

Original Research Article

Prevalence and Practice of Self-Medication among University Students in Pakistan through Online Resources

Abstract

Background: Self-medication or self-care is regarded as unhealthy practice. However, it is widely accepted and practiced in the low and middle income countries (LMICs) due to scarce of health resources.

Objectives: To assess the prevalence of self-medication by using online sources among the University students in Pakistan.

Methodology: A descriptive cross-sectional study was conducted between May 2017 and August 2017 by involving 991 university students. A pre-tested questionnaire was administered to obtain data.

Results: 85.9% (852/991) of the respondents knew on online medicine and their uses of self-medication. Overall, 68% (674/991) of them have to travel long-distance to access essential health services. Nearly half (41.7%) of the respondents procured drugs through the online, while only 15.6% of them obtained through pharmacies.

Conclusions: The rampant irrational use of drugs without medical guidance could contribute to adverse consequences viz.; (1) emergence of multi-drug resistance, (2) adverse drug reactions, (3) drug interactions etc. Strict regulations must be enforced to limit the public access to online-drugs by the law-enforcement agencies.

Keywords: Self-medication, Prevalence, Online Resources, University Students, Pakistan

Introduction

Self-medication (SM) is defined as the 'selection and use of medicines by individuals (or a member of the individuals' family) to treat self-recognized or self-diagnosed conditions or symptoms' (1). It is not only unsafe but also irresponsible as well as unethical practice too (2).

Comment [I1]: Your objective should be inspired from your title or the same as your title, as the following:

To assess the prevalence and practice of self-medication among university students in Pakistan through online resources

Comment [I2]: Why you mentioned pretested, is you take the data pre and post? I thought you collect your data one time, so you can say:

One questionnaire was administered to obtain data.

Comment [I3]: Don't start your results comment by number, you can say: The majority (85.9%) of the respondents knew on online medicine and their uses of self-medication.

Comment [I4]: It's preferable to arrange your keywords alphabetic: Online Resources, Pakistan And so on.

This paternalistic approach to medicine, supported by health systems designed to treat sickness in order to minimize the health system burden in the majority of the tropical countries, where infectious diseases like malaria (3), onchocerciasis, HIV/AIDS (4) and schistosomiasis are endemic and causing enormous morbidity and mortality.

The practice of SM started to appear in medical research since 1970s, when clinicians observed that heroin addicts were using SM to overcome illnesses i.e. stress and loneliness (5). Indeed, most of the people are hesitated to consult with the qualified-physician, whenever they feel not well. They often consult with families, friends, neighbours, and the pharmacist, or self-care by previous prescribed drug, or suggestions from an advertisement in newspapers, scientific journals and magazines are common sources of self-medications (6).

Perhaps, in recent years almost everybody is under the illusion that he/she has adequate medical knowledge (7) to practice self-care. It is important to note that the dose greatly varies from person-to-person. Therefore, ill-advised medication is extremely danger which could lead to negative consequences. Currently, though, many countries have adopted free treatment policy, the people, those are living in remote areas have to walk/travel a long distance to access quality healthcare (8). Eventually, they approaches neighbours or drug-vendors to seek medical advice and therapeutic agents, which contributes to the genesis of resistance, treatment-failure and prolonging illnesses because of sub therapeutic dosage (8).

The recent information communication technology revolution led to widespread usage of internet, through smartphone by young-adults, particularly university students. Now, almost all the information is readily available on internet/websites. However, it is extremely difficult to authenticate the credibility of the existing information (9) on the websites. It is just like an authorless environment as there is limited mechanism in cyberspace (10).

It is important to note that the number of health conscious people is keep increasing every day and there are several reports indicating about counterfeiting of life-saving drugs (8). It is a crime against humanity and this persistent threat has torn society by imposing severe menace in all spheres of human life viz, clinical, socio-economic, and public health (8). In online self-

medication, anyone can visit the relevant website, and he/she can place their orders. However, it is important to note that the ingredients and the credibility of information and the location of online shop are quite unknown. Unfortunately, most of controlled medicines are freely available, and this kind of freedom could lead to addiction/dependence of certain medicine (11).

