


Intake of antibiotics and fasting during the Holy month of Ramadan: a literature review

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ABSTRACT

Objectives: To review the intake of antibiotics and fasting during the holy month of Ramadan. **Methods:** In this study, we performed an extensive search of 50 databases following the Saudi Digital Library search engine. We included meta-analysis, randomized controlled studies and observational studies published in English language with human study only for update May 2017. The search terms included Ramadan, fasting, medication, therapy, type of disease and medication based on therapeutic class. The list of antibiotic medication and switch from regular days to Ramadan days based on literature search revealed comparative safety studies, efficacy studies and cost of type of medication for each disease studies and national or international evidence-based guidelines of switching short half-life to long half-life. All parenteral dosage form of medication were excluded from study. All medications should be listed in the Ministry of Health drug formulary. **Results:** A total of 710 studies were obtained after an extensive search with specific terms. Of those, 104 studies were duplicate studies and 606 were considered for further evaluation. After evaluation, we obtained 30 studies which discussed about the antibiotics and Ramadan. Of these 30 studies, only 2 studies were found to be appropriate for further revision. Among the two, one study was an observational study regarding the pattern of prescribing antibiotics during the holy month of Ramadan. The second study was about the systemic review on the safety of fasting and several infectious diseases. The suggested draft of list of antibiotic switch from regular days to the holy Ramadan days was explored in this review. **Conclusion:** The investigations about antibiotics intake during fasting not found. The studies of antibiotic during the holy month of Ramadan is required during legal registrations at all Muslim countries. Antibiotics switch therapy during fasting is highly recommended at all Muslim patients in the world.

Key words: Antibiotics, Fasting, Ramadan, Literature, Review.

INTRODUCTION

The General Administration of Pharmaceutical Care founded the National Stewardship of Antimicrobial Program in 2014 at the MOH hospitals in the Kingdom of Saudi Arabia.^{1,2} The project was established through the pharmacy strategic planning task force committee. The program consists of antibiotic administration guidelines, elements of antibiotics committee and all related regulations of the antimicrobial stewardship program according to the American Society of Infectious Diseases. The antibiotic guidelines consisted of disease management and names of all available medications in the MOH drug formulary, the dosing frequency and time of administration. These guidelines are applicable during all months of the year. However, during the holy month Ramadan, it changes. In this month, all Muslims should perform fast. The fast starts from sunrise and followed until sunsets. During this period, the patient should stop taking any medications. One systematic review discussed the effect of fasting in some infectious diseases.³ All the infectious diseases need the administration of antibiotics for disease management. The review, however, did not mention how to administer the medications during the holy month of Ramadan. To the best of our knowledge, there is no publication regarding the antibiotics switch from regular to Ramadan days in the KSA, Gulf and Middle Eastern countries. Therefore, in this study, we

aimed to explore the intake of antibiotics and the time administration during the Ramadan fasting.

METHODS

In this study, we performed an extensive search on 50 databases included in the SDL search engine: Wiley Online Library, Web of Science, Springer Link, Taylor and Francis, Social Science Journal accessed via ProQuest, Science journal accessed via ProQuest, Scopus, SciFinder, Science Direct, Sage Journal, Royal Society of Medicine, Royal Society of Chemistry, Psychology Journals accessed via ProQuest, Pharmaceutical News Index accessed via ProQuest, Patient Education accessed via MD Consult, Drug accessed via MD Consult, Oxford Journals accessed via Oxford University Press, Ovid Journals, Nursing and Allied Health Sources accessed via ProQuest, Nature Publisher Group, Medline Index accessed via ProQuest, Medline Complete accessed via EBSCO, Medical Evidence Matter accessed via ProQuest, IGI InfoSci Journals, Health Management accessed via ProQuest, Health and Medical complete accessed via ProQuest, Global Health Database-CABI, Family Health accessed via ProQuest, Eric accessed via ProQuest and EBSCO, Emerald, DynaMed via EBSCO, Directory of Open Access Journal (DOAJ), Current Content accessed via Web of Knowledge, Dentistry and Oral Science accessed via EBSCO, Clinical Key-

