

Evidence-based Case Report: Acute Diabetic Complication Risks of Ramadan Fasting in Type 2 Diabetics

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ABSTRAK

Tujuan: mengetahui hubungan kausalitas antara puasa Ramadan dengan komplikasi diabetik akut pada pasien DM dewasa tipe 2 terkontrol. **Metode:** penelusuran literatur menggunakan Pubmed Clinical Queries dan Embase dilakukan dan diperoleh dua buah artikel, sebuah review sistematik dan sebuah studi kohort yang ditelaah dengan kritis. **Hasil:** insidens komplikasi diabetik akut lebih tinggi pada bulan Ramadhan, dengan risiko relatif bagi pasien DM tipe 2 yang berpuasa adalah 1.36 dan number needed to harm sebesar 50. **Kesimpulan:** puasa Ramadan berhubungan dengan komplikasi diabetik akut pada pasien DM dewasa tipe 2 terkontrol, namun risiko tersebut hanya sedikit lebih tinggi. Pasien DM tipe 2 diperbolehkan menjalani ibadah puasa Ramadan.

Kata kunci: puasa Ramadhan, komplikasi diabetik akut.

ABSTRACT

Aim: to investigate causal relationship between Ramadan fasting and acute diabetic complications in adult controlled type 2 diabetics. **Methods:** a Pubmed's Clinical Queries and Embase search was conducted and resulted in 2 useful articles: 1 systematic review and 1 cohort study to be critically appraised. **Results:** the incidence of acute diabetic complications is higher during Ramadan, with the relative risk for adult type 2 diabetics who fast during Ramadan is 1.36 and number needed to harm 50. **Conclusion:** Ramadan fasting was related with acute diabetic complications in adult controlled type 2 diabetics, but the risk was only slightly higher. It is acceptable for type 2 diabetics to fast during Ramadan.

Key words: Ramadhan fasting, acute diabetic complications.

INTRODUCTION

American Diabetes Association (ADA) 2010 states that diabetes mellitus (DM) is a constellation of metabolic diseases characterized by hyperglycemia and resulting from the abnormalities of insulin secretion, its mechanism of action, or both.^{1,2} In 2000, WHO stated that Asia and Australia have the highest DM

prevalence in the world, and the number was predicted to become twice in 2030.² Either acute or chronic diabetic complications result in morbidity, mortality, and decreased quality of life. In other words, DM prevention and management have an important role, especially in Indonesia which has the fourth highest DM prevalence in the world.¹

Most Indonesians are Muslims and fast during Ramadan, including the type 2 diabetics patients. For one month they have to restrain from eating and drinking since dawn until sunset (approximately 13 hours/day in Indonesia), but there are no restriction of food intake since sunset until dawn.³ However, the metabolic alterations during fasting is similar to diabetes mellitus.⁴ The incidence of acute diabetic complications during Ramadan is predicted to be higher,³ such as hypoglycemia, hyperglycemia, ketoacidosis, dehydration, and thrombosis. Therefore, we aim to investigate whether there is causal relationship between Ramadan fasting and acute diabetic complications in adult controlled type 2 diabetics.

CLINICAL QUESTION

Is Ramadan fasting related with acute diabetic complications in adult controlled type 2 diabetics?

METHODS

Search Strategy

Pubmed's clinical queries and Embase searching was conducted on 28th June 2011 by using terminology listed in **Table 1**. The results are described in **Figure 1**.

Selection Criteria

The first selection was based on inclusion and exclusion criteria. We used limit and filter function for Pubmed's clinical queries and Embase, respectively (**Figure 1**). After screening for full text availability and reading title or abstract, there were 5 articles suitable. Then we read the full text and obtained 2 articles, 1 systematic review and 1 cohort study.

Critical Appraisal

The articles were appraised by consensus of all authors using appraisal tools from www.cebm.net for systematic review and etiologic study, respectively. The critical appraisal results are showed in **Table 2** and **Table 3**.