The recent Pakistan census report (2016) indicated that the total population is 207.774 million. The EMRO-WHO report (2007) showed that in Pakistan there are 1167-Hospitals, 5695-government rural dispensaries (GRDs), 5464-Basic Health Units (BHUs) sub-health centres, 675-Rural Health Centre (RHC), 339-Tuberculosis Centres, and 733-Maternity and Child Health Centres (MCHCs). Around 118 869 total beds are available and ratio of population per bed is 1613. Pakistan Health Profile Data (2015) were indicating that the health facilities are overburdened to meet the people expectations in terms of providing quality health services.

Self-medication practices of the among university students have been surveyed in various parts of the world; in Slovenia, (94.1%) (12) in Ethiopia (38.5%) (13) , and in Palestine (98/0%) (14) students practicing self-medication. However, the rampant irrational use of SM without proper medical guidance may result; (1) missed diagnosis, (2) undue therapy, (3) delays apt treatment, (4) wastage of resources, (5) emergence of multi-drug resistance and particularly (6) causes serious health hazards like increased morbidity and mortality (6). SM is influenced by several confounding factors i.e. education, gender, socio-economic status and availability of medicines. In this context, this survey was conducted to assess the prevalence self-medication by using online sources among the Pakistan University students. We strongly believing that it could pave the way for the policy-makers to design appropriate mitigation strategies to regulate this unhealthy risky behaviour in the near future.

Materials and Methods

Study Settings and Study Design

A cross-sectional survey was conducted in two Pakistani Universities, i.e. University of Lahore, Hajvery University and a Police Training Academy at Choung, Lahore, Pakistan. The survey

Comment [15]: What do you want to say here?
I think you need to put coma (,)
Or
You put coma after million and the EMRO

conducted between May 2017 and August 2017. A stratified, systematic random sampling was adopted for selection of a total of 991 respondents from the chosen academic institutions. The sample size was estimated by employing 95% confidence interval formula to estimate a population proportion.

Comment [I6]: It is best if you put details about your technique which you already chosen

Interview

The interview was carried out by involving selected 991 respondents. To improve the quality of the data, pre-testing was carried out prior to the actual data collection, in an area different from the study area, but with the similar socio-demographic pattern. The students were interviewed on the knowledge, usage of self-medication patterns and trends particularly those obtained through online resources, using a pre-tested questionnaire specifically designed for this purpose. Both male and female respondents were included. To avoid biased information and variables, the questionnaire has been prepared in English language and has been translated into native local language (Urdu) in order to make it easy to understand and to administer by interviewers and interviewees.

Comment [I7]: Why do you do this? You can do pilot study in the same population you selected. After that you can add this sample or exclude according to the results of pilot study.

Pilot study done on 10% of the study sample to test the clarity and applicability of the study tools.

Comment [I8]: You should show your study questionnaire (tool) on a jury of experts in the field of your study specification before starting data collection to test its validity and reliability. You also, should mentioned the validity and reliability values.

You should also, mentioned your tool; its aim, items, if it has a scoring system, adopted or adapted from who and so on....

You also need to write if any one of the study sample excluded, the time needed for filling the questionnaire. More details about your data collection are needed.

Ethical considerations

The study was approved (PKLUEC322017/83) by the ethical clearance committee of the Lahore University, Pakistan. Before the commencement of the survey, meetings with the students, class representatives, leaders and members of the student associations were held in which the objectives of the survey were clearly explained. Written consent was obtained from each study participant. Every participant was assured to withdraw the interview at any phase if they wish to do so. However, all the informants actively involved and no one declined to finish the interview.

Data management and analysis

In the field, data was collected in standardized questionnaire and data collection forms checked for errors and completeness. Data was then counterchecked before entry into DbaseV (Borland International, Scotts Valley, California, USA) using the double entry system. Summary statistics was performed using STATA version 10 (STATA Corp., Texas, USA). Range and mean were analyzed and appropriate tables, graphs and percentage details were displayed.

