ORIGINAL ARTICLE

AVAILABILITY AND STORAGE CONDITIONS OF ESSENTIAL MEDICINES AT PRIMARY HEALTHCARE FACILITIES IN PUNJAB, PAKISTAN

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Background: Availability of essential medicines is one of the most important universal human right. For one third of the world, unavailability of essential medicines remains a major problem. The objective of this study is to authenticate the availability of essential medicines along with the storage conditions at primary healthcare level, district central warehouses and private pharmacies in the rural areas. **Method:** A community based cross-sectional survey was conducted in five districts of Punjab, Pakistan. Data was collected retrospectively and prospectively, by World Health Organization (WHO) tool, Operational Package for Assessing, Monitoring and Evaluating Country Pharmaceutical Situations. **Results:** On an average availability of essential medicines in primary healthcare, private pharmacies, and warehouses were 90.32±1.78 (SD), 82.83±2.75 (SD) and 96±0.83 (SD), respectively. Stock out duration of essential medicines in primary healthcare and district central warehouses were 11.56±4.08 (SD) and 10.24±5.95 (SD) respectively. Expired medicines were not found. Storage conditions of medicines in store room in PHC, private pharmacies and district central warehouses were 75.76±1.53(SD), 73.33±2.16 (SD), and 82.0±2.48 (SD) respectively. Storage conditions of dispensing room in PHC and private pharmacies were 66.06±2.52 (SD) and 39.65±4.25 (SD) respectively. **Conclusion:** Availability of essential medicines was below WHO standards. Medicines were found to be stocked out. No expired medicine was found on shelves. Storage conditions of medicines were poor.

Keywords: Primary healthcare facilities; Private pharmacies; Conservation conditions; Essential medicines list; World Health Organization

Citation: Hussain R, Rshidian A, Hafeez A, Sakha MA, Mustafvi H, Mirzaee N. Availability and storage conditions of essential medicines at primary healthcare facilities in Punjab, Pakistan. J Ayub Med Coll Abbottabad 2021;33(Suppl. 1):763–8.

INTRODUCTION

The Alma-Ata declaration has delineated the eight important elements of PHC and availability of essential medicines is one of them.[1] Essential medicines gratify the necessary health care requirements of a population and their continuous provision and affordability is imperative for the healthcare.[2] In Pakistan, primary healthcare services were recognized and started in 1980s, aimed to offer free essential medicines, treatment of basic illness and adequate health education of the community, but still Pakistan is far behind in health indicators if compared with other neighbouring countries due to inappropriate use of Primary healthcare services.[3]

Nearly one third of the world population lack access to essential medicines. In Africa and Asia, there are countries belonging to very low-income groups where more than half of the population has no standard access to essential medicines.[4]

Limited provision of essential medicines is a setback for the management of illnesses that mainly influence the developing countries.[5] Pakistan is the 6th most heavily populated nation with annual growth rate of 1.91% and a total population of 191.71 million.[6] Majority of the people (63%) live in rural areas; growth rate per annum of urban areas is 3.1% with 37% of overall people residing in urban part till 2015.[6]

In Pakistan, public and private divisions contribute about 9.31per capita and 24.80 per capita US $ respectively.[7] The public expenditure is relatively lower than the worldwide commendation of US $ 60 per capita.[8]

Public healthcare in Pakistan, so far is underutilized due to unsatisfactory attention on prevention and promotion of health, disproportionate integration of organizations, political intervention and insufficient human resource.[9,10]

The underutilization of primary healthcare in Pakistan is disappointing as a result of limited health awareness, inadequate availability of drugs and lack of education in rural regions.[11] In Pakistan Pharmaceutical sector is managed by the Drug Act of 1976 which offers a comprehensive detail regarding healthcare facilities but no attention is focused on

collection of statistics neither from patients nor from private hospitals or healthcare institutes excluding Provincial Heath Department.[12]

The act covers broad state of affairs on licensing in pharmaceutical industry, registering procedure for medicines and quality controlling etc. These matters cover the quality regulation, pricing and intellectual property rights (IPR), by Drug Regulatory Authority of Pakistan (DRAP) which was formed under the DRAP Act of 2012 and assists in organizing and implementing the Drug act of 1976.[13] The requirements for the medicines up to 70% are met by local production and remaining 30% through imports.[14]

This paper explores the availability and storage conditions of medicines to facilitate the access to essential medicines for the community.

MATERIAL AND METHODS

Data was collected in five districts Rawalpindi, Gujranwala, Rajanpur, Muzaffargarh and Bahawalnagar of Punjab, Pakistan. The Province of Punjab has an area of 205,345 sq. kilometers, giving an average population density of 359 persons per square kilometer. The estimated population of Punjab is 110.012442 million. Data was collected from 1st February, to 2nd March, 2016.

