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INFORMATION RESOURCES AVAILABLE AT COMMUNITY PHARMACIES IN OMAN

Saif Mohammed Al-Farsi [1], Hussain Abdullah Mubarak Al Rahbi [2] and Havagiray R. Chitme*[1]

Oman Medical College, Premedical and Pharmacy Campus Bousher, Azaiba, Muscat, P.O. Box: 620, Postal code: 130, Sultanate of Oman
Department of Out-Patient Pharmacy, Khoula Hospital [2], Muscat, Sultanate of Oman

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Correspondence to Author:

Dr. Havagiray R. Chitme

Oman Medical College, Premedical and Pharmacy Campus Bousher, Azaiba, Muscat, P.O. Box: 620, Postal code: 130, Sultanate of Oman

E-mail: hrchitme@gmail.com

ABSTRACT:

Background: Health care professionals, patients, public, patient caretakers, and other professionals prefer to ask their medication-related questions to community pharmacists as they are easily accessible to them. It is challenging for pharmacists to keep up the pace of medicine discovery and development and have better and effective information than the patients retrieve information independently.

Aim and objectives: *The aim* of this study was to identify information resources of medicine used by the community pharmacists in various parts of Oman to update the knowledge and provide updated and effective information to the patient and other medical professionals. *Other objectives* of this study were to know the most common primary, secondary, tertiary, web based and other information resources used by the community pharmacists**.**

Methods: Total of 71 community pharmacies in different parts of Oman were contacted personally. Pharmacists at the sample community pharmacies completed a self-administered questionnaire that consisted of six sections. First section presented demography of population for the study. Second section elicited type of sources of information the community pharmacists commonly refer. Third section elicited type of books available in community pharmacies. Fourth section was to know access to online databases. Fifth section was to know availability of scientific journals at community pharmacies. Last and the sixth section were to know whether they refer any websites as sources of information if any.

Results: All pharmacies had at least one reference but most were books. The Oman National Formulary (ONF) and British National Formulary (BNF) were the most commonly found (n=56, 79%). The first, second and third most commonly referred secondary sources of information by the community pharmacists includes medline, micromedex and Pharm-line respectively. 10% of community pharmacists had internet access and 13% of pharmacists getting drug information from journals.

Conclusion: There is a need to improve quality of information accessed and provided to patients and prescribers by referring appropriate information resources to minimize adverse consequences of medication therapies and also to improve the role that pharmacists can play in the health system in Oman.

INTRODUCTION: Community pharmacists are considered as health care professional specialized in medication related information [1]. In consideration of their knowledge and experience they frequently come across with questions from other health care professionals, patients, patient care taker and their families[2]. It is also due to the fact that they are easily accessible without appointment, faster, less expensive and convenient than the physicians[3]. Several challenges are being faced by the community pharmacists in everyday practice due to rapid advancement of information on medicines and the proliferation of new drugs

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launched in the market which has provided prescribers with a wide range of drug choices in therapeutic areas. Simultaneously some of them are withdrawn from market and/or discontinued. Another challenge faced by community pharmacists includes an increased public awareness on risks and benefits associated with the prescribed medication due to wider availability of internet and smart phones to retrieve information independently [2, 4-5].

Varieties of questions are asked to community pharmacists every day [6]. The most common questions are related to drug dose, administration, availability, adverse drug reactions, drug-drug interaction, toxicity, pharmacotherapy, the mechanism of action, contraindication, methods and route of administration [2, 7]. It is impossible for any community pharmacists to remember everything about drugs and that is why it is important for them to have up-to date relevant knowledge and easy access to evidence-based information on medications. Specially, they must know where to find drug information, how to evaluate them and how to apply them to specific patients [2, 5].

Failure to choose the best resources of information may compromise the quality of patient care resulting in unnecessary patient suffering and increased health care expenditure[1]. Failure to choose the best possible information resources and answer correctly a drug related questions may not only invite questions from patients, regulators, but also raise doubts about the pharmacist's professionalism [1]. There are also evidences which show that the level of provision of medication-related information has the potential to increase consumer patronage and loyalty to a community pharmacy [2, 8]. There are other studies indicated that the drug information provided by the community pharmacists are associated with greater patient satisfaction [1].