Results

The survey was conducted by involving all the selected respondents. Among them 58.1% and 41.9% were male and female, respectively (Table 1). Almost half of them [48.9%; (male 26.2% and female 22.7%)] belongs to between 21 and 25 years of old (Table 1). Also, it was found that 58.5%, 20.7% and 20.8% of the respondents from the pharmacy, computer engineering and police training academy, respectively. Overall, 63.7% and 36.3% of them was residing in urban and rural areas, respectively. Since, all the participants are well-educated they were having ample awareness about self-care. Among the 991 respondents, 852(85.9%) of them knew about online therapeutic-agents and their uses for self-medication, and 356(41.7%) of them have bought drugs through online previously.

Comment [I9]: When you mentioned there was 58.1% were male, already known that 49.9% were female. So you can mentioned one of them only if you want.

Comment [I10]: Not almost say near half of them
Or about half

Table 1: Age group and gender wise distribution of study participants

S. No.	Age group	Total respondents		Male		Female	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
1.	15-20	170	17.1	110	11.2	60	06.1
2.	21-25	485	49.0	260	26.2	225	22.7
3.	26-30	336	34.0	207	20.8	129	13.1
Total		991	100	577	58.1	414	41.9

Comment [I11]: You don't need this column delete it. It is not necessary to put serial number.

Interestingly, 23.3% of the students mentioned that they never advice anyone to purchase online medicine, while 66.5% of them have already advised their relatives or friends (Figure 1). Out of 66.5%, only 18.7% of them may have some kind knowledge about drugs because of their specialty (pharmacy), and rest of them (37.5%) have referred drugs because of their previous practices and 10.3% of them learned through the medical journals/magazines and advertisements.

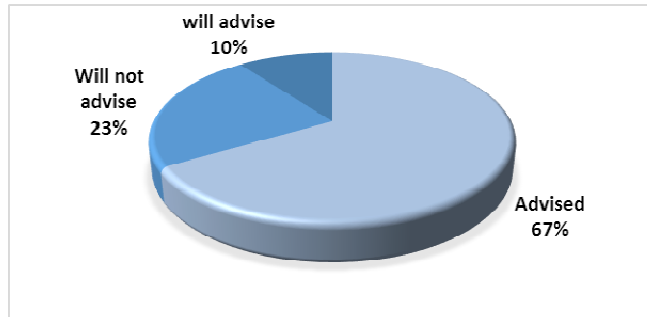


Figure 1: Percent of respondents advise others to procure online drugs for self-medication

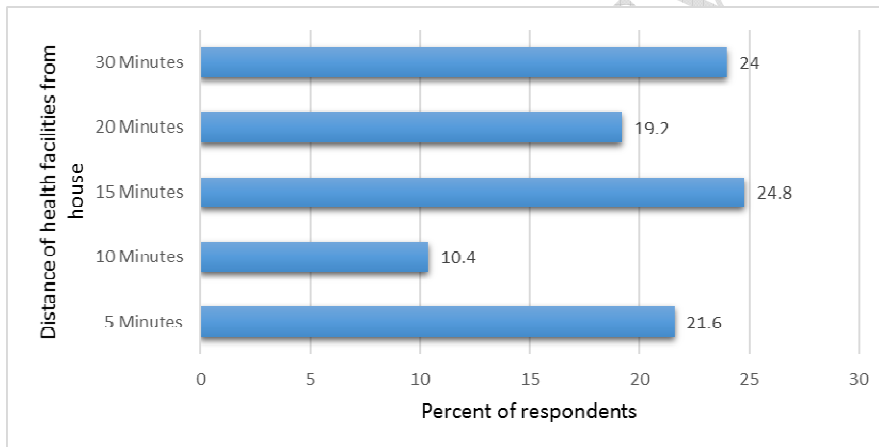


Figure 2: Distance of respondent's houses from the nearest health facility

Figure 2 shows the distance of the nearest health facilities from the residence to acquire treatment. Overall, 32% (21.6% 5 minutes; 10.4% 10 minutes) of them living within five-to-ten minutes walkable distance, while others need to travel long distance to access necessary health services (Figure 2). While 14% of them were have witnessed absence of physicians, when they have visited for the medical assistance.