It is a community based cross-sectional survey conducted in five districts of Punjab, Pakistan, selected on the basis of human development index (HDI) Pakistan (Quantifying sub-national Human Development indices from household survey) 2016. Rawalpindi from very high HDI, Rajanpur from low and three, Gujranwala, Muzaffargarh and Bahawalnagar were selected randomly from province of Punjab, Pakistan. WHO operational package for assessing, monitoring and evaluating the pharmaceutical situation in countries was used as a guiding tool with some modification on the data collection forms to include medicines that are selected on the basis of their importance in treating major health problems in the country. To make list of key medicines, selection of medicines was made according to frequently occurring diseases in rural areas. Primary healthcare centers were selected in five districts of Punjab. In each of the five identified areas, six primary health facilities with six private pharmacies and one district central warehouse were chosen.

Sampling was conducted taking into consideration primary healthcare facilities. Five districts were selected according to criteria mentioned above. A community based cross-sectional study was conducted 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. The districts in provinces are divided into low, medium and high, according to Quantifying sub-national human development indices from household survey data, 2016.[15] One district was selected among high category of HDI districts of Punjab, one from low performing HDI and three were randomly selected. In each of the selected district six primary healthcare facilities, one district central warehouses. and six private pharmacies were selected randomly.

Indicators measuring percentage of availability of essential medicines, storage conditions of store and dispensing room, percentage of expired medicines and stock-out duration for essential medicines were collected from the selected primary healthcare centers and private pharmacies and district central warehouse.

In current study a modified WHO medicines list was used. Essential Medicines for treating frequently occurring diseases in rural areas were selected to make key list of essential medicines.

Before conducting survey, permission was taken from the Punjab Department of Health and the from District Police Officer of each district. The survey was carried out at primary health facility. central district warehouses and private pharmacies. Data was collected by five teams, each of five data collectors, were trained on the conducting survey on WHO operational package for assessing, monitoring and evaluating country pharmaceutical situation.

Data entry and analysis took place once each data collection form was reviewed for clarity and completeness using SPSS version 23 and Microsoft Excel. Twenty key essential medicines to treat the common health problems in Pakistan were surveyed to identify their physical availability, duration of stock-out and storage conditions in the store room and dispensing area. The availability percentage was measured by counting the number of medicines available out of the total sampled on the list at each facility level (Primary healthcare facility, private pharmacy and district central warehouse) divided by the number of medicines in the list and then multiplied by 100 to find the percentage of availability at the indicated facility. The national indicator for availability for example, at primary healthcare facilities were calculated as the sum of percentages of medicines available for all public health facilities surveyed, divided by the number of health facilities sampled. The same rule of calculation was applied for district central warehouse and private pharmacy sector to identify the percentage of availability.

Stock-out duration was calculated retrospectively from the stock registers that indicated

which medicines have records covering at least 6 months within the previous 12 months. The total number of medicines with records were calculated. The percentages of medicines with adequate records were calculated by dividing the number of medicines with records covering at least 6 months by the total number of medicines and multiplied by 100.

A medicine was considered in stock if it was available in generic or branded form. The number of days out of stock and actually reviewed period for each medicine was indicated. The number of stock-out days per year for each medicine was calculated by multiplying the number of days medicine was out of stock with 365 and dividing by the number of days covered by the review period. The total number of stock-out days per year was computed. The average number of stocks out days was finally calculated by dividing the total number of stock-out days by the total number of medicines reviewed. Adequate storage conditions and handling of medicines in store room and dispensing area were assessed by checklist comprising of ten points regarding the temperature control, presence of ventilator, windows, moisture, cold storage facility, shelves of medicines, pests, handling of medicines with gloves or without gloves and arrangement of medicines. All parts of the statement which are true for the storeroom are taken. Then sum of the total number of true statements are calculated by dividing the sum of true statements by 10 and multiplying by 100. Same procedure is repeated for assessing the storage conditions and handling of dispensing room. All parts of the statement which are true for the dispensing room are taken. Then sum of the total number of true statements are calculated by dividing the sum of true statements by 10 and multiplying by 100.

RESULTS

On an average the availability of essential medicines in Primary healthcare, Private pharmacies and Warehouses were 90.32±1.78 (SD), 82.83±2.75 (SD) and 96±0.83 (SD), respectively. Availability of key (essential medicines) in Primary healthcare facilities of Rawalpindi was 92.5%, in Bahawalnagar was 95.83%, Muzaffargarh was 85.83%, Gujranwala was 94.15% and in Rajanpur was 83.33%.

In private pharmacies the availability of essential medicines in Rawalpindi was 93.3%, in Bahawalnagar was 86.67%, in Muzaffargarh was 70.83%, in Gujranwala was 80.83% and in Rajanpur was 82.5%.

