Dentist's Knowledge of Essential Drug Information Resources in Saudi Arabia

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ABSTRACT

Objectives: To explore the knowledge of dentists regarding drug information resources in Saudi Arabia. **Methods:** This is a 4-month cross-sectional study exploring the knowledge of dentists about drug information resources in Saudi Arabia. This is a self-reported electronic survey of dentists. The questionnaire contained two parts. The first section collected demographic data of the responders. In contrast, the second section collected information about dentists' essential knowledge about dental drug information resources, knowledge of the selected 12 dental drug information books, and their preferred 17 websites containing dental drug information resources. We used 5-point Likert response scale system to obtain responses to the close-ended questions. The data were collected through the Survey Monkey system and were analyzed using SPSS and Jeffery's Amazing Statistics Program (JASP). **Results:** A total of 260 dentists responded to the survey. Of them, 153 (59.30%) were male, and 105 (40.7%) were female, which was statistically significant ($p<0.003$). The majority of the responders (257 (98.85%)) were in 24–35 years. Almost half of the responders were interns (135 (51.92%)) followed by residents (63 (24.23%)) and as General Practitioner with (62 (23.85%)), which was statistically significant ($p<0.001$). The average score of dentist knowledge about dental drug information resources was 1.80, and the highest score was recorded for knowledge of the concept of dental drug information resources. The average dental knowledge score of dental drug information resources was 1.80, which was statistically significant ($p<0.5$). The majority of the responders (80.70%) were not familiar with dental drug information books. In contrast, the best resources known by the responders were *Martindale: The Complete Drug Reference* (55 (21.24%)) and *ADA Dental Drug Handbook* (54 (20.77%)). The majority of the responders (74.30%) were not familiar with the websites related to dental drug information resources. In comparison, the most frequently used resources by the responders were the World Health Organization (WHO) (137 (52.69%)) and Ministry of Health websites (137 (52.69%)). **Conclusion:** The responders had insufficient knowledge about the available dental drug information resources, including books and websites. Targeting to improve dentist knowledge of dental drug information resources is required in Saudi Arabia through dental schools, and pharmacists play a critical role in dental education.

Key words: Dentist, Knowledge, Drug Information, Resources, Saudi Arabia.

INTRODUCTION

Drug information services are in-depth, unbiased sources of crucial drug information to meet the needs of practicing healthcare professionals, including physicians, pharmacists, and other allied healthcare providers.[1] Resources of drug information can be classified as primary, secondary, and tertiary sources. In primary resources, all drug information is obtained from journal publications such as reports of clinical drug trials, case reports, and pharmacological research. The most appropriate evidence comes from randomized controlled trials, which requires considerable experience.[2-4] The secondary sources present as a guide to or review of the primary literature, for example, review paper; meta-analyses; indexes (Index Medicus); abstracts (International Pharmaceutical Abstracts); as well as combinations of abstracts and full-text reprints, for instance, Medline, Current Contents, International Pharmaceutical Abstracts, Index Medicus, Excerpt Medica, and the Iowa Drug Information Service (including full-text reprints of articles). The last class of drug resources is the tertiary or general sources, which Provide documented information in a condensed format. For instance, include formulary manuals, standard treatment manuals, textbooks, available reference books, drug bulletins, and drug compendia.[5]

Regarding kinds of literature, dental school curricula are revised, including significant teaching time devoted to studying drugs and their application. The dentistry practice was slight in pharmacology and toxicology during the past few decades.[6] With increased pharmacology training at dental schools, a better understanding of dental therapeutics, and the advent of newer drug agents, dentists are now a visible source of prescriptions and drug use. Dental prescriptions are increasing at an approximate rate of 50% greater than physician prescriptions. This is alarming as there could be potential problems related to drug therapy. The National Center for Health Statistics indicates that there are approximately 295 million visits to dentists per year in the United States and an average of 1.5 visits per person.[7] Many of which will interact with the therapeutic dental staff. Only the pharmacist is better equipped to supply the needed drug-use information in the Kingdom

of Saudi Arabia. Although dentists appear to write prescriptions for relatively few drug classes, those drug classes are large and rapidly expanding. Besides, dentists treat patients with many diseases and on many different drugs, all of which may modify the selection of drugs and the application of procedures for dental therapeutics. Therefore, the drug information center must be aware of the current sources of biomedical information in the case of dental literature as recommended by old investigation.[8] The authors were not aware of study declare the dentist's knowledge of drug information resources locally or gulf and middle Est countries.[8] This encouraged us to explore the knowledge of dentists with respect to drug information resources in Saudi Arabia.