Comment [I12]: Delete it you already mentioned above it

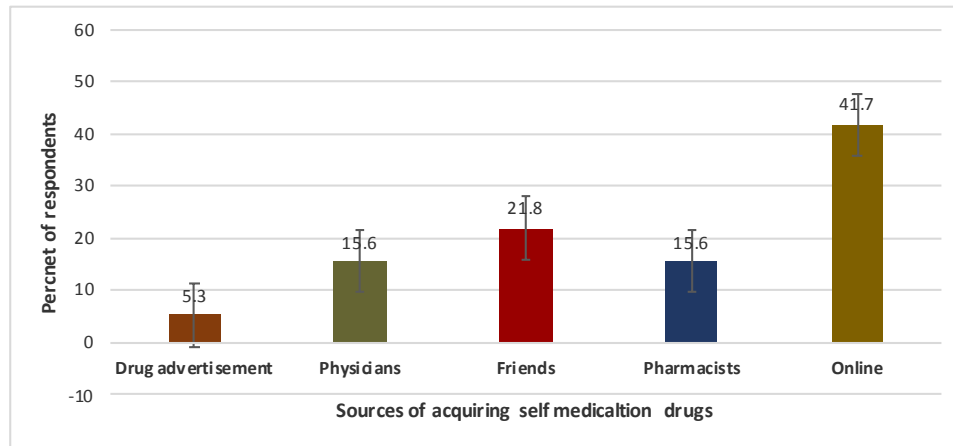


Figure 3: Sources of acquiring drugs for self-medication

It is important to note that nearly half of the respondents (41.7%) procured drugs through the online, while only 15.6% of them have obtained from the pharmacists. Besides, 21.8% of them borrowed from their friends/relatives (Figure 3). Interestingly, 258/72.4% of the participants, those have purchased via online claimed that the dosage-regimen, duration, and the possible side-effects were not clearly mentioned in the instruction labels. Figure 4 clearly shows that nearly half of the respondents (43.4%) are using antacids and antipyretics for the self-medication (Figure 4).



Figure 4: The most commonly used drugs by the respondents for self-medication purpose

The most common cited illnesses or symptoms that led students to procure self-medication, were headache (33.6%), fever (30.4%) and throat infection/soreness (14.8%) (Figure 5).

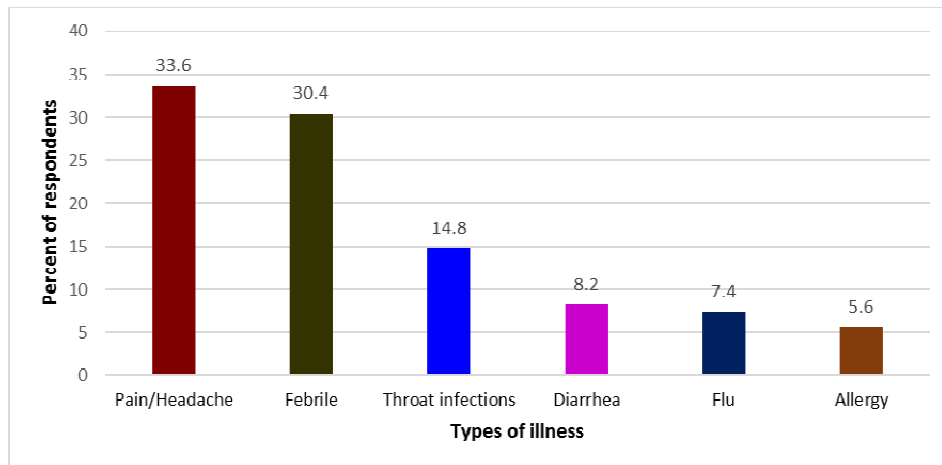


Figure 5: The most common illness or symptoms that led students to administer self-medication.

The respondents cited the following reasons for the self-medication; (a) mild illness, (b) previous illness with similar kinds of symptoms, (c) absence of physicians, (d) expensive treatment and (e) long waiting-time (Figure 6).

