ORIGINAL ARTICLE

A SURVEY ON HOUSEHOLD STORAGE OF MEDICINES IN PUNJAB, PAKISTAN

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Background: Household storage of medicines is a world-wide practice that triggers the irrational use of medicines and consequent threats. The purpose of this research is to explore sources of medicines availability, utilization and reasons of medicines storage in household. **Methods:** A community-based survey was performed on 900 households in five districts of Punjab, Pakistan from 1st February to 2nd March, 2016. Data was collected through employing a pretested questionnaire, the World Health Organization (WHO) operational package (for assessing, monitoring and evaluating country pharmaceutical situations Level IIb), and analysed by SPSS 23. **Results:** A mean of 2.94 medicines per household were observed in 900 households visited with 2,648 of total medicines found. Significant number of medicines was analgesics (58.6%) and antibiotics (12.97%). Out of total, 20.4% of household medicines were for current treatments**.** Left over medicines from past treatments were 8.7%, and 70.9% were anticipated for future use. Household medicines existed in the form of oral tablets, were 89%. Household medicines of 91.2%, were satisfactorily labelled in acute cases and majority were obtained from private pharmacies. Household medicines of 80% were acquired by respondents with post-graduation qualification and 61.2% of the medicines were obtained by respondents with no formal education and in both cases source of medicines was private pharmacies. While overall, 61.5% of respondents took medicines from the private pharmacy. In general, patients got 3.4% of medicines from the primary healthcare facilities. Adherence to medical treatment was very poor. In chronic cases 35.7% of patients left treatment when symptoms improved, while in acute cases 41.1% of the patients showed non-adherence to the treatment. Patients who knew about use of medicines were 92.32%. **Conclusions:** Maximum medicines stored were for the future use. The main source of medicines found in households was private pharmacies. Antibiotics and analgesic were in common in use. Patient's non-adherence to the treatment was one of the reasons of presence of medicines at home.

Keywords: Household medicines storage; Over the counter; Primary healthcare facility; Lady health visitor; Human Development Index

Citation: Hussain R, Rashidian A, hafeez A. A Survey on household storage of medicines in Punjab, Pakistan. J Ayub Med Coll Abbottabad 2019;31(1):90–7.

INTRODUCTION

Household storage of medicines with anticipation of use in acute, chronic, or emergency situations is a worldwide practice that triggers the irrational use of medication and associated risks.[1] Medicines are meant for the cure of the diseases but if not utilized properly can risk the health rather than treating the sickness.[2]

In Pakistan, primary healthcare facilities are underutilized, due to low availability of medicines. Most of the stored medicines are acquired from private pharmacies.[3] Therefore once patients bought medicines, they kept it at home for the future use. Furthermore, scarcity of knowledge regarding health and use of medicines contribute to household storage of medicines which in turns lead to health risks and waste of recourses.[4]

Generally, Pakistan has a very low literacy rate as compared to the neighbouring countries.[5] Literacy rate of a community has a significant influence on medicine dose adherence, storage and sharing of medicines with acquaintances (household members, friends, relatives).[4,6]

Improper use of antibiotics is also an alarming public health concern worldwide. It nurtures resistant microorganisms and yields undesirable sensitive reactions, lethal effects, and economic loss. This in turn conceals proper diagnosis and deferral of proper treatment.[7,8]

Easy availability of medicines at the private health facilities is also an adding factor for the piling up of medicines at home. In Pakistan, private pharmacies are vital source of acquiring medicines as there is slight check on buying medicine over the counter, ultimately one of the leading reasons of irrational use of medicines.[3] Advancement was noted in the delivery of healthcare services in Pakistan since 1947, but health indicators, as compared to

neighbouring countries, subsisted barely. In the process of devolution, after 18th Constitutional Amendment, healthcare delivery was transferred from federal to provincial government. Therefore, issues have arisen including the delivery of services in all departments and especially the division of health.[9]

The proposition of holding medication in households has not been completely measured in the greater parts of the world especially in developing nations.[10] Therefore facts behind the practice of household storage of medicines, its sources of availability and utilization have been explored through this study. Thus, it may be the avenue through which amends to the household storing practice of medicine and its irrational use can be brought about. The current survey enlightens the household storage of medicines in Punjab, Pakistan.