Nursing, Clinical Key-Physician, CINAHL accessed via EBSCO, Central accessed via ProQuest, CBCA accessed via ProQuest, Canadian Science Publishing. Cambridge Journals accessed via Cambridge University, Britannica Academic, BMJ Journals, BMJ Clinical Evidence accessed via BMJ Best Practice, BMJ Best Practice, Biology Journals accessed via ProQuest, ACM Digital Library, Academic Search Ultimate accessed via EBSCO, Cochrane Library PubMed. In addition to Google Scholar searched without SDL searching engine. We included meta-analysis, randomized controlled studies and observational studies published in English language and in May 2017. The search terms included Ramadan, fasting, medication, therapy, type of disease and medication based on therapeutic class. The medication list and switch from regular to Ramadan days based on literature search revealed comparative safety studies, efficacy studies and cost of type of medication for each disease studies and national or international evidence based guidelines of switching short half-life to long half-life.^{4,6} The antibiotic medication list included drug name and general dosing and frequency of administration during regular and Ramadan days. All settings of patient care services such as inpatient, ambulatory care, or community services with oral medication were included. All parenteral medications were excluded from analysis. All medications should be included in the MOH drug formulary. The location of studies must include Saudi Arabia, Gulf, or Middle Eastern countries and if such data was not found, then other countries were included. If studies evidence not existed; the suggested came from author's experiences.

RESULTS

After an extensive search, a total of 710 studies were short-listed. Of these, 104 were found to be duplicate studies and 606 were included for further evaluation. Of the 606 studies, 92 studies discussed about medications related to diabetes mellitus and Ramadan, 27 studies discussed about the psychiatry and Ramadan, 27 studies investigated gastrointestinal diseases and Ramadan, 30 studies discussed about the intake of antibiotics and Ramadan, 30 studies discussed about the cardiovascular diseases and Ramadan, 15 studies discussed about medicines for asthma,

rheumatoid arthritis and Ramadan and 402 studies discussed about other diseases and Ramadan. Of those 30 studies, only 2 were found to be appropriate for further analysis (Table 1). One of them was an observational study regarding pattern of prescribing antibiotics during Ramadan. The authors did not discuss the appropriate system of antibiotics that can be used alternatively during Ramadan. Besides, the study had a small number of patients and short period of duration. While the review study discussed about the fasting in case of several diseases such as hepatitis, infection in diabetes milieus, diarrheal diseases, appendicitis, urinary tract infection, eye infections. Regarding the medications, the anti-helminthic found Mebendazole, albendazole and pyrantel not affected by fasting. The suggested draft of antibiotics list switching from regular days to the holy Ramadan days (Table 2).

DISCUSSION

The General Administration of Pharmaceutical Care setup the strategic planning for antibiotics stewardship program at the MOH.^{1,7} This program includes key performance indicators and a self-assessment tool to monitor the outcome of the program.¹ The program should be monitored throughout the year including the month of Ramadan. In previous studies, antibiotics showed most of the prescribing pattern and most of the Muslim patients wished not to break their fast during infectious diseases and to take treating antibiotics.⁸ Randomized controlled studies on the topic of switching antibiotics are scarce. Breakfasting with multiple doses to antibiotics given few doses and less frequency administration or single daily during fasting the holy month of Ramadan. The authors recommend a list of antibiotics that are appropriate to be taken during Ramadan without breaking the fast. The drug list based on microbial coverage with normal renal and hepatic functions. The list is very useful for the healthcare provider while prescribing the antibiotics during Ramadan. All healthcare providers should refer to other references to check about the approved indication and appropriate dosing for that indication. Further studies are highly recommended to validate the switch of antibiotics from regular days to Ramadan days.

Table 1: The antibiotic studies conducted during the holy month of Ramadan.

No	Author	Year of publication	Country	No of participants	Duration	Study design	Outcome	Comments
1	Mikhael EM, Jasim AL ⁸	2014 Iraq		34 patients, observational study	10 days	Metronidazole aminoglycoside Cephalosporin Macrolide Penicillin Quinolone tetracyclines	Metronidazole and cephalosporin were the most common types of antibiotics that were prescribed for patients during Ramadan. patients, even if they had been compliant with taking the drug twice daily just prior to and just after the fast, since this way of taking the medication is not sufficient to ensure 12-h intervals and is thus best to be avoided to prevent the provoking of bacterial resistance and treatment failure for fasting patients in Iraq during Ramadan	Small simple size, Short duration of the study.
2	Bragazzi NL et al. ^P	2015	Multinational	51 studies	1954-2015	Systematic review	The disease covered was infectious in Diabetes mellitus, Hepatitis, Diarrheal disease, HIV, Anti-helminthic therapy, Ulcer disease, Appendicitis, Urinary tract infectious diseases, Eye infectious diseases and Other infectious diseases	The study about demand of Knowable and education about medication during Ramadan

Table 2: Antimicrobial drug therapy during regular days versus drug therapy during the holy month of Ramadan.