RESULTS

A systematic review done by Azizi⁵ aimed to investigate health condition of fasting people during Ramadan, including diabetics. He

Table 2. Critical appraisal of systematic review

Article: Azizi F. Islamic fasting and health. <i>Annals of Nutrition & Metabolism</i> ; 2010;56(273-82)	
Level: 1A (systematic review of clinical trial, cohort, case control)	
PICO	
- P : Moslem people (including diabetics)	
- I : Ramadan fasting	
- C : No fasting	
- O : Health risk (lipid profile, diabetic complications, metabolic syndromes, etc)	
Question	
Does the systematic review address a focused question (PICO) and use it to direct the search and select articles for inclusion?	Yes
Find	
Did the research find all the relevant evidence?	Yes
Appraise	
Have the studies been critically appraised and was the overall quality adequate?	Unclear
Synthesise	
Have the results been synthesised with appropriate summary tables and plots?	No
Were the results similar between studies?	Yes
Result	
What measure was used, how large was the effect (could it have been due to chance)?	Unclear

Table 1. Search strategy used in Pubmed's clinical queries and Embase on 28th June 2011

Location	Terminology	Hits	Selected
Pubmed's clinical queries: Etiology	Etiology/Broad[filter] AND ((type 2 diabetes[All Fields] OR type 2 diabetes/glucose[All Fields] OR type 2 diabetes/igh[All Fields] OR type 2 diabetes/igt[All Fields] OR type 2 diabetes/insulin[All Fields] OR type 2 diabetes/obesity[All Fields] OR type 2 diabetic[All Fields] OR type 2 diabetic/hypertensive[All Fields] OR type 2 diabetici[All Fields] OR type 2 diabetics[All Fields]) AND Ramadan[All Fields])	35	2
Embase	'type 2 diabetes mellitus'/exp OR 'type 2 diabetes mellitus' AND ramadan AND complication*	26	0