MATERIAL AND METHODS

A community based cross-sectional study was conducted on 900 households in five districts of Punjab, Pakistan from 1st February to 2nd March 2016 in five districts (Rawalpindi, Gujranwala, Rajanpur, Muzaffargarh, Bahawalnagar) of Punjab, Pakistan. There are four provinces of Pakistan; Baluchistan, Khyber Pakhtunkhwa, Punjab, and Sindh. These districts in provinces are divided into low, medium, high, according to Quantifying sub-national human development indices from household survey data, 2016. Districts were selected via convenience sampling; one district from each of the existing categories and two were randomly selected.

A sample size of 900 households was taken in accordance to World Health Organization's (WHO) Operational Package for Assessing, Monitoring and Evaluating Country Pharmaceutical Situations IIb. Data was checked for completion under the supervision of author and then entered. It was analysed by SPSS 23. The sample consisted of a reference of 30 households per primary healthcare facility. These households were selected through random sampling at three distances of <5 km, 5–10 km, and >15 km from the respective primary healthcare facility. In every third household from the two clusters in opposite directions around health facility, information was gathered from the respondent who was head of the family, main decision maker and earner of the household, and willing to respond to the questionnaire after the verbal consent.

The current study explores the reasons of storage, i.e., sources of availability and utilization of medicines storage in the household by using questionnaire, the WHO Operational Package for Assessing, Monitoring and Evaluating Country Pharmaceutical Situations Level IIb.

It is imperative to choose community of households, which are rationally illustrative of the geographic regions considered, directive to attain study assessments that are near to factual populace standards. Table.1, lists the five districts with their HDI level in Punjab. Primary healthcare level is very important in the national tier of public health care, which is located in rural areas and caters the healthcare needs of rural patients.

Using a structured questionnaire, five trained health workers collected data from households regarding the source and use of present medications. Lady health visitors are attached with the primary healthcare facilities to provide health awareness door to door regarding family planning, diarrhoea and malaria. As she was familiar with the community, her services were acquired to approach heads of households to introduce them to information collectors.

Questionnaires were customized in consideration to the local culture and geographic region of Pakistan. It was translated forward in National language 'Urdu' (It is also considered as an official language for paperwork, otherwise Punjabi is spoken as a local language) and backward in English by expert translators. Previous similar studies suggest that guidelines for information that was used in the validation of the study questionnaire, i.e., Sudan.[4] It included I) demographic data concerning sex, age, number, of members of household, marital status, employment, education, income, profession; II) health problems or sicknesses present in the household in the last three months; III) medications currently present at home; IV) name, source, preparation, prescriber, of medications including the reason for taking and storing at home; condition of label and amount retained; V) travel time (distance) to the source of acquisition of the medicines; VI) information regarding the utilization of medications.

RESULTS

Of the total population visited (5024), 47.7% were female. The average family size was 5.6 with a 56% of households having at least five family members. 42.8% of the households had children <5 years of the age. Out of 900 households visited, 26.8% were farmers, 19.7% were self-employed business owners, and 19.6% were non-agricultural laborers. Illiterate were 20.4%, 16.7% had primary school education, and 8.2% had a secondary school (high school) education. Out of total males, (18.2%) completed graduation and (8.3%)

completed their post-graduation education. Distribution of socio-demographic characteristics of the households is shown in table-2.

The storage of medicines was found 100% in total (900) of household visited. The mean number of medicines found per household was 2.94. For the ongoing treatments only 20.4% (540/900) medicines were stored, 8.7% (230/900) were left from the past treatment, and 70.9% (1878/900) were anticipated for the future use mentioned in figure-1

70.9% of the medicines stored were with the anticipation of future use. The finding was investigated to understand whether the underlying reason related to education. It was found 20% of heads-of-household with no formal education stored medicines,14% stored for future use, 1.5% had medicines left over from previous treatments and 4.5% had medicines currently in use. This proportion was lower among those with higher levels of education. A staggering 1.1% of households with the head member having a post-graduation education kept 2.2% of medicines for future need as shown in table-3.

Private pharmacies were the main source of obtaining medicine. Medications bought from private pharmacies were 61.5%. Communities living at distance <5 km, obtained 56.1% of their medications from private pharmacies, 28% from medicine sellers (medicine store without pharmacist), 8.6% from primary healthcare facilities and public hospitals, and 2.3% from traditional healers or other sources. Communities living within 5–10 km of the primary healthcare facilities obtained 64% of medicines from the private pharmacies, 25% from medicine sellers, 4.7% from the primary healthcare facilities and public hospitals, and 2.3% from traditional healers or other sources. Those living more than 15 km away got 64.4% of medications from the private pharmacies, 27.3% from medicine sellers, 6.3% from the primary healthcare facilities and public hospitals as mentioned in figure-2.