It is very essential for community pharmacists to stay abreast of current events in health care clinical guidelines, new therapeutic molecules and their indications either by attending professional national, international conferences, seminars, symposiums, workshops or from the information provided by pharmaceutical companies and its medical representatives. However, the variation in content, speakers, sponsors, and level of topics limit their usefulness and less reliable compared to other sources of information [2, 9-11].

Community pharmacists are efficiently looked upon to provide accurate, up to-date, reliable, unbiased or two sided information in the fast-paced environment of community pharmacy. Pharmacists therefore need access to comprehensive information sources on medication [12]. Generally, there are three categories of drug information [2]. Primary source of information includes research articles published in scientific journals they are the most up-to-date and cutting-edge.

Secondary sources of information include bibliographic indexing, and abstracting services they are useful for quick and selective screening of primary literature. Tertiary sources of information such as books, review articles, and monographs, are probably the most commonly used reference materials as they provide easy and convenient access to consistent information [13].

Availability and reference of those information resources by the community pharmacists will empower the pharmacists to provide efficient information about complicated question related to medicines thereby reducing the medication errors [14]. Many studies carried out in Jordan [15], Kuwait [14], Palestine [1], Saudi Arabia [16] and other countries [17] have found that the information resources are either unavailable or drug related enquiries were answered without consulting a reference sources. In some other studies the pharmacists working at community pharmacies were unable to answer the enquiries efficiently.

Situation on availability of these references at the community pharmacists in Oman is not well studied. In line with these studies, we hypothesize that the recommended information resources are either unavailable or may not be referred. The main purpose of the study was to know the type of information resources available at community pharmacies and their purpose of referring in Oman by conducting a questionnaire based cross sectional survey among community pharmacists.

Methods:

Study Design: This was a cross sectional survey carried out systemic randomly among community pharmacists in different parts of sultanate of Oman. Approximately, 150 survey questionnaires were hand delivered (more than 10%) to community pharmacists working in both independent and chain community pharmacies across different parts of Oman by the first author assisted by his colleagues during (March - May 2013). Those who did not return the questionnaires within 15 working days were regarded as non-respondents. Approximately, 120 survey questionnaires filled in were returned. In this study we considered only 71 questionnaires as they have mentioned as community pharmacist and those pharmacists mentioned as hospital (40) and clinical pharmacists (9) were excluded from the study.

Method of study: The survey questionnaire was developed based on pharmacy practice and scientific literature evaluation book. This six-section questionnaire assessed following major domains.

The first parts of the questionnaire were designed to obtain demographic data including gender, age, place of working, and specialization about the responding pharmacist.

The second part of the questionnaire was to know the information regarding source of information like, journals, textbooks, standard treatment guidelines, literature supplied by pharmaceutical companies, pharmaceutical company representatives and colleagues.

The third part of the questionnaire was focused on availability of textbooks and their purpose of reference.

The fourth part of the questionnaire was to know their access to online database at pharmacy and their purpose of reference.

The fifth part of the survey questionnaire was to know their access to journals and the preference of their reference.

The last section was to evaluate whether they have an access to internet and do they rely on it for information and also, to know whether they refer any specific websites for detailed information.

Questions were presented as yes or no options or open written questions. Questionnaire contains a list of well recognized reference books, database, and were asked to indicate which reference were readily available at the site of practice and referred to answer the enquiry.

Bioethics: Verbal consent to participate was provided by an individual pharmacist after the purpose of the study was explained by an investigator and confidentiality was assured.

Statistical analysis: The response to all questionnaire were coded, collected, stored and analyzed using Microsoft excel. Simple descriptive statistics were used to summarize respondent data.

RESULTS:

Demography of Respondents: Response rate to this survey questionnaire was 80% and the sample was 120. Out of which 40 considered themselves as hospital pharmacists and 9 considered themselves as clinical pharmacists. Seventy one respondents considered as community pharmacists and are the part of this study.

Twelve of them were from Muscat, ten of them were from Al Khoud, eight of them have not mentioned, six of them were from Mawaleh, five of them were from Sumail, four of them were from Al Khuwair and Ruwi each, three of them were from Yanqul, Musanna, Khasab, and Al Ghoubra each, two of them were from Nizwa, Barka, Khabourah, and Azaiba each (**Figure 1**).