METHODS

This is a 4-month cross-sectional study conducted in Saudi Arabia. It is a self-reported electronic survey questionnaire related to dentists. The survey was distributed to dentists from interns to consultants and those belonging to all specialties in dentistry and located in Saudi Arabia. All non-dentists or students and non-completed surveys were excluded from the study. The survey consists of two parts. The first part collected demographic information of the responders. The second part was collected information about responders' essential knowledge of dental drug information resources, their knowledge of selected 12 books on dental drugs, and their knowledge of selected 17 websites on dental medicine. The responses were collected using a 5-point Likert response scale system. In this cross-sectional study, the sample was calculated with an unlimited size of the population, population percentage of 50%, confidence level of 95% with a z score of 1.96 and margin of error of 5–6.5%, and drop-out rate of 10%. As a result, the sample size was equal to 251 to 432 with a power of study of 80%.[9-11] A 60–70% response rate was required to calculate sample size.[11,12] The survey was distributed through social media (WhatsApp and Telegram).

A reminder message was sent every two weeks. Expert reviewers and pilot testing validated the survey responses. Moreover, we performed the test of the reliability of the data obtained in this study (Cronbach's alpha). The data were obtained through the Survey Monkey system. Moreover, the Statistical Package of Social Sciences (SPSS), Jeffery's Amazing Statistics Program (JASP), and Microsoft Excel were used for data analysis. Descriptive and frequency analysis, good of fitness analysis, correlation analysis, inferential analysis of factors that affect responder's knowledge about adverse drug reaction and reporting system. The STROBE (strengthening the reporting of observational studies in epidemiology statement: guidelines for reporting observational studies) guided the reporting of this study.[13,14]

RESULTS

A total of 260 dentists responded to the questionnaire, with maximum responses coming from the northern (5 (28.85%)) followed by the central region (64 (24.62%)) with statistically significant differences between the areas (p<0.001). Out of 260 responders, 153 (59.30%) were male, and 105 (40.7%) were female, which was statistically significant (p<0.003). The majority of the responders (257 (98.85%)) were in the age group of 24–35 years, which was statistically significant for all age groups (p<0.001). Almost half of the responders were interns (135 (51.92%)) followed by residents (63 (24.23%)) and 62 (23.85%(as General Practitioner with statistically significant differences among them (p<0.001). Most of the responders were the dental staff (222 (85.38%)), with statistically significant differences based on the type of the position held (p<0.001). Most of the responders had three years of experience (230 (88.46%)) followed by non-specialized dentists (217 (84.44%)) with statistically significant differences between the period of experience (p<0.001) (Tables 1 and 2).

The average score of "dentist knowledge of dental drug information resources" was 1.80, with the highest score (2.13) obtained for the element "knowledge of the concept of dental drug information resources." In contrast, the lowest score (1.44) was obtained for "dentist knowledge of the approved list of dental drug information resources at their organization" with statistical significance between the answers at each aspect (p<0.5) (Table 3). Almost 80.70% of the responders were not familiar with dental drug information books. In contrast, the best resources known by the responders were *Martindale: The Complete Drug Reference* (55 (21.24%)) and the *ADA Dental Drug Handbook: A Quick Reference* (54 (20.77%)) (Table 4). The majority of the responders (74.30%) were not familiar with the Internet websites related to dental drug information. The most frequently used resources were the World Health Organization (WHO) (137 (52.69%)) and Ministry of Health websites (137 (52.69%)) (Table 5). The reliability test of McDonald's ω was 0.665, Cronbach's α was 0.777, Gultman 2 was 0.794, and Gultman 6 was 0.823 in regular Biostatistics. In contrast, in Bayesian Biostatistics, the reliability tests were McDonald's ω (0.671), Cronbach's α (0.775), Gultman 2 (0.794), and Gultman 6 (0.825).

DISCUSSION

Drug information services refer to a set of services that encompasses specially trained individuals' activities to provide accurate, unbiased, factual drug information, primarily in response to patient-oriented problems.[15] Nowadays, there has been a rapid expansion in the pharmaceutical market's number and diversity, medication therapy complexity, and the need for evidence-based treatment protocols. This has led to an increased demand for consultation regarding therapeutic indication, medicine selection, comparative effectiveness and safety, proper medication use with current evidence, and updated literature. In this study, we investigated the knowledge of dentists among different drug information resources. With the massive amount of currently available literature, the source of drug information and the quality is

Table 1: Demographic, social information.