While in warehouses availability of essential medicines in Rawalpindi was 100%, in Bahawalnagar was 95%, in Muzaffargarh was 95%, in Gujranwala was 90%, and in Rajanpur was 100%.

Storage conditions of medicines in store room of Primary healthcare, Rawalpindi was 72.73%, in Bahawalnagar was 87.88%, in Muzaffargarh was 71.21%, in Gujranwala was 80.30%, and in Rajanpur was 65.15%. Storing conditions of medicines in dispensing area of Rawalpindi was 74.24%, in Bahawalnagar was 78.79%, in Muzaffargarh was 36.6%, in Gujranwala was 75.76% and in Rajanpur was 65.15%.

In Ware houses conservation storage conditions of store room in Rawalpindi were 40%, in Bahawalnagar were 100%, in Gujranwala were 100%, in Rajanpur were 90%. Medicines Record for 6 months was available in all Primary healthcare facilities. Expired medicines were not found.

Stock out duration of essential medicines in Primary healthcare and Warehouses were 11.56±4.08 (SD), 10.24±5.95 (SD). In Primary healthcare in Rawalpindi stock out duration was 23 days, in Bahawalnagar was 15 days, Muzaffargarh was 12 days, in Gujranwala was no stock out found and in Rajanpur was 6 days. Stock out duration in Private pharmacies of Rawalpindi were 23.82 days, in Bahawalnagar was 15.05%, in Muzaffargarh was 12.48 days, in Gujranwala was zero days, and in Rajanpur was 6.47days.

In Ware houses stock out days were 23.82 in Rawalpindi, 15.05 in Bahawalnagar, 12.48 in the Muzaffargarh, in Gujranwala was no stock out period recorded in Rajanpur was 6.47days.

Storage conditions of medicines in store room in PHC, Private pharmacies and Warehouses were 75.76±1.53 (SD), 73.33±2.16(SD), 82.0±2.48(SD). and conservation condition in the dispensing room in PHC and Private pharmacies were 66.06±2.52 (SD), 39.65±4.25(SD) as mentioned in the table-3.

Table-1: Availability and storage quality indicators for core medicines in primary healthcare facilities

Indicators	Rawalpindi	Bahawalnagar	Muzaffargarh	Gujranwala	Rajanpur	Mean±SD
% Availability of key medicines	92.5	95.83	85.83	94.15	83.33	90.32±1.78
% of Expired medicines	0	0	0	0	0	0±0
Average stock out duration (Days)	23.82	15.05	12.48	0	6.47	11.56±4.08
Adequacy of Storage (%)						
Store room	72.73	87.88	71.21	80.30	66.67	75.76±1.53
Dispensing area	74.24	78.79	36.36	75.76	65.15	66.06±2.52

Table-2: Availability and storage quality indicators for core medicines in private health facilities

Indicators	Rawalpindi	Bahawalnagar	Muzaffargarh	Gujranwala	Rajanpur	Mean±SD
% Availability of key essential medicines	93.33	86.67	70.83	80.83	82.5	82.83±2.75
% of expired medicines	0	0	0	0	0	0±0
Adequacy of storage (%)						
Store room	87.88	75.76	62.12	78.79	62.12	73.33±2.16
Dispensing area	74.24	15.15	60.61	30.30	57.58	39.65±4.25

Table-3: Availability and storage quality indicators for core medicines in warehouses

Indicators	Rawalpindi	Bahawalnagar	Muzaffargarh	Gujranwala	Rajanpur	Mean±SD
% Availability of key medicines	100	95	95	90	100	96±0.83
% of expired medicines	0	0	0	0	0	0±0
Average stock out duration (Days)	13.38	15.20	0	11.02	11.58	10.24±5.95
% Conservation condition (Store room)	40	100	80	100	90	82.0±2.48

Table-4: Essential medicines available in public/ private/warehouse

Name of Medicines	Public Sector	Private Sector	Warehouse
Amoxicillin	100%	83.33%	100%
Antihistamine (Cetirizine)	100%	96.66%	100%
Chloroquine/ Artemether-Lumefantrine	100%	86.66%	100%
Ciprofloxacin	70%	93.33%	100%
Metronidazole	100%	100%	100%
Enalapril maleate/ Atenolol	63%	66.66%	100%
Ibuprofen, Paracetamol, Diclofenac	100%	96.66%	100%
Metformin	60%	73.33%	100%
Injections			
Dexamethasone	93.3%	60%	100%
Antihistamine (Pheniramine maleate)	100%	60%	100%
Dicloran	96.6%	93.33%	100%
Amoxicillin	96.6%	66.66%	100%
Paediatric Syrups / Medicines			
ORS and Zinc Sulphate	100%	96.66%	100%
Albendazole	100%	90.0%	100%
Amoxicillin	96.67%	93.33%	100%
Metronidazole	100%	100%	100%
Paracetamol	100%	100%	100%
Salbutamol Syrup/ Nebule	96.67%	86.66%	100%
Ciprofloxacin	63.3%	86.66%	100%
Anti-tuberculous drug availability	70%	23.33%	100%

