. These drugs strictly should not be available OTC.

Most of the survey population agrees that awareness of self-medication should be added in the academic curriculum and strict law enforcement is needed in case of prescriptions of the antibiotics and other addictive drugs.

There should be improvement of referral and communication system between pharmacist and physician.

There is a dire need of research especially for new emerging diseases and becoming pandemic, for this purpose funds are required that should be spent on priority basis.

CONFLICT OF INTEREST

The authors declare that present study was performed in absence of any conflict of interest.

ACKNOWLEGEMENT

We acknowledge the overwhelming contribution of the participants.

AUTHOR CONTRIBUTIONS

S.J designed the study and also wrote the manuscript. T.A, and S.J contributed in the survey, H.Z did the data analysis. S.J reviewed the manuscript. All authors read and approved the final version.

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