In general, 61.9% of respondents held the opinion that their primary healthcare facility was easily accessible. Respondents of 69.7% with primary healthcare facilities <5 km away regarded the facility was easily accessible, 21.7% between 5–10 km, and only 8.6% >15km away regarded this to be the case. Respondents of 42.8% said that medicinal needs were fulfilled. Respondents of 42.7% opinioned that the health care facility closest to their household had medicines they required. Respondents of 73.6% agreed that private pharmacies closest to their household usually fulfilled their medicinal needs. As the distance between health facility and community increased, less people regarded their medicinal needs as being fulfilled. The largest percentage of households obtained their medications from private pharmacies as shown in table-4.

Adherence to medical treatment was very poor. In chronic cases 35.7% of patients left treatment when symptoms improved, while in acute cases 41.1% of the patients showed non-adherence to the treatment.

Of the medications found in the household, antibacterial were 12.9%, analgesics were 58.6%, other frequently occurring medications were respiratory tract medicines in 7.52%, gastrointestinal tract medicines were 5.85%, anti-diabetics were 1.62%, anti-histamines were 1.51%, vitamins were 2.53% and supplements were 1.06% shown in table-5.

In the current study, all 900(100%) households were found with stored medicines. Household within 5 km distance, were found with 52.3% stored medicines, 28.4% in households at 5–10 km and 19.2% at 15 km away, as shown in figure-3.

Different independent variables, sex, age, education, occupation, and reasons for storing medicines were analysed at the access. Outcome variable was divided into <5 km and >5 km through a logistical regression at 95% confidence intervals to check the significance. Age and primary education (some primary, completed primary, completed secondary, completed college) were the predictors of access. Sex was not a predictor of access. And in occupation, teachers and farmers were predictors of binary variable, access as given in table-6.

Table-1: Punjab districts on Human Development Index, Primary healthcare facilities including total households sampled from districts of Rawalpindi, Bahawalnagar, Gujranwala, Muzaffargarh, and Rajanpur.

District name	HDI	Sub-national level HDI based on household survey in Punjab	Total no. of Primary healthcare facilities	Primary healthcare facilities selected	Households sampled		
					<5 km	5–10 km	> 15 km
Rawalpindi	0.646	Highest	108	6	10	10	10
Bahawalnagar	0.478	Medium	82	6	10	10	10
Gujranwala	0.604	Highest	97	6	10	10	10
Muzaffar Garh	0.427	low	84	6	10	10	10
Rajanpur	0.425	low	38	6	10	10	10

Table-2: Socio-demographic profile shows the distribution of socio-demographic characteristics of the households visited.

Characteristics	**Distance from reference Facilities**			
	All	<5 km	5–10 km	>15 km
No of households	900	300	300	300
Average household size	5.58	5.7	5.57	5.46
Percentage of household with children under 5 years	42.8%	46.7%	41.3%	40.3%
Average number of children under five year per household with children	0.42	0.46	0.41	0.40
Total population	5024	1714	1671	1639
Females	47.7%	49.14%	46.5%	47.34%
Children (5–14 years)	385	140	124	121
Percentage of households where someone earns money	95.8%	34.1%	33.1%	32.8%
Occupation of member earning money:				
Farmer	26.8%	20.0%	27.7%	32.7%
Teacher	0.6%	0.3%	1.0%	0.3%
Artisan	1.6%	1.0%	1.7%	2.0%
Office Worker	0.6%	0.7%	0.3%	0.7%
Civil Servant	7.8%	6.3%	10.3%	6.7%
Housewives	3.7%	2.0%	4.0 %	5.0%
Agricultural labour	2.7%	3.0%	2.7%	2.3%
Non-Agricultural labour	19.6%	27.7%	16.3%	14.7%
Self-Employed / Own Business	19.7%	22.0%	16.0%	21.0%
Students / Pupil	0.7%	0.7%	1.0%	0.3%
Unemployed	8.0%	7.3%	10.0%	6.7%
Not a Labour Force / Retired	0.4%	0.7%	0.3%	0.3%
Other	8.1%	8.3%	8.7%	7.3%