Nationality	Response Count	Response Percent	*p*-value
Central area	64	24.62%	< 0.001
North area	75	28.85%	
South area	31	11.92%	
East area	36	13.85%	
West area	54	20.77%	
Answered question	260		
Skipped question	0		
Gender	**Response Count**	**Response Percent**	
Male	153	59.30%	< 0.003
Female	105	40.70%	
Answered question	258		
Skipped question	2		
Age	**Response Count**	**Response Percent**	
24–35	257	98.85%	< 0.001
36–45	3	1.15%	
46–55	0	0.00%	
> 55	0	0.00%	
Answered question	260		
Skipped question	0		

Table 2: Demographic, social information.

Dentist Qualifications	Response Count	Response Percent	p-value (chi X2)
Intern	135	51.92%	< 0.001
Resident	63	24.23%	
General Practitioner	62	23.85%	
Specialist	0	0.00%	
Consultant	0	0.00%	
Answered question	260		
Skipped question	0		
Position Held	**Response Count**	**Response Percent**	
Director of dental unit	5	1.92%	< 0.001
Assistant director of dental unit	2	0.77%	
Dental Director	31	11.92%	
Dental staff	222	85.38%	
Answered question	260		
Skipped question	0		
Years of experiences at Dentists career	**Response Count**	**Response Percent**	
< 1	149	57.31%	< 0.001
1 – 3	81	31.15%	
4 – 6	28	10.77%	
7 - 9	2	0.77%	
> 9	0	0.00%	
Answered question	260		
Skipped question	0		
Dentist Specialties	**Response Count**	**Response Percent**	
Dental Public Health	6	2.33%	< 0.001
Endodontics	8	3.11%	
Oral and Maxillofacial Surgery	1	0.39%	
Oral Medicine and Pathology	0	0.00%	
Oral and Maxillofacial Radiology	0	0.00%	
Orthodontics and Dentofacial Orthopedics	1	0.39%	
Pediatric Dentistry	1	0.39%	
Periodontics	0	0.00%	
Prosthodontics	5	1.95%	
Restorative dentistry	18	7.00%	
Special needs dentistry	0	0.00%	
Non-applicable	93	36.19%	
General practitioner	124	48.25%	
Other (please specify)			
Answered question	257		
Skipped question	3		

crucial to utilize the evidence in the clinical setting with paramount confidence.[16]

Each dentistry college has a unique undergraduate and postgraduate curriculum, and each of the specialties has different resources and textbooks as their reference material. Dental medications and their adverse effects are one of the crucial parts of the curriculum. The dental medications have particular reference material to look for and which dentists can refer for studying. Once the students graduate from their school, they require additional resources based on dental care specialties. However, resources on dental medications are needed because daily are used. As a result, we explored dentists' knowledge concerning the selected necessary drug information resources in practice. Our results, most of the responder recently graduated from dental school, either intern or general practitioner. The sample population in this study was good to reflect the practice of the dental population. Our results showed insufficient knowledge of drug information resources in practice, which agrees with the previous research.[8] The highest score was obtained for the element "learning," which may reflect the internship year's requirements. Most of the responders were not familiar with dental drug information resources, which might be due to various factors; for instance, some dentists might not have studied the drug information resources during their undergraduate course at the school of dentistry or rarely found them in practice. The most frequently read book on dentistry drug information was *ADA Dental Drug Handbook*: *A Quick Reference* and *Martindale: The Complete Drug Reference,* where the quick reference of ADA Dental drug is widespread. At the same time, the Martindale is related to the most common trade name of dental compounding.

The most frequently read online drug resource was *ADA Dental Handbook* for drug interaction fact or *AHF Essential Drug Information*. Other drug information resources necessary in dental practice such as *BNF* or *Micromedex Drug Frequency* might be duo to finical problem approximately 92.69% of the responders did not know about *Micromedex-Drugdex*, the best bio-informative drug reference. Besides, most responders neither knew about *Dental Lexi-Drugx* nor *BNF* because dental practitioners do not prescribe drugs regularly.[17]In this study, we found that the most frequently used website for obtaining drug information was Google Scholar, Ministry of Health (MOH) website, WHO website, or drug.com, which depend on it in their bachelor years that may require research project that a must for their graduation. The websites mentioned above provide general information about dental drugs and do not focus on drug information references. However, most of the responders frequently accessed the drug.com website, which is fast and free of charge. Most of the responders did not often use drug information websites as applications that related to dentists. This study showed that dentists' knowledge of drug information resources was low and not organized in Saudi Arabia. They need education and training to use the best dentistry medications during their undergraduate and postgraduate courses. The curriculum should be regularly updated at their college of dentistry in Saudi Arabia.