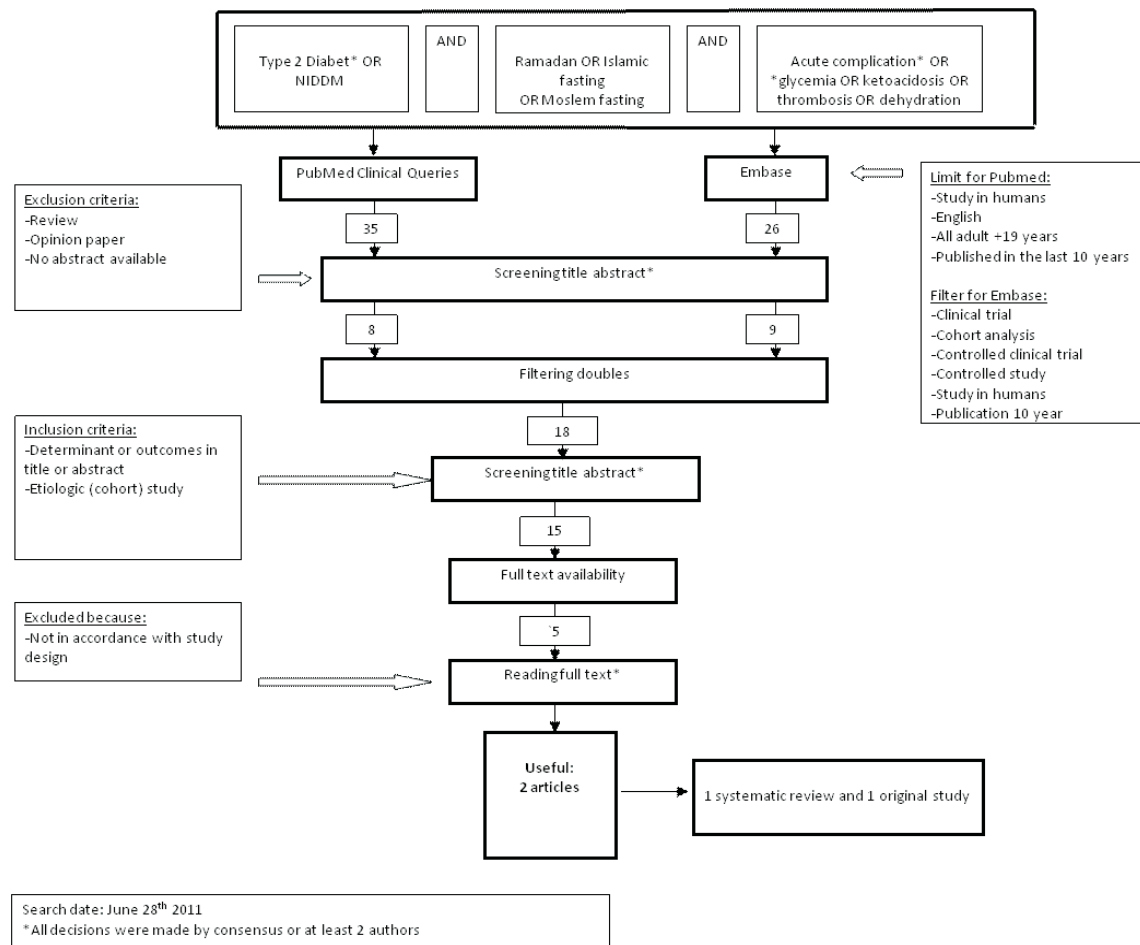


Figure 1. Search strategy flowchart

searched each articles from different sources and in different languages, especially Muslim countries, starting from 1960-2009. The 113 articles meeting the criteria, ranging from survey to clinical trials, were appraised by blinded reviewers. He concluded that Ramadan fasting is safe for healthy people (including controlled diabetics), but some people/conditions need medical advice. Acute diabetic complications is higher during Ramadan.

A multicenter cohort study done by Salti, et al.⁶ aimed to determine the characteristics and circumstances of patients with diabetes in 13 Muslim countries, and study the effect of fasting on diabetics. The methods used were population-based and retrospective cohort study with total randomized 12243 samples. Severe hypoglycemia and hyperglycemia were seen approximately five times more often during Ramadan, with RR 1.36 and NNH 50. They

concluded that most type 1 and type 2 diabetics did not follow doctor recommendation during fasting. Education, guidelines during fasting, and the morbidity and mortality risk should be explained for diabetics patients before Ramadan.

DISCUSSION

The two articles obtained are only one systematic review and one cohort study, due to several reasons. First, few articles are published because Ramadan fasting research is usually conducted in developing countries, or countries with non-English language. Many relevant abstracts are not available, while others do not meet the inclusion criteria. Most studies also focus on the management of diabetes during Ramadan. These further narrowed useful article numbers.

We appraised the systematic review and found several weaknesses. It did not synthesize

Table 3. Critical appraisal of etiologic study

Article: Salti I, Benard E, Detournay B, Bianchi-Biscay M, LeBrigand C, Voinet C, et al. A population-based study of diabetes and its characteristics during the fasting month of Ramadan in 13 countries. *Diabetes Care*; 2004;27(2306-11)
Level: 2B (individual cohort study)

Validity

Were there clearly defined groups of patients similar in all important ways other than exposure to the treatment or other cause? Yes

Were treatment exposure and clinical outcome measured the same ways in both groups? Yes

Was the follow up of study patients complete and long enough? Yes

Do the results satisfy some "diagnostic tests for causation"? Yes

Is it clear that the exposure preceded the onset of the outcome? Yes

Is there a dose-response gradient? Yes

Is there positive evidence from a "dechallenge-rechallenge" study? Yes

Is the association consistent from study to study? Yes

Does the association make biological sense? Yes

Importance

The 2x2 table for counting RR in patients with type 2 DM

Exposure		Acute Diabetic Complications		Total
		(+)	(-)	
Fasting	(+)	670	8124	8794
	(-)	134	2245	2379
Totals		804	10369	11173

RR = $[a/(a+b)]/[c/(c+d)] = 1.36$
PEER is used from CER
PEER = CER = $c/(c+d) = 0.06$