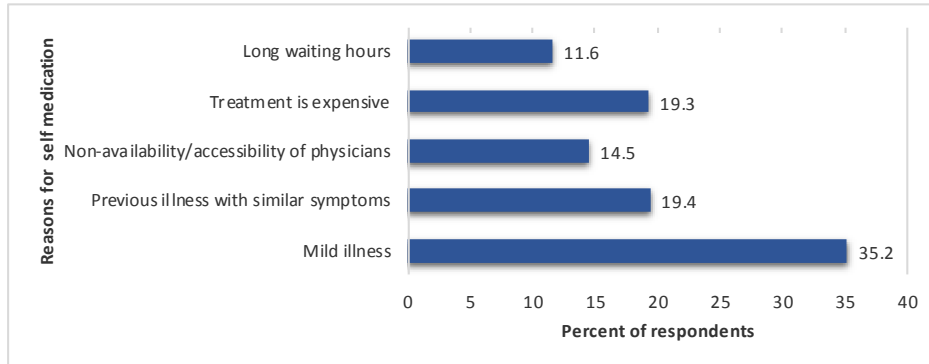


Figure 6: The respondents cited reasons for the self-medication

Discussion

According to World Health organization (WHO) SM is the use and selection of different medication by individual person to treat self-identified symptoms or illness (15). The recent Pakistan Medical Statistical Report (2017) reported that there are 230 613 physicians [41 994 Surgeons; while 188 619 with basic medical degree] are working in various health facilities across the Pakistan. WHO Global Health Statistical Report (2014) indicated physician density ratio to population in Pakistan that was only 0.806 per 1000 that is very as low as compared with developed countries.

Therefore, the purpose of this survey to shed lime-light on the trend and associated risk-factors on self-medication via online resources among the university students. Overall, 58.1% and 41.9% were male and female students were involved for this survey (Table 1). 58.5%, 20.7% and 20.8% of the study-participants from the pharmacy, computer engineering and police training academy, respectively. The main determinants of self-medication include educational status, age, gender, past successful usage, severity of illness and economic level. Reported negative outcomes of antimicrobial self-medication included, allergies (2/34: 5.9 %), lack of cure (4/34: 11.8 %) and causing death (2/34: 5.9 %). The commonly reported positive outcome was recovery from illness (4/34: 11.8 %) (16).

Comment [I13]: Your purpose is to assess the Prevalence and Practice of Self-Medication among University Students in Pakistan through Online Resources.

Comment [I14]: Recently, it is not recommended to use your numbers or percentages values but you can say as the following e.g.:

- More than half
- More than one-fifth
- Two-thirds
- One-third
- One-quarter
- And so on...

- 20 % = one-fifth
- 33%= one-third
- 25%=one-quarter
- 66%=two-thirds
- If 85% say majority
- And so on.

Overall, 66.5% of the respondents advised by others to procure medicines via online outlets (Figure 1) but only 41.7% of them procured drugs through online (Figure 3). The major sources of drugs included, pharmacies (65.5 %), leftover drugs from the friends and relatives (50 %) and drug shops (37.5 %) (16). However, the authenticity of these online outlets is a major concern. If someone has no adequate knowledge on medicines and their right dosage, then it can be a highest-risk for their lives. The results are quite comparable with a study that was performed to ensure the validity of online pharmacies and websites and they found that the accuracy of information was quite inadequate. Besides, the quality of the delivered drugs were quite substandard and it was delivered without proper guidelines regarding the potential side-effects and interactions (15).

Because, the present study indicating that though only 18.7% of the respondents have awareness on medicines (Figure 1), but without knowing their right dosage and interactions. Still they self-administer these drugs due to prior experience. However, because of lack of information it can cause adverse side-effects such as antibiotic resistance, skin problem, hypersensitivity and allergy (6) (8). The distance of the nearest health facilities, mild illness, prior illnesses, absence of physicians, and long waiting hours also some of the key factors to led the people to practices of self-medication (Figure 2 and 6). Some governments encouraging self-care for mild-illnesses, to minimizes the cost, travelling time as well as physicians consultation time (17).