Limitations

This study had various advantages related to dental drug information resources. However, it had few disadvantages: most of the responders were intern or recently graduated, which did not reflect the qualification of the entire population, and the reliability of this study did not reach the optimal level. This necessitates further exploration regarding the type of questions to obtain a good reliability test score.

CONCLUSION

In this study, we explored dentists' current knowledge about dental information resources in the Kingdom of Saudi Arabia. This study showed that dentists' knowledge regarding dental drug information

Table 3: Dental drug information resources assessment of knowledge.

	Never		1-25 % knowledge		26-50 % knowledge		51-75 % knowledge		76-100 % knowledge		Total	Weighted Average	*p*-value (chi X2)
Have you ever heard about the concept of dental drug information resources?	8.08%	21	72.31%	188	17.69%	46	1.92%	5	0.00%	0	260	2.13	< 0.001
Have you ever had a course/ attended a workshop about dental drug information resources?	36.15%	94	53.08%	138	10.00%	26	0.77%	2	0.00%	0	260	1.75	< 0.001
In your institution, is there an approved list of dental drug information resources?	58.08%	151	40.00%	104	1.92%	5	0.00%	0	0.00%	0	260	1.44	< 0.001
In your institution, is there an available subscription of dental drug information resources for dentists?	58.08%	151	38.85%	101	2.69%	7	0.38%	1	0.00%	0	260	1.45	< 0.001
Are you familiar with online dental drug information resources?	18.08%	47	61.15%	159	15.77%	41	3.85%	10	1.15%	3	260	2.09	< 0.001
Are you familiar with evidence-based dental drug information resources?	15.38%	40	60.00%	156	20.38%	53	3.85%	10	0.38%	1	260	2.14	< 0.001
Are you familiar with the applications of dental drug information resources?	44.62%	116	50.00%	130	4.62%	12	0.38%	1	0.38%	1	260	1.62	< 0.001
Answered											**260**		
Skipped											**0**		

Table 4: The frequent type of dental drug information books resources used by dentists.

	Book		Online		Application		I do not know this reference		Available at your institution		Total
Micromedex-Drugdex	2.31%	6	5.38%	14	0.00%	0	92.69%	241	0.00%	0	260
Dental Lexi-Drugdex	1.55%	4	8.91%	23	0.39%	1	89.15%	230	0.39%	1	258
AHFS Essential (Adults and Pediatrics)	2.33%	6	17.51%	45	0.78%	2	81.32%	209	0.00%	0	257
Sanford guide to antimicrobial therapy	1.54%	4	8.08%	21	0.38%	1	90.38%	235	0.00%	0	260
Merck Manual	17.37%	45	8.11%	21	0.00%	0	76.06%	197	0.39%	1	259
BNF	1.54%	4	10.38%	27	0.00%	0	89.23%	232	0.00%	0	260
Physician Desk References (PDR)	1.54%	4	6.92%	18	0.38%	1	91.92%	239	0.00%	0	260
BNF pediatric	2.70%	7	10.81%	28	0.00%	0	87.64%	227	0.00%	0	259
Drug Interaction Facts	5.45%	14	22.18%	57	0.78%	2	72.76%	187	0.39%	1	257
Mosby's Dental Drug Reference	2.31%	6	7.31%	19	0.38%	1	90.77%	236	0.00%	0	260
Martindale – The Complete Drug Reference	21.24%	55	10.04%	26	0.00%	0	69.50%	180	0.00%	0	259
ADA Dental Drug Handbook: A Quick Reference	20.77%	54	58.46%	152	0.77%	2	36.92%	96	0.00%	0	260
Other (please specify)											0
Answered											260
Skipped											0

Table 5: The frequent type of Internet website for dental drug information resources used by the dentist.