59% of the respondents were in the age group of 24-34 years, 20% of them were 35-44 years and 10% of them have not mentioned their age. However, one of them was in 55-64 years age group (**Figure 2**). 77% of the community pharmacists considered in the study was male, 14% of them were female, and 9% of them have not mentioned (**Figure 3**).

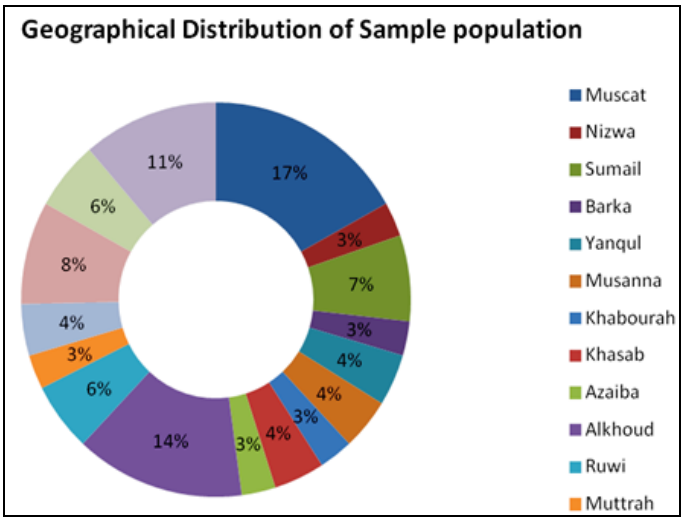

FIGURE 1:

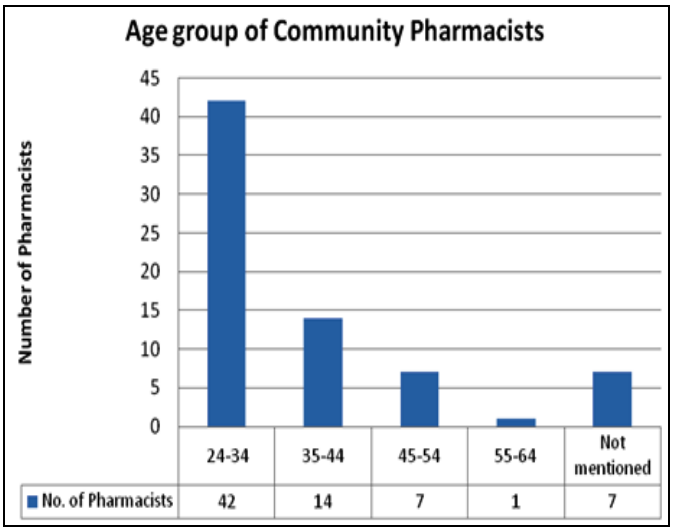

FIGURE 2

Information resources referred: The pharmaceutical information resources referred are shown in figure 4. No medical journals either in the paper print or E.print are referred by the respondents. Most of the community pharmacists preferred (90%) to refer standard books for the information. Whereas, the second most commonly preferred source of information along with BNF were colleagues and other healthcare professionals (89%). Pharmaceutical company representatives and pharmaceutical company literature were referred by 82 and 81percent of community pharmacists respectively. Least referred source of information includes the National standard treatment guidelines (66%) (**Figure 4**).