Table-3: Relationship between education and medicines storage found in home

Count		Medicines found in home			Total
		Current Treatment	Left from Past Treatment	Anticipate Future Need	
Education	No Formal Schooling	41 (4.5%)	14 (1.5%)	130 (14%)	185 (20.5%)
	Some Primary	14 (1.5%)	4 (0.4%)	53 (5.3%)	71 (7.8%)
	Completed Primary	26 (2.8%)	13 (1.4%)	111 (12.3%)	150 (16.6%)
	Completed Secondary	12 (1.3%)	16 (1.7%)	44 (4.8%)	72 (8%)
	Completed High School or Equivalent	(4.5%)41	(1.7%)16	(11.5%)104	(17.8%)161
	Completed College / Pre-University / University	11 (1.2%)	6 (0.6%)	47 (5.2%)	64 (7.1%)
	Completed Post Graduate	5 (0.5%)	5 (0.5%)	10 (1.1%)	20 (2.2%)
	Others	34 (12%)	4 (0.4%)	139 (15.4%)	177 (19.6%)
Total		184 (20.4%)	78 (8.6%)	638 (70.8%)	900 (100%)

Table-4: Views towards availability of medicines

Distance from Reference Facility					
Opinion		**All**	**<5 km**	**5–10 km**	**>15 km**
Number of Respondent		900	300	300	300
The Public Health Care Facility Closest to my household is easy to reach	Agree	61.9%	69.7%	21.7%	8.6%
My household would use public health care facilities more if opening hours were convenient.	Agree	75.4%	55.2%	27.5%	17.2%
The public health care facility closest to my household usually has the medicines we need.	Agree	42.7%	72.2%	23.1%	4.7%
The private pharmacy closest to my household usually has the medicines my household needs.	Agree	73.6%	58.4%	28.8%	12.8%

Table-5: Most frequent medicines according to system found in household

	%age	**Type of medicines found**	**%**
Antihistamines	1.51	GIT	5.85
Antibiotic	12.9	Herbal	1.06
Anti-diabetic	1.62	Analgesics/antipyretics	58.6
Anti-fibrinolytic	0.19	Respiratory Tract Medicines	7.52
Antifungal	0.04	Skin	0.76
Anti-gout	0.08	Steroid	0.19
Anti-worm	0.19	Vitamins/Minerals	2.53
ATT	0.19	Thyroid Treatment	0.11
CNS	0.68	Urinary Tract Medicines	0.23
CVS	1.89	Other	3.66
Eye Drops	0.26	Grand Total	100

Table-6: Predictors of medicine storage at households

Step 1[a]	Sig.	Exp(B)	95% C.I. for EXP(B)	
			Lower	Upper
B1_Q1(1) Sex	.486	.699	.255	1.913
C1_Q1Age	.006	1.017	1.005	1.030
E1_Q1Education	.030			
E1_Q1(2) some primary edu	.001	2.118	1.364	3.290
E1_Q1(3) completed primary edu	.007	2.244	1.246	4.039
E1_Q1(4) completed secondary	.008	1.883	1.176	3.017
E1_Q1(5) completed high school	.111	1.626	.894	2.956
E1_Q1(6) completed college /pre uni	.020	1.754	1.091	2.820
E1_Q1(7) completed post graduate	.457	1.269	.677	2.376
E1_Q1(8) others	.568	1.342	.488	3.692
F1_Q1 occupation	.002			
F1_Q1(2) teacher	.015	.476	.262	.866
F1_Q1(3) artisan	.999	.000	.000	.
F1_Q1(4) office worker	.223	.477	.145	1.571
F1_Q1(5) civil servant	.368	.420	.063	2.777
F1_Q1(6) housewife	.138	.577	.279	1.194
F1_Q1(7) health worker	.194	.447	.133	1.506
F1_Q1(8) agriculture labor	.843	.905	.339	2.415
F1_Q1(9)	.403	1.310	.696	2.465
F1_Q1(10) self employed	.920	.968	.515	1.820
F1_Q1(11) students	.997	.997	.172	5.775
F1_Q1(12) unemployed	.435	.759	.379	1.519
F1_Q1(13) retired	.365	.388	.050	3.009
Med1C_Q23 current treatment	.961			
Med1C_Q23(2) left from past treat	.815	1.043	.734	1.480
Med1C_Q23(3) (anticipate future use)	.907	.971	.589	1.600
Constant	.435	.588		

DISCUSSION

Information depicted by this study was very significant for the healthcare authorities, experts and primary living in rural areas especially due to facts related to existence of medicines in homes.