Majority of the respondents (85.9%) claim that self-medication is time-saving as well as economical, besides they believe that it is quite convenient and easy to choose their medicine by themselves for the minor illness for the quick relief rather than go to nearby healthcare facilities (Figure 2). The results are quite comparable with a previous study, which reported that self-medication can be a low-cost and convenient alternative to treat minor-illnesses (5). Most of the respondents (85%) practicing self-medicine (Figure 2), the results are quite consistent with a few studies within Pakistan among the university students that about 76% of university students used to self-medicate (18) in Karachi with prevalence rate of 80% (19), in Ethiopia (39.2%) (20); in Oman (94%) and Pakistan (40%) (21). A study was conducted in, Sudan reported 73% prevalence of self-medication with antibiotics /antimalarials (22).

Comment [I15]: Say (the current study found that more than two-thirds of the respondents

Overall, 43.4% are using antacids and antipyretics for the self-medication (Figure 4) and 22.4% of students self-administering antibiotics. The recent systematic review conducted by (16) reported that overall prevalence of antimicrobial self-medication was 38.8 %. The respondents are administering the various drugs for the self-medication against headache (33.6%), fever (30.4%) and throat infection/soreness (14.8%) (Figure 5). The results comparable with several studies as reported by (16) in a systematic review. The common disease symptoms managed were, respiratory (50 %), fever (47 %) and gastrointestinal (45 %) (16). Another study also reported the similar kinds of findings that the reported the most frequent health complaint that led to SM. Other common complaints included fever, allergies, cold and cough-related symptoms, insomnia, skin problems, and menstruation disorders (23).

Nearly half of the respondents (41.7%) used online resources to procure medicines and interestingly among those 72.4% of the participants argue about the instructions given on the label that were not satisfactory. It is noted that the participants of this study belong to well-educated category of society and if the practice of self-medication is so high in people who are well aware of its dangers, then this practice in rest of the population may be even more serious, but according to another study, the practice of self-medication is highly prevalent in rural and urban areas ranging from 32.5% to 81.5% (24). Although it is true that self-medication can help by treating minor illness that do not require medical consultation and hence can reduce the pressure on medical services particularly in the developing countries with limited health care resources.

Nearly, 22.5% and 18.6% of the participants use the antibiotics 22.5% and painkillers, respectively (Figure 4). The results are quite consistent with several studies in several countries; in Yemen (87.1%) (25), Saudi Arabia (30%) (26) and in Qassim University Saudi Arabia (32%) (27), Spain (41%) and Croatia (38%) respondents were administering antibiotics as self-medication. Another study also reported consistent findings reported by (28) most frequently self-prescribed medications are analgesics (55.4%), vitamin supplements (45.7%) and antipyretics (41.5%). This was also observed in another study conducted among University students of Turkey where 89% of students knew that it is wrong practice to take antibiotics without consulting a doctor but still 45% of them are still involved in this activity (29).

In Pakistan only 4.1% and 12% pharmacies comply with regulatory requirements and pharmacies are running under direct supervision of pharmacists, respectively (30). The practice of self-medication often has many adverse effects that can lead to many problems, including multi-drug resistant pathogens, drug dependence and addiction, hazard of misdiagnosis, problems relating to over and under dosing, drug interactions and tragedies relating to the side effect profile of specific drugs. The majority of victims of counterfeit often belong to underprivileged sections of society. They primarily prefer self-medication from informal, private, pharmaceutical sectors owing to the inaccessibility and unaffordability of quality healthcare medicines (8). Therefore, pharmacies and health facilities must provide better services within shorter span in order to minimize the prevalence of self-medication (3).