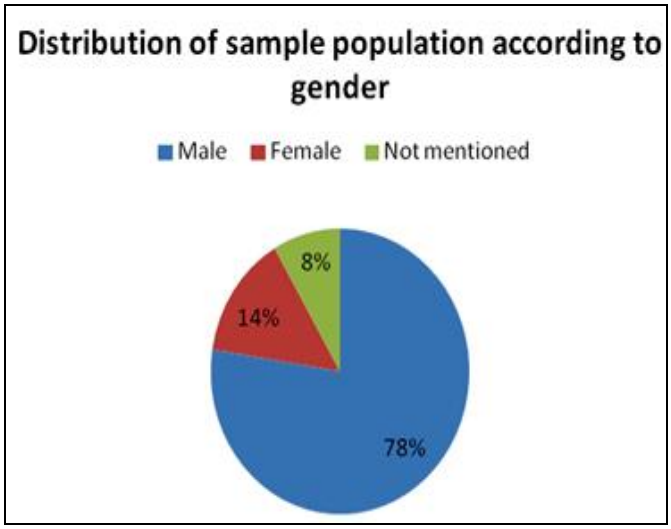

FIGURE 3

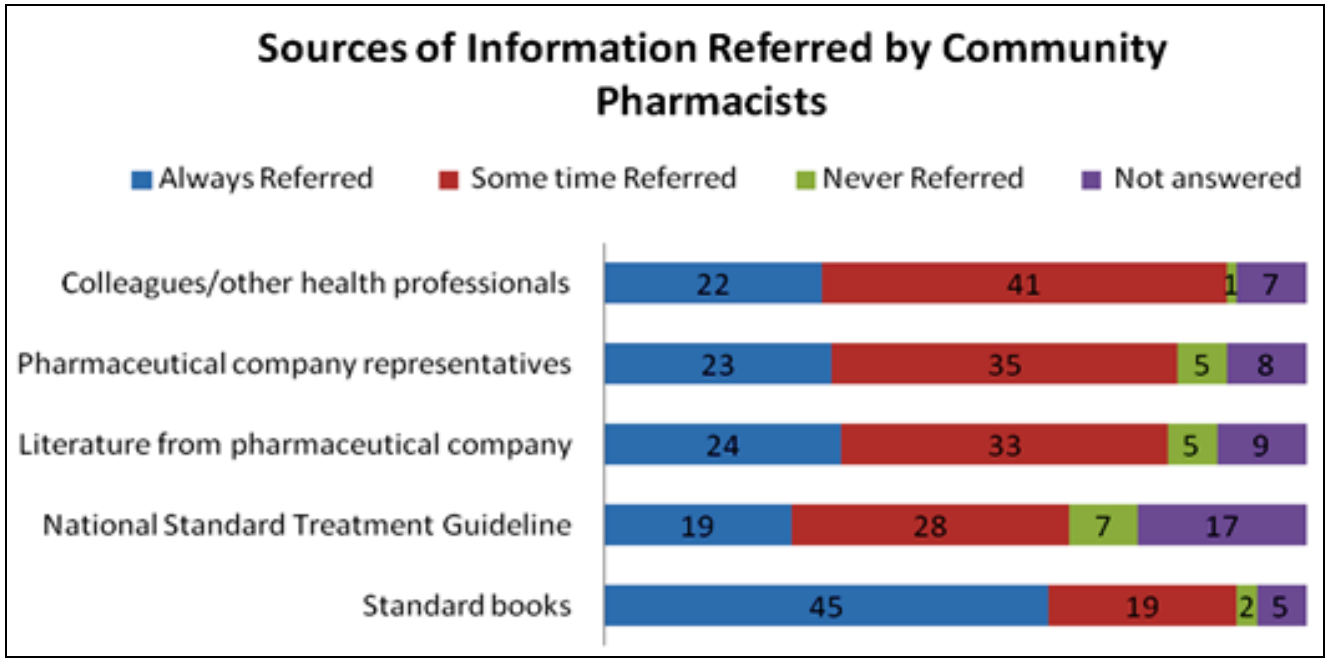

FIGURE 4

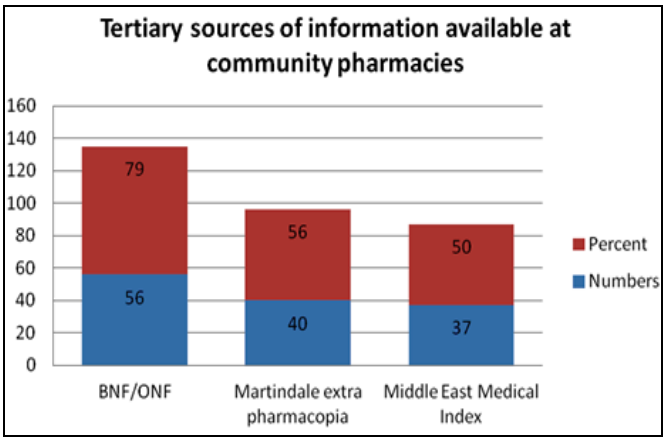

FIGURE 5

Secondary sources of information: The secondary sources of information which are also called as non-book and web information sources. Results of present study revealed that medline was the most commonly accessed by the community pharmacists for information followed by micromedex and pharm-line respectively. Medline and pre-medline were referred by 13 of the community pharmacists for information mainly related to adverse drug reactions, pharmacology, side effects, drug identification and therapeutics. Micromedex was referred by seven of the community pharmacists and was the second most commonly accessed online database for information focused on side effects, pharmacology, therapeutics, drug interaction, dosage, adverse effects and toxicology. An interested fact found in the study was that there was no internet connection in the community pharmacies and online data bases were assessed on their smart phones or at home. The rate of access of community pharmacists was very limited and calculated to be less than 20% (**Figure 6**).