Medicines were found in all of the households visited. Stored medicines were either prescribed before but not taken, left over from the past treatment, for the current use, kept for future use or as a result of medicine exchange and respondents bought maximum number of medicines from private pharmacies.[6] And medicines at private pharmacies were comparatively expensive.[3]

People stored medicines for an easy access to be use at the time of sickness. This easy access to stocked medicines leads to its inappropriate use resulting in waste of resources, medicines related accidents like, error in administration, medicine poisoning and harmful side effects as a study done in Ethiopia.[11]

It was observed in this study that majority of respondents were male, and more likely to be responsible for presence of medicines in their households, as they were source of earning, main decision maker and responsible for the wellbeing of the household. In Uganda survey showed different culture, female respondents about two third were decision maker regarding health of the family and responsible for stored medicines at home.[10] Many related studies used corresponding methods of data collection. The change in the rates of household medicine storage could have been due to change of socio-economic aspects in different countries throughout the world. This might be the reason that a study done in Northern United Arab Emirates reported 40% of households visited had medicines, while in Barangay Talamban, Cebu City**,** 97.03% people stored medicines and in Uganda it was 35.1%.[10,12,13] But in current study households had highest (100%) storage of medicines than stated in similar studies done in a different country; 97.7% in Sudan, 94% in Iraq.[4,6]

The average number of medicines retained in every house was 2.94 with maximum households retaining between 1–9 medicines. This was comparable to the mean number of medicines kept in households in earlier studies completed elsewhere, Qatar 6 (4.1 standard deviation)[2], Saudi Arabia 6[14], Sudan 4.4[4], Uganda 6 (5 standard deviation)[10]. This outcome indicates improper medicine practice among health experts adding to poor medicines adherence among community.[3,11] Of all households visited, maximum number of medicines were stored for future use.

This finding was deeply investigated to know the underlying reason. For that respondent's education was analysed, it showed that the number of household storage of medicines went down as education was increasing. Households with postgraduate respondents were found with minimum number of medicines. Same results were shown by current treatment and for medicines left from past. It shows awareness regarding health utilization among the educated community people.[14] Education was considered a special tool which was strongly linked with the public health.[15] As in other studies, in Barangay Talamban, Cebu City, and in Uganda respondents described the purpose of storage as for present use, which shows the significance of health awareness.[10,16]

Respondents who informed to have consistent salary were about twice more prospective to retain medicines in their houses. As in Uganda, people with explicit regular income were twice likely to store medicines at home.[10] One of the main reasons of presence of medicines at home was noncompliance with medicines. Patients acquired medicines either from without prescription, or shared with other family members for whom medicine was not prescribed, not only resorted to irrational use which may add to medicine related health hazards but also showed social influence of acquaintances on the utilization of medicines by the individuals.[8,10,17]

Stored medicines became an easy access to inappropriate use. Therefore, prevalence of disease remained high in community.[4,18]

More than half of the respondents (61.9%) gave the opinion about the easy geographic access of the primary healthcare facility with 42.8% availability of medicines. As the distance between health facility and community increased less people opinioned about the availability of medicines of their need. It shows distance is the significant determinant and has negative impact on the utilization of the healthcare facilities and that might be the reason of acquiring non-prescribed medicines and their inappropriate use.[9,19]

Maximum households with stored medicines bought them from private pharmacies, that practice was not much changed in last few years in which 78.08% of the people spend money on private services for their health needs.[9] Less than one fourth of the people avail public healthcare which was free of cost, due to low availability of medicines and was one of the reasons of dissatisfaction among the community on use of public healthcare.[3]

Use of analgesics-antipyretics in pain and fever was considered as a first line treatment especially when they are not prescribed primarily by health professional and are easily available over the counter from private pharmacies, were one of the most commonly found household stored group of medicine.[1,20,21] Second most frequently occurring stored medicine by households was antibiotic. Inappropriate use of which exacerbate medicine resistance along with side effects, economic loss with persistence sickness and waste of resources.[7,22] A study done in Bahir Dar city, Ethiopia associated the irrational use of antibiotics with multiple factors, of which low literacy rate and lack of health awareness were important to mention.[23]