No	Drug therapy during Regular days ⁹			Drug therapy during Holy Ramadan			Registration ^{10,11}
	Regular Days	Doses/ Day	Frequency Per day	Regular Days	Doses/Day	Frequency Per day	
1	Amoxicillin	250- 500 mg	3 times/day	Cotrimoxazole	490- 960 mg	2 times/day	RSFDA, MOHDF
2	Cefacolr	250- 500 mg	3 times	Cefuroxim axitel	250- 500 mg	2 times	RSFDA, MOHDF
3	Celecoxib	200 mg	2 times	Celecoxib	200 mg	2 times	RSFDA
4	Cephalexin	250 -500 mg	4 times	Cefadroxil	500-1000 mg	2 times	RSFDA, MOHDF
5	Ciprofloxacin	250-750 mg	2 times	Ciprofloxacin	250-750 mg	2 times	RSFDA
6	Cloxacillin	250 -500 mg	4 times	Cefadroxil	500-1000mg	2 times	RSFDA, MOHDF
7	Cotrimoxazole	490- 960 mg	2 times/day	Cotrimoxazole	490- 960 mg	2 times/day	RSFDA, MOHDF
8	Doxycyline	100-200 mg	Divided in 1-2 doses	Doxycyline	100-200 mg	Divided in 1-2 doses	RSFDA, MOHDF
9	Emtricitabine/tenofovir DF	600/300 mg	In 1 dose	Emtricitabine/tenofovir DF	600/300 mg	In 1 dose	RSFDA, MOHDF
10	Erythromycin	250-500 mg	4 times	Clarithromycin Azithromycin	250-500 mg 500-1000 mg	2 times 1 time	RSFDA, MOHDF
11	Efavirenz [EFV]	600 mg	In 1 dose	Efavirenz [EFV]	600 mg	In 1 dose	RSFDA
12	Flucloxacillin	250-500 mg	4 times	Cefadroxil	500-1000mg	2 times	RSFDA, MOHDF
13	Fluconazole	50- 400 mg	In 1 dose	Fluconazole	50- 400 mg	In 1 dose	RSFDA, MOHDF
14	Itraconazole	400 mg	Divided in 2 doses	Itraconazole	400 mg	Divided in 2 doses	RSFDA, MOHDF
15	Ketoconazole	200- 400 mg	In 1 dose	Ketoconazole	200- 400 mg	In 1 dose	RSFDA, MOHDF
16	Mebendazole	100 mg	2 times	Mebendazole	100 mg	2 times	RSFDA, MOHDF
17	Minocycline	50-100 mg	1-2 times	Minocycline	50-100 mg	1-2 times	RSFDA, MOHDF
18	Moxifloxacin	400 mg	In 1 dose	Moxifloxacin	400 mg	In 1 dose	RSFDA, MOHDF
19	Nalidixic Acid	500-1000 mg	4 times	Norfloxacin Ciprofloxacin	400-800 mg 250-750mg	2 times 2 times	RSFDA, MOHDF
20	Norfloxacin	400 mg	2 times	Norfloxacin	400 mg	2 times	RSFDA, MOHDF
21	Ofloxacin	400 mg	2 times	Ofloxacin	400 mg	2 times	RSFDA, MOHDF
22	Posaconazole	400 mg	2 times	Posaconazole	400 mg	2 times	RSFDA, MOHDF
23	Simeprevir	150 mg	In 1 dose	Simeprevir	150 mg	In 1 dose	RSFDA, MOHDF
24	Sofosbuvir	400 mg	In 1 dose	Sofosbuvir	400 mg	In 1 dose	RSFDA
25	Ledipasvir + Sofosbuvir	90+400 mg	In 1 dose	Ledipasvir + Sofosbuvir	90+400 mg	In 1 dose	RSFDA,
26	Sparfloxacin	400 mg loading then 200 mg	In 1 dose	Sparfloxacin	400 mg loading then 200 mg	In 1 dose	RSFDA, MOHDF
27	Terbinafine	250 mg	In 1 dose	Terbinafine	250 mg	In 1 dose	RSFDA, MOHDF
28	Trovafoxacin	200 mg	In 1 dose	Trovafoxacin	200 mg	In 1 dose	RSFDA,
29	Voriconazol	400 mg	Divided in 2 doses	Voriconazol	400 mg	Divided in 2 doses	RSFDA, MOHDF
30	Linezolid	600 mg	Every 12 hours	Linezolid	600 mg	Every 12 hours	RSFDA, MOHDF
31	Azithromycin	500 mg 1g	Once Daily In 1 dose	Azithromycin	500 mg 1g	Once Daily In 1 dose	RSFDA, MOHDF
32	Isoniazid	300 mg 15mg/kg	Once Daily 3 times a week	Isoniazid	300 mg 15mg/kg	Once Daily 3 times a week	RSFDA, MOHDF
33	Rifampicin	600 – 900 mg 450 – 600 mg	3 times a week, Once Daily	Rifampicin	600 – 900 mg 450 – 600 mg	3 times a week Once Daily	RSFDA, MOHDF
34	Rifabutin	150 – 600 mg	Once Daily	Rifabutin	150 – 600 mg	Once Daily	RSFDA, MOHDF
35	Moxifloxacin	400 mg	Once Daily	Moxifloxacin	400 mg	Once Daily	RSFDA, MOHDF
36	Levofloxacin	500 mg	1 – 2 times a day	Levofloxacin	500 mg	1 – 2 times a day	RSFDA, MOHDF