Tertiary sources of information: A variety of sources were reported to be available at many community pharmacies. Most commonly available textbooks as source of information was found to be BNF\ ONF (79%), Martindale extra pharmacopeia (56%) and Middle east medical index was (50%) (**Figure 5**). Most of the respondents are using BNF and ONF to find the information on medicines including availability, stability and compatibility of medicines. Martindale was the second most common tertiary source of information used for all types of information. Middle East medical index was the third most common source of information used by community pharmacists for information on adverse effects, indications, availability, stability, compatibility, etc. Type of the textbooks referred to answer the enquiries and frequencies are summarized in **Table 1 and Figure 5**. It is important to note that 11 of the respondents have primary health guidelines as source of information.

TABLE 1: BOOKS REFERRED WITH RESPECT TO REQUIRED INFORMATION

Books	Adverse reaction	Availability	Compatibility/ Stability	Dosage	Drug interactions	Identification	Pharmacology	Toxicology	Side effect	Therapeutics	others
American drug index	5	2	3	6	4	1	5	4	3	4	2
ASHP Formulary Service /BNF/ONF	42	23	18	44	42	32	35	23	21	33	11
Blue book/Red book/internet	7	9	4	7	11	6	12	3	6	8	3
Drug facts and companies	6	8	3	10	5	8	9	4	6	6	1
Evaluation of drug interactions	4	2	5	5	6	5	4	3	4	4	1
Goodman and Gillman's Pharmacological Basis of therapeutics	7	4	1	5	4	3	8	6	6	7	1
Handbook of clinical drug data	5	2	1	5	4	4	2	5	4	6	3
Handbook of nonprescription drugs	3	4	1	6	6	3	5	3	4	6	2
Martindale extra pharmacopeia	24	19	13	27	24	18	21	17	26	23	9
Merck Index	6	7	6	8	7	8	6	6	5	8	4
Physician's Desk Reference	4	5	1	4	2	3	5	3	7	3	0
Remington's pharmaceutical series	4	3	4	4	6	3	4	2	3	3	0
USP vol-III: approved drug products and legal requirements/British Pharmacopeia III	4	3	2	4	4	2	4	3	4	4	1
MEMI	19	20	6	18	14	16	13	10	16	18	3
Others	Primary health care formulary										11