Applicability

Can the study results be extrapolated to your patient? Yes

What are your patient's risk of the adverse outcome?
RR = 1.36, PEER = 0.06
NNH = $[PEER (RR-1) + 1] / [(PEER \times (RR-1)) \times \{1-PEER\}] = 50$

What are your patient's preferences, concerns and expectations from this treatment?
Answer: Fasting safely without worrying acute complications risk

What alternative treatments are available?
Answer: Special management during Ramadan for type 2 diabetics h refer to Guidelines from EPIDIAR or PERKENI 2011

used articles, has no results described in tables or graphs, and the appraisal method used by the author is unclear. However, the Salti, et al. cohort study was valid, important, and also applicable to our question.⁶

The relative risk from Salti, et al. study is 1.36.⁶ It states that adult type 2 diabetics who fast in Ramadan has 1.36 times chance to suffer acute diabetic complications than those who do not fast. The risk is slightly higher in those who underwent Ramadan fasting but it is not clinically significant. So, Ramadan fasting is acceptable in such patients.

We calculated the number needed to harm based on RR and PEER. Since Salti, et al. study involves 13 countries and one of which is Indonesia,⁶ PEER is taken from CER (0.06) and results in NNH of 50. It shows that there will be only one person from 50 fasting patients, who suffers from acute complications. Therefore, Ramadan fasting is safe for type 2 diabetics.

The type 2 diabetics preference whether to fast during Ramadan should be individually managed and followed by specific assessment to avoid acute complications, according to guidelines from PERKENI¹ or EPIDIAR 2011.³ The management starts with pre-Ramadan medical assessment to address patients' whole well-being, education, and risk of fasting.³ It mainly depends on blood glucose level (controlled or uncontrolled), and the therapy used. The recommended management during Ramadan is showed in **Table 4.**³

While fasting during Ramadan, ingesting large amounts of carbohydrates and fats at sunset should be avoided, and complex carbohydrates are advisable at predawn meal.³

Diabetics are also forbidden to do rigorous physical activity which may lead to higher risk of complication.^{1,3} The management of diabetes medications is described in **Table 4.** Oral agents that act by increasing insulin sensitivity are

Table 4. Recommended management for fasting diabetics

Before Ramadhan	During Ramadhan
Patients on diet and exercise control	Consider modifying the time and intensity of physical activity; ensure adequate fluid intake
Patients on oral hypoglycemic agents	Ensure adequate fluid intake
Biguanide, metformin 500 mg, three times daily	Metformin, 1,000 mg at the sunset meal, 500 mg at the predawn meal
Thiazolidinediones, alpha-glucosidase inhibitors, or incretin-based therapies	No change needed
Sulfonylureas once a day	Dose should be given before the sunset meal; adjust the dose based on the glycemic control and the risk of hypoglycemia
Sulfonylureas twice a day	Use half the usual morning dose at the predawn meal and the usual dose at sunset meal
Patients on insulin	Ensure adequate fluid intake
Premixed or intermediate-acting insulin twice daily	Consider changing to long-acting or intermediate insulin in the evening and short or rapid-acting insulin with meals; take usual dose at sunset meal and half usual dose at predawn meal

Taken from: Al-Arouj M, Bouguerra R, Buse J, Hafez S, Hassanein M, Ibrahim MA, et al. Recommendations for management of diabetes during Ramadan. *Diabetes Care* 2010; 33:1901.

preferable than those acting by increasing insulin secretion.³ The doses should also be adjusted, especially for those taking insulin.

As for our patient, it is less risky, a controlled type 2 diabetic, to suffer from acute diabetic complications if he fasts during Ramadan.^{3,5,6} He can fast during Ramadan, but some arrangement should be made. The nutrition and physical activity therapy is suggested as mentioned above, and medications should be managed as described in **Table 4**.

CONCLUSION

Ramadan fasting is related with acute diabetic complications. The incidence of acute diabetic complications is slightly higher for type 2 diabetics who fast during Ramadan, but fasting is acceptable as long as they control their blood glucose level. Both pharmacological and non-pharmacological therapy need to be adjusted individually. More importantly, Ramadan should be used as a moment to improve diabetic control.

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