In the recent years, counterfeiting of life-saving drugs is a matter of grave concern and it is regarded as an attack on global public health. The counterfeiters produce fake drugs and distribute in resource-poor settings (8) as well as through online resources too. Therefore, there is an urgent and intensified effort is imperative in terms of multi-layered approaches and multi-disciplinary scientific research and policies to avert and combat this public health disaster. Besides, adequate efforts must be made to generate the awareness regarding the harmful effects of self-medication among the health conscious people as well as health-seekers in order to avert the prolonged morbidity and avoidable death. In addition, it could prevent and shrink the emergence/spread of multidrug-resistant strains.

Conclusion

The online 'non-prescription' or 'over the counter' (OTC) practice was assessed among the university students in order to understand the prevalence and patterns of this risky-behaviour among elite society in Pakistan. The survey findings clearly revealed that the majority of them practicing self-diagnosis and treatment for common illnesses. However, there is a lacuna of knowledge was observed towards the potential risks of using drugs without proper supervision and consultation. The educational-status do not effect on self-medication practises. Indeed, there are several cultural, socio-economic barriers exist for growing trend of self-medication like (1) financial constraints, (2) distance, (3) absentism of physicians, (4) lack of time, (5) long-waiting

hours, (6) mild-illnesses, and (7) extensive advertisement. Therefore, most of the students acquiring information through online resources on the symptoms, self-diagnosis and treatment. However, credibility of existing online information is a matter of grave concern.

Indeed, self-diagnosis and self-care is not only a harmful practice, it also creates many complications/side-effects when it is not properly performed or practiced. Besides, it is quite evident that irrational use of medicines may lead to increased morbidity, mortality, and prevalence of resistance to chemotherapeutics besides wasting of time, efforts and resources. Therefore, appropriate communication strategies needed to be devised by involving all the pertinent stakeholders like policy makers, healthcare professionals, and the people to generate public awareness about adverse impact of self-medication via printed and electronic-media. Strict regulation policies must be enacted to limit public access to online drugs through regulatory authorities and law-enforcement agencies. Besides, strengthening the healthcare services in the underserved areas could significantly curtail this risky-behaviour in the near future.

References

1. Ruiz ME. Risks of self-medication practices. *Current drug safety*. 2010;5(4):315-23.
2. Montastruc J, Bagheri H, Geraud T, Lapeyre-Mestre M. Pharmacovigilance of self-medication. *Therapie*. 1997;52(2):105-10.
3. Karunamoorthi K, Deboch B, Tafere Y. Knowledge and practice concerning malaria, insecticide-treated net (ITN) utilization and antimalarial treatment among pregnant women attending specialist antenatal clinics. *Journal of Public Health*. 2010;18(6):559-66.
4. Karunamoorthi K, Rajalakshmi M, Babu SM, Yohannes A. HIV/AIDS patient's satisfactory and their expectations with pharmacy service at specialist antiretroviral therapy (ART) units. *Eur Rev Med Pharmacol Sci*. 2009;13(5):331-9.
5. Shah SJ, Ahmad H, Rehan RB, Najeeb S, Mumtaz M, Jilani MH, et al. Self-medication with antibiotics among non-medical university students of Karachi: a cross-sectional study. *BMC Pharmacology and Toxicology*. 2014;15(1):74.