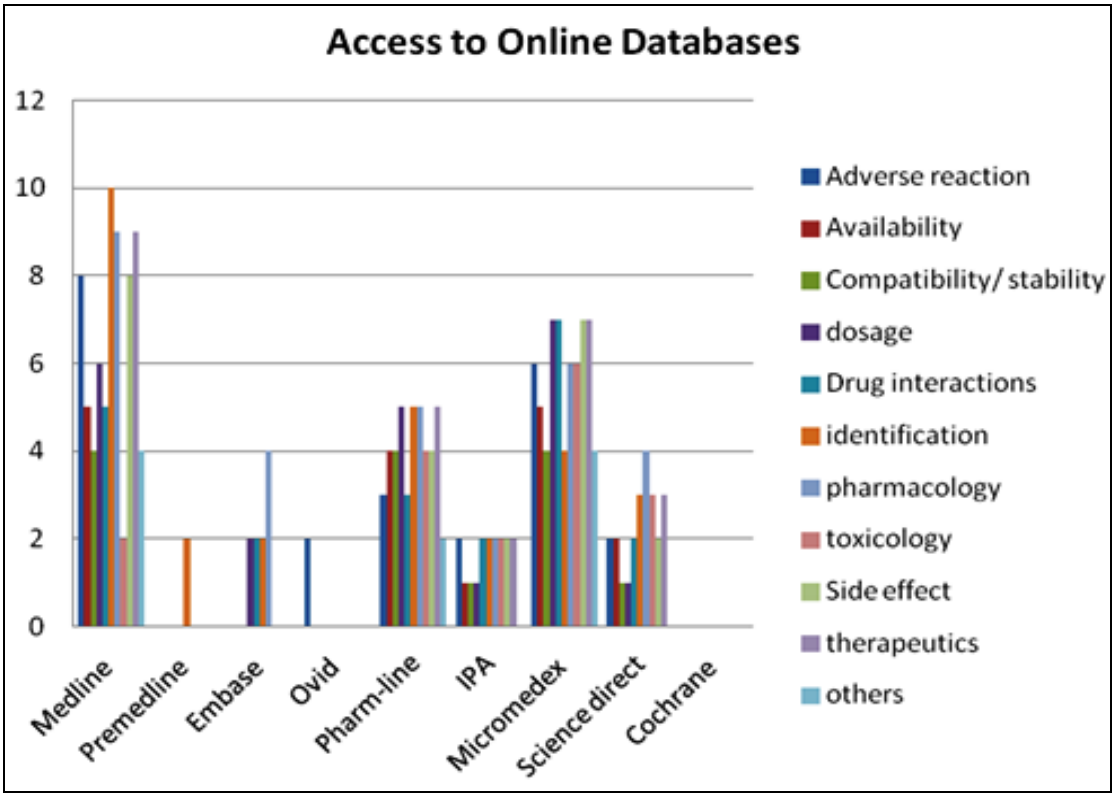

FIGURE 6

Primary sources of information: Research journals and scientific articles were available to 30% of the community pharmacist in Oman. 87% of the community pharmacists have said they don't have an access to research journals. Only 13% of pharmacists they refer scientific journals. During our visit to the community pharmacies we found the pharmacists having MOH newsletter. The frequency of its presence with pharmacists was not calculated in this study as it was not a part of questionnaire (**Figure 7**).

Web information sources: During visit to community pharmacies to distribute questionnaire we did not find internet facilities. Pharmacists were more dependent on their own smart phones, cyber cafes and facility at home. Commonly www.google.com (10%) meant for common public was referred by community pharmacists. However, 55% of the pharmacists don't refer the internet and web information. 35% of the community pharmacists they refer other websites (not specified) in providing the information (**Figure 8**).