DISCUSSION

The purpose behind this research was to assess essential medicines availability, stock-out duration and storage conditions of medicines in store rooms and dispensing area of primary health facilities, private pharmacies and district central warehouse. Even though provision of essential medicines is very significant objective of country drug policies, but the non-availability of essential drugs is still a dilemma.[16,17]

Provision of essential medicines free of cost for complete healthcare of community is a challenge. Because of unavailability of essential medicines, community suffer from economic devastation due to high out of pocket expenses.[18] The results prove the mean availability of essential medicines in the primary health facilities, private pharmacies and central district 90%, 82% and 96% respectively. Out of all districts studied, Muzaffargarh and Rajanpur were with low availability of essential medicines at the Primary Healthcare level. Medicines for the diabetes, hypertension and ciprofloxacin were not available generally in all primary healthcare facilities although they were adequate in the central district warehouses. Though maximum disease burden in underdeveloped and developing countries is caused by chronic diseases.[19] In Pakistan there is a gradual shift of disease burden from infectious diseases to the non-communicable diseases.[20] So unavailability of essential medicines for chronic diseases can trigger the high prevalence of cases of diabetes and hypertension in the community. Rest of districts had acceptable level of availability of essential medicines.

There was low availability of essential medicines at private pharmacies as they were less in price as compared to the branded drugs, this is in contrast to other studies conducted in Uganda a developing country.[21] In district central ware houses, there were high availability of essential medicines as there is very strict legislation by government about the availability of good quality essential medicines to be supplied to public healthcare facilities at the time

of demand[22], Availability of essential medicines is a significant part of the Primary Healthcare Services and this concept is taken from Alma-Ata Declaration in 1978[23].

None of the available medicines at primary healthcare, private pharmacies and district central warehouses were found to be expired as it is again due to the strict enforcement of the law and random inspection by the health teams, Provincial Quality Control Board (PQCB) in Punjab. Government of the Punjab has established PQCB u/s 11 of the Drugs Act 1976, to ensure availability of quality drugs to the general public and for effectively inhibiting its violations through prosecution of defaulters in the Court of Law.[24] Record keeping of the medicines was found to be up to mark and accurate as there are Monitoring& Evaluation Assistants appointed for improving the Primary healthcare for the people which is a vital component of "Implementation & Monitoring Framework of Health Department".[25]

The survey found stock-out duration at primary healthcare facilities, private pharmacies and ware houses was as short as one week to ten days on an average. Improved indicators in previous few years are as a result of facts caused by the Healthwatch and MEAs data which is used to shape suitable policies to deal with the bottlenecks.[26]

Storage conditions of medicines in the store rooms and in dispensing area were worrisome and in dire need for improvement. As storage conditions in primary healthcare facilities of Muzaffargarh, Rajanpur and Rawalpindi were worse considering the weather condition of the Punjab which has a high temperature in most of its region. Medicines show full efficiency and effect if its quality is maintained by the required conservative conditions during storing and dispensing of medicines.[27] Inadequately stored medicines bear hazard to the patient's healthiness. Threats are related to the lack of the curative effects and undesirable side effects as a result of pharmaceutical formulation, from high temperature, moisture, and/or dissolution caused by ultraviolet rays.[28] Hence appropriate storage and the preservation of medicines are fundamental factors for effectiveness.

CONCLUSION

On the whole availability of essential medicines at the selected PHC, private pharmacies and warehouses was not according to WHO standards. But low availability of essential medicines for the chronic diseases is alarming. as for low income and low middle-income countries there is a double burden of disease (high burden of Communicable as well as Non-Communicable Diseases), adding too much pressure for the government to undertake. Proper consideration should be given to storage conditions of medicines in store rooms and dispensing areas as medicines present benefits, but also health risks.

It should be high lightened that the quality and effectiveness of the medicine is associated with the preservation of its stability concerning storage conditions and dispensing. Poorly preserved medicines carry risks to the patient's health.

AUTHORS'CONTRIBUTIONS

AR: Directed to outline the content related to my research to write this paper like always. MR: In the perspective of healthcare Dr Radwan Mahmood guided me over indicator selection. SH: And I thanked fellow, Associate Professor for her worthy explanation on drafting this paper.

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Submitted: March 7, 2018	*Revised: January 12, 2020*	*Accepted: May 8, 2021*

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