Medicine preparation in tablet or in capsules forms were maximum (88.9%) found medicines retained in homes in cases of acute illnesses, and was comparable with same study conducted in Northern Uganda. The major reason behind this could be due to their effortlessness usage by community people as a self-medication.[4,20,24]

The primary packaging and labelling were found satisfactory in household medicines as maximum number of medicines were bought from private pharmacies. A study done in Tigray Region, Northern Ethiopia, stated that about two third of medicines got from health centres and hospitals, rest from the private pharmacies and little from acquaintances but more than half were not proper labelled.[11]

In the current study, there were a slight proportion of medicines either left from the past treatment or are in excess in houses. Nevertheless leftover medicines should be dropped back to healthcare facilities for appropriate discarding. Inappropriate discarding methods of medicines such as sharing the undesired, retained or 'left over' medicines with other ill household person or disposing off in dumping areas as established in the some studies could risk the surrounding atmosphere in addition to endorsing inappropriate use of medicines in the community.[2,12,25] The difference in results could be due to difference in healthcare provision system and different data collection technique in different countries.

There should be health awareness programs in primary healthcare centres for community on hazards related to household storage and inappropriate usage of medicine along with laws and regulations to check the availability of medicines over the counter in order to resolve the issue of household storage and utilization of medicines. Heath care providers and end users (community) should be trained on rational use of medicines to avoid the risks caused by household storage of medicines. The community should be taught by health professionals periodically regarding use of medicines according to proper prescription, compliance with treatment, risks related to household storage and on disposal of medicines properly in community. It will be helpful in solving the problem of storing medicines at home and other related threats in Punjab, Pakistan.

Before the commencement of the research taking permission from the concerned authorities was a big challenge. While conducting this study, time limit and exceeding budget were the main constrains. To approach respondents according to their time of availability was another time-consuming hurdle but with the help of trained collectors it was overcome. Despite these restrains there were also people who were helpful in making this study possible in time.

CONCLUSION

In community of Punjab, Pakistan all of households visited, stored medicines with analgesics and antibiotics being the most common and were frequently in use. Adherence to treatment was not appropriate. Patients knowledge about the use of medicines was not adequate. Complete treatment, regular source of income, adherence to medicines and male respondents estimate the

household storage of medicines. The main source for getting medicines was private pharmacies and private medicine stores. Results of this study will help to unfold and address the facts behind the household storage of medicines in order to improve the general health of the community.

Ethical Approval and Consent to Participate:

According to University and home country Pakistan requirements ethical approval was given by Tehran University of Medical Sciences "Ethical Committee" Ethical Approval Code: IR, TUMS, REC,1395, 2564

i. Permission from Department of Primary and Secondary Health Punjab, Pakistan

(Punjab Health Department Lahore, Pakistan)

It was taken as data collection was in Punjab, Pakistan, therefore this department was authorized to give permission for data collection.

ii. In addition permission for approaching Health facilities and households for information in each district was taken locally by District Police Officer of each district, according to the local protocol for data collection.

iii. Consent to participate under the 'Ethics, consent and permission, was taken verbally from participants one reason was low literacy rate (which was 58% in Punjab). In rural area it even more low and secondly those who were literate in rural areas, were very conservative and were reluctant to sign any paper. Then it was discussed with the local advisor of PhD Program in Pakistan who gave permission for verbal consent.

As mentioned above, study didn't involve the patients personal health related outcomes instead general questions were asked about access to and use of medicines NOT the health outcomes. Considering conservative circumstances and low literacy rate, verbal permission was taken from the participants.

Consent to Publish:

This study involves human general information NO health outcomes, videos, images or pictures or recording was included. So not applicable here.

Data/ Information concerning patients was kept secret and was erased after structuring code and entering.

Availability of data and material

DATA was available as a supplementary file with the Manuscript

Competing interest

I Confirm that I have read BioMed Central's guidance on the competing interests and have included a statement in the manuscript indicating that none of the authors have any competing interests.

Funding

As corresponding author was a PhD student, and this study was self-sponsored and a part of academic program, conducted in a low-income country Pakistan**.** Therefore, author received WAIVER from the respected Editor in Chief.

AUTHORS' CONTRIBUTION

AR: Helped in framing and organizing the study, data correction. AH: Advisor and helped in editing and writing concise.

Acknowledgements

The authors are very obliged to all those who have contributed in the study and spare their precious time for its completion.

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Submitted: 14 July, 2017	*Revised: 26 April, 2018*	*Accepted: 18 June, 2018*

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