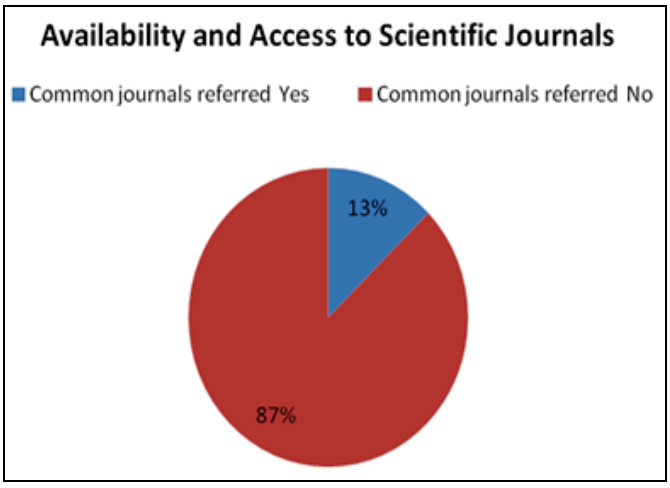

FIGURE 7

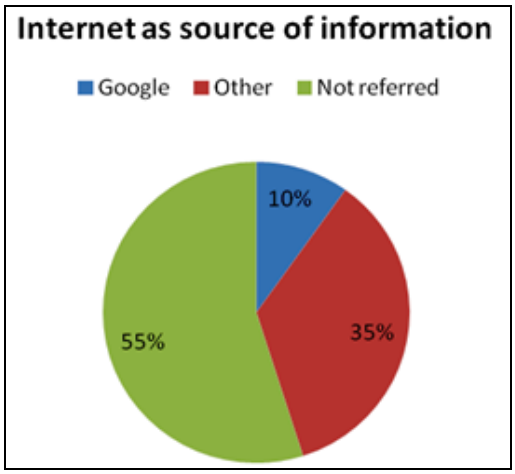

FIGURE 8

DISCUSSION: Pharmacists working in community are the first source of information on medicines for patients, patient family and health care professionals [18]. Results of present study indicated that the information resources British National Formulary, Oman National Formulary, Martindale extra pharmacopeia and Middle East Medical Index are commonly available in community pharmacies however; most of the editions were outdated. Although it is a preliminary study and the findings are based on information provided by 71 community pharmacies. The sources of information available at community pharmacists are similar to the studies reported from other countries like Kuwait, Saudi Arabia, Jordan and UAE [14-16]. Response rate in this study was 80% similar to the studies reported earlier and also better than other studies. This could probably attribute to hand delivering and collection of questionnaire in person [19].

This study has shown that community pharmacists possess a range of paper based resources, which can be used to handle medicine-related enquiries. It has been found that 76% of respondents have BNF and ONF, Martindale extra pharmacopeia was present with more than 56% of respondents, and 50% of them were also having Middle East Medicines Index but most of the pharmacists were found to have old editions. The Middle East Medicines Index is occasionally provided by pharmaceutical company representatives which contains limited information on selected products. Therefore, it may be of limited use [15]. Additionally, respondents may not to choose to have such specialist texts due to the nature of the majority of enquiries they field [20]. The nature of the enquiries generated from patients, parents and carers may be of a less technical or complex nature, thus negating the need for specialist texts [21].

Additionally, paper based information resources were supported in some pharmacies by access to information services and accessing the internet. Less than half of them have an access to online databases of which 39% of them were referring medline for further information on medications. It is also surprising to know that 46% of the respondents rely on internet as source of information. However, there is no internet connection in community pharmacies. The online databases and internet are referred to answer the questions either by using their smart phones, or internet connection at home. The lack of internet could be a result of pharmacies being run by 1252 expatriate pharmacists rather than the owner. These pharmacists are likely to rely on the owner to provide information resources rather than supply their own [14].

Most of respondents always prefer to refer standard text books to provide information and sometime they prefer to ask their colleagues. Probably, the fact they are readily available at pharmacy and easy to refer. It could also because the questions referred may be simple and can be answered easily by these sources of information. There is also a big group of pharmacists who always prefer to refer the literatures from pharmaceutical companies and company representatives for information. Pharmaceutical company literature and representatives are likely to be biased, with decreased emphasis on risks relative to benefits and often is unreliable[1]. Community pharmacists are referring variety of sources of information indicating that they are coming across with variety of questions forcing them to update themselves before providing information to the patients.

It was also found that community pharmacists commonly prefer BNF for information related to adverse reaction, availability, stability, dosage, drug interactions, identification, pharmacology, toxicology, side effects and therapeutics. Surprisingly BNF and ONF were found to be referred for identification of the medicines as Drug facts and companies is the most reliable source of information in this regard [13]. This indicates the need of information to refer a specific source of information for a specific question. Martindale extra pharmacopeia and Middle East Medicines Index are the second and third most commonly referred books respectively for most of the information. Primary health care formularies were also found in some of the pharmacies. Availability of poor quality and outdates medicine information resources in community pharmacies will affect the quality of information provided to clients and prescribers [14].

Evaluated databases are considered as highly relevant, moderate-highly valid and useful for pharmacy practicing [2]. In this study, it was found that the pharmacists refer the databases very rarely due to non-availability of internet connection at pharmacy. Medline, Micromedex and Pharm-line were the first, second and third commonly referred online databases at their own expenses. A potential solution to pharmacies having access to up to date reference sources recommended by the professional body is by subscription to electronic databases accessed via the internet. Reference to few of these secondary sources of information is a reflection of the fact that they are coming across with most recent and complex questions.

Research publications in medical, biomedical and pharmacy journals are considered as the primary sources of information. 87% of the community pharmacists have not accessed any journals and MOH newsletter. It could due to three reasons first, they are not well trained on critically evaluating and appraising the research articles. Second, they are not aware of importance of referring primary sources of information. Third, busy schedule and lack of time to go through primary sources of information [5].