	Online		Application		I do not know this reference.		Total
LexisNexis	6.95%	18	0.39%	1	92.66%	240	259
Compounding Today	15.06%	39	0.39%	1	84.56%	219	259
National Institutes of Health	14.34%	37	0.00%	0	85.66%	221	258
Medscape	2.72%	7	1.17%	3	96.50%	248	257
FDA drug information	39.69%	102	0.00%	0	60.31%	155	257
Google Scholar	71.88%	184	1.17%	3	27.73%	71	256
Microsoft academic.	3.52%	9	0.78%	2	95.70%	245	256
WebMD	9.62%	25	0.00%	0	90.38%	235	260
Drug.com	43.19%	111	1.17%	3	56.03%	144	257
Center of Diseases Control (CDC)	41.92%	109	0.77%	2	57.69%	150	260
Saudi Food and Drug Authority (SFDA)	19.62%	51	0.38%	1	80.00%	208	260
World Health Organization (WHO)	52.69%	137	0.38%	1	47.31%	123	260
Daily-med	30.50%	79	0.00%	0	69.50%	180	259
Medline-plus	6.92%	18	0.77%	2	92.31%	240	260
Ministry of Health (MOH)	52.69%	137	4.23%	11	44.62%	116	260
Medpage	6.18%	16	0.77%	2	93.05%	241	259
Clinical key	10.85%	28	0.00%	0	89.15%	230	258
Other (please specify)							0
Answered							260
Skipped							0

resources was inadequate, including knowledge about various books and internet resources. Therefore, we recommend increasing steps in educating and training dentists across the Kingdom of Saudi Arabia. Pharmacists play an essential role in the training provided on dental drug information resources.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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Consent for Publications

Informed consent was obtained from all the participants

Ethical Approval

This research is exempted from research and ethical committee or an institutional review board (IRB) approval.
https://www.hhs.gov/ohrp/regulations-and-policy/decision-charts-2018/index.html

ABBREVIATIONS

MOH: Ministry of Health; **KSA:** Kingdom of Saudi Arabia; **SPSS:** Statistical package of social sciences; **JASP:** Jeffery's Amazing Statistics Program; **STROBE:** Strengthening the reporting of observational studies in epidemiology.

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REFERENCES

1. Pradhan SC. The performance of Drug Information Center at the University of Kansas Medical Center, Kansas City, USA - Experiences, and evaluations. Indian J Pharmacol. 2002;34(2):123-9.
2. Nibu P, Ramesh M, Parthasarathi G. Review of a Drug Information Service in an Indian Teaching Hospital. Aust J Hosp Pharm. 2001;31(2):144-5.
3. Cuddy PG, Elenbaas RM, Elenbaas JK. Evaluating the medical literature part I: Abstract, introduction, methods. Ann Emerg Med. 1983;12(9):549-55.
4. Elenbaas RM, Elenbaas JK, Cuddy PG. Evaluating the medical literature part II: Statistical analysis. Ann Emerg Med. 1983;12(10):610-20.
5. Elenbaas JK, Cuddy PG, Elenbaas RM. Evaluating the medical literature, Part III: Results and discussion. Ann Emerg Med. 1983;12(11):679-86.
6. Koehler HM. Sources of biomedical information in the dental literature. Ther Innov Regul Sci. 1975;9(1):30-1.
7. Hussar DA. Interactions involving drugs used in dental practice. J Am Dent Assoc. 1973;87(2):349-58.
8. Parker WA, Reid LW. Dentist attitudes toward drug information resources. Ther Innov Regul Sci. 1978;12(2):84-4.
9. Charan J, Biswas T. How to calculate sample size for different study designs in medical research?. Indian Journal of Psychological Medicine. 2013;35(2):121-6.
10. Pourhoseingholi MA, Vahedi M, Rahimzadeh M. Sample size calculation in medical studies. Gastroenterol Hepatol from Bed to Bench. 2013;6(1):14-7.
11. Ezhumalai G. How big a sample do I need require. Ann SBV. 2017;6(1):39-41.
12. Johnson TP, Wislar JS. Response rates and nonresponse errors in surveys. Vol. 307, JAMA. 2012.307; 1805–6.
13. Elm FV, Douglas G. Altman, Matthias Egger, Stuart J. Pocock, Peter C. Gøtzsche JPV. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for Reporting Observational Studies. PLoS Med. 2007;4(10):1623–7.
14. Elm FV, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. Lancet

2007; 370: 1453–57.

15. Rajanandh MG, Varghese R, Ramasamy C. Assessment of drug information services in a south Indian tertiary care hospital in Kanchipuram district. Int J Pharm Pharm Sci. 2011;3(3):273-6.
16. Fernandez-Llimos F. Quality of drug information for healthcare professionals: The ARCA acronym. Pharmacy Practice. 2015;13(4):709.
17. Brinkman DJ, Nijland N, Diermen DEV, Bruers JJM, Ligthart WSM, Rietveld PJ, *et al*. Are Dutch dental students and dental-care providers competent prescribers of drugs?. Eur J Oral Sci. 2019;127(6):531-8.