37	Primaquine Phosphate	15 – 30 mg 45 mg	Once Daily Once Weekly	Primaquine Phosphate	15 – 30 mg 45 mg	Once Daily Once Weekly	RSFDA, MOHDF
38	Albendazole	400 mg	Twice Daily	Albendazole	400 mg	Twice Daily	RSFDA, MOHDF
39	Pyrazinamide	1.5 – 2 g	Once Daily	Pyrazinamide	1.5 – 2 g	Once Daily	RSFDA, MOHDF
40	Dapsone	50 – 100 mg	Once Daily	Dapsone	50 – 100 mg	Once Daily	RSFDA, MOHDF
41	Vancomycin	125 mg	Every 6 hours	Fidaxomicin	200 mg	Every 12 hours	RSFDA, MOHDF
42	Metronidazole	400 – 500 mg	2 – 3 times/ Day	Metronidazole	400 – 500 mg	2 times/Day*	RSFDA, MOHDF
43	Ethambutol	15 mg/kg	Once Daily	Ethambutol	15 mg/kg	Once Daily	RSFDA, MOHDF
44	Tedizolid	200 mg	Once Daily	Tedizolid	200 mg	Once Daily	RSFDA, MOHDF
45	Nitrofurantoin	100 mg	2 times/Day	Nitrofurantoin	100 mg	2 times/Day	RSFDA, MOHDF
46	Itraconazole	50 – 200 mg	Once – Twice Daily	Itraconazole	50 – 200 mg	Once – Twice Daily	RSFDA, MOHDF
47	Griseofulvin	500 mg – 1 g	Once Daily	Griseofulvin	500 mg – 1 g	Once Daily	RSFDA, MOHDF
48	Aciclovir	400 mg	Twice Daily	Aciclovir	400 mg	Twice Daily	RSFDA, MOHDF
49	Valganciclovir	900 mg	Once – Twice Daily	Valganciclovir	900 mg	Once – Twice Daily	RSFDA, MOHDF
50	Zidovudine	250 -300 mg	Twice Daily	Zidovudine	250 -300 mg	Twice Daily	RSFDA, MOHDF
51	Clarithromycin	250 – 500 mg	Once – Twice Daily	Clarithromycin	250 – 500 mg	Once – Twice Daily	RSFDA, MOHDF
52	RSFDA: The Drug had been registered in Saudi Food and Drug Authority, MOHDF: The Drug is Ministry of Health Drug Formulary.						

CONCLUSION

The studies antibiotics intake while fasting the holy month of Ramadan has not existed. The implementation of some antibiotic switch from regular to fasting days is preferable in practice. Future investigation about antibiotics in Ramadan is highly recommended at all Muslim patients in the world.

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None.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

ABBREVIATIONS

MOH: Ministry of Health; **KSA:** Kingdom of Saudi Arabia; **USA:** United State of America; **RPC:** Ramadan Pharmaceutical Care; **SDL:** Saudi Digital Library.

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