The most visited internet site was one targeting the public, suggesting that pharmacists are accessing information that will be understood by the enquirer; and that respondents thought references they had access to be sufficient for the majority of enquiries they fielded. The www.google.com website meant for common public is referred by most of the pharmacists to answer the questions [22]. This can be overcome by establishing a central medicine information centre either at the ministry or at teaching institutes by including senior pharmacists and pharmacologists where they would participate in providing the information to community pharmacists through toll free telephone communication or E-mails [23].

Specially, dedicated website or webportal with a social network maintained by recognised pharmacists and pharmacologists under the strict supervision of MOH can also bridge this gap, which will be more cost-effective and consolidates the source of medicine information.

Access to this kind of web information source is likely to be easy because of extensive use of smartphones [19]. We also recommend to develop computer or mobile application with a provision of online and offline accessibility. Application should also have a provision to deliver and update MOH newsletters and circulars at regular intervals. These steps will improve the accessibility of up to-date, reliable, uniform and consistent information on medicines. It will also ensure 100% reaching of MOH newsletters and circulars.

The pharmacy school curriculum in Oman medical college educates and train pharmacy students on drug information resources and how to get, use and evaluate these drug information resources. Actually, the situation in Oman demands the incorporation of such course in other pharmacy institutes. This type of curriculum will promote thinking in order, critically evaluating primary literature to practice evidence based pharmacy practice and the pharmacists will be able to implement the science of drug information in customer satisfaction and patient's health outcome [24]. Community pharmacists in Oman are found to prefer tertiary sources of drug information. Tertiary sources of drug information are one of the immediate ways to answer a drug information request. However, it would be preferable to encourage the use of primary drug information so that the consumer will receive the most up-to-date information [17]. Therefore, it is required to equip them with up-to-date information resources to face the challenges from ageing population, chronic diseases, advances in pharmaceuticals and rise in awareness among general public and also need to be informed by reliable evidence-based information sources [25-27].

Sultanate of Oman has a comprehensive health system supported by private hospitals and over 435 private pharmacies also called as community pharmacies. `These pharmacies are private and licensed from the Directorate General of Pharmaceutical Affairs and Drug Control (DGPA & DC), Ministry of health (MOH), Muscat based on the pharmacy practice law conditions which include that the establishment must have an updated copy of either *British National Formulary and Oman National Formulary*.

To be registered pharmacist, he/she must hold a certificate of four years B. Pharm for pharmacist or two years D. Pharm for assistant pharmacist from an accredited school must have completed a training period of three years and have passed the pharmacy qualification exam. Pharmacy qualification exams or licensing exams are conducted by the ministry of health on first Sunday of every month followed by the oral on the next day.

Limitations of this study include, first; 43 of community pharmacists of 71 pharmacists included in this study are from Muscat region (61%). Second; Survey questions were not validated before use. Third; the sampling technique, although systematic, did not capture all pharmacists with drug information responsibilities. Fourth; Qualification of the pharmacists working at community pharmacists were not recorded. Fifth; total years of their experience as community pharmacists was also not considered in the questionnaire. Sixth; year of their pharmacy graduation was also not considered in this study.

This small exploratory study has shown that community pharmacists possess a range of paper based resources, which can be used to handle medicine-related enquiries. Based on these results, it can be concluded that drug information resources in community pharmacies in Oman have to be improved [16]. Apparently there is a need for information about available sources of information. In addition there is also a need for centres with larger information resources [28].

Online continued pharmacy education programs with credit hours on new trends in pharmacy practice, introduction of new medicines in market as well as medicines withdrawn from the market should be conducted to enable the pharmacy personnel to be scientifically sound and updated to bring professional changes in their practice at their own convenience[1, 25]. Finally, the community pharmacist should be trained in an appropriate fashion to meet an expectation of health care professionals and society as an important source of information and can play a vital role in promoting patient health care in the community.

ACKNOWLEDGEMENT: We would like to thank our Dean Dr. Diana Biattie and Head of Department Dr. Jayasekhar P. for their continued support to carry out the study. Special thanks to all the community pharmacists who cooperated to conduct this survey.

Declaration: Part of the study was presented at 9th Annual workshop on good pharmacy practice held under the pharmaceutical continuing education programme for the private sector pharmacists on Thursday, 19th December 2013 at Hotel Muscat Holiday by Directorate General of Pharmaceutical Affairs and Drug Control, Ministry of Health, Oman.

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