6. Bennadi D. Self-medication: A current challenge. *Journal of basic and clinical pharmacy*. 2013;5(1):19.
7. Mehmood A, Rehman AU, Zaman M, Iqbal J, Ul Hassan SS. Self-medication; An Emerging Trend. *British Journal of Pharmaceutical Research*. 2016;14(1).
8. Karunamoorthi K. The counterfeit anti-malarial is a crime against humanity: a systematic review of the scientific evidence. *Malaria journal*. 2014;13(1):209.
9. Keshavarz H. How credible is information on the Web: Reflections on misinformation and disinformation. *Infopreneurship Journal*. 2014;1(2):1-17.
10. Warnick B. Online ethos: Source credibility in an "authorless" environment. *American Behavioral Scientist*. 2004;48(2):256-65.
11. Laing R. Rational drug use: an unsolved problem. *Tropical doctor*. 1990;20(3):101-3.
12. Klemenc-Ketis Z, Hladnik Z, Kersnik J. Self-medication among healthcare and non-healthcare students at University of Ljubljana, Slovenia. *Medical Principles and practice*. 2010;19(5):395-401.
13. Abay S, Amelo W. Assessment of Self-medication practices among medical, pharmacy, health science students in Gondar University, Ethiopia. *Journal of Young Pharmacists*. 2010;2(3):306-10.
14. Sawalha AF. A descriptive study of self-medication practices among Palestinian medical and nonmedical university students. *Research in Social and Administrative Pharmacy*. 2008;4(2):164-72.
15. Bessell TL, Anderson J, Silagy C, Sansom L, Hiller J. Surfing, self-medicating and safety: buying non-prescription and complementary medicines via the internet. *BMJ Quality & Safety*. 2003;12(2):88-92.
16. Ocan M, Obuku EA, Bwanga F, Akena D, Richard S, Ogwal-Okeng J, et al. Household antimicrobial self-medication: a systematic review and meta-analysis of the burden, risk factors and outcomes in developing countries. *BMC Public Health*. 2015;15(1):742.
17. Porteous T, Bond C, Hannaford P, Sinclair H. How and why are non-prescription analgesics used in Scotland? *Family Practice*. 2005;22(1):78-85.
18. Jain S. Concept of self medication: a review. *International Journal of Pharmaceutical & Biological Archive*. 2011;2(3).
19. Zafar SN, Syed R, Waqar S, Zubairi AJ, Vaqar T, Shaikh M, et al. Self-medication amongst university students of Karachi: prevalence, knowledge and attitudes. *Journal of the Pakistan Medical Association*. 2008;58(4):214.

20. Suleman S, Ketsela A, Mekonnen Z. Assessment of self-medication practices in Assendabo town, Jimma zone, southwestern Ethiopia. *Research in social and administrative pharmacy*. 2009;5(1):76-81.
21. Hussain A, Khanum A. Self medication among university students of Islamabad, Pakistan-a preliminary study. *Southern Med Review*. 2008;1(1):14-6.
22. Stevenson R, MacWalter R, Harmse J, Wilson E. Mortality during the Winter Flu Epidemic—Two Cases of Death Associated with Self-Medication. *Scottish medical journal*. 2001;46(3):84-6.
23. Shehnaz SI, Agarwal AK, Khan N. A systematic review of self-medication practices among adolescents. *Journal of Adolescent Health*. 2014;55(4):467-83.
24. Pandya RN, Jhaveri KS, Vyas FI, Patel VJ. Prevalence, pattern and perceptions of self-medication in medical students. *International Journal of Basic & Clinical Pharmacology*. 2017;2(3):275-80.
25. Albawani SM, Hassan YB, Abd-Aziz N, Gnanasan S. Self-medication with antibiotics in Sana'a City, Yemen. *Tropical Journal of Pharmaceutical Research*. 2017;16(5):1195-9.
26. Aljaouni ME, Hafiz AA, Alalawi HH, Alahmadi G, AlKhawaja I. Self-medication practice among medical and non-medical students at Taibah University, Madinah, Saudi Arabia. *Int J Acad Sci Res*. 2015;3:54-65.
27. Albusalih FA, Naqvi AA, Ahmad R, Ahmad N. Prevalence of self-medication among students of pharmacy and medicine colleges of a public sector university in Dammam City, Saudi Arabia. *Pharmacy*. 2017;5(3):51.
28. Lukovic JA, Miletic V, Pekmezovic T, Trajkovic G, Ratkovic N, Aleksic D, et al. Self-medication practices and risk factors for self-medication among medical students in Belgrade, Serbia. *PloS one*. 2014;9(12):e114644.
29. Buke C, Hosgor-Limoncu M, Ermertcan S, Ciceklioglu M, Tuncel M, Köse T, et al. Irrational use of antibiotics among university students. *Journal of infection*. 2005;51(2):135-9.
30. Shah SSAM, Naqvi BS, Fatima M, Khaliq A, Sheikh AL, Baqar M. Quality of drug stores: Storage practices & Regulatory compliance in Karachi, Pakistan. *Pakistan journal of medical sciences*. 2016;32(5):1071.