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Diabetes and lipid profile fluctuations associated with Ramadan fasting among Saudi Stroke's patients

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ABSTRACT

Background: Stroke is a major health problem in Saudi Arabia, due to an increasing state of its risk factors such as hypertension and obesity. Therefore, the present study aimed to assess diabetes and lipid profile fluctuations associated with Ramadan fasting among Saudi Stroke patients. *Methodology*: In the present study, data denoting to 61 Saudi stroke patients were retrospectively recovered from King Khalid hospital (records), Hail, Northern Saudi Arabia. Data relating to patients attended during the period from April 2019 to June 2019. The sample included two months (Shaban (non-fasting) and Ramadan (fasting)) a full coverage sample. Results: Out of the 61 patients, 35(57%) were non-fasting and 26(43%) were fasting. High glucose level was found in 36/61(59%) of the patients, of whom 20/35(57%) were females and 16/26(62%) were males. Low and high cholesterol levels were seen in 29/42(69%) (17/35(49%) females & 12/26(46%) males) and 8/42(19%) (6/35(17%) females & 2/26 (8%) males), respectively. *Conclusion*: Though Ramadan fasting showed a relative decrease in the incidence of stroke, improvement of blood glucose, and lipid profile, none of these factors showed a statistically significant correlation with fasting.

Keywords: Stroke, Ramadan, Saudi Arabia, Cholesterol, Lipid, blood glucose

1. INTRODUCTION

Fasting and dietary constriction have a miscellaneous positive impact on health and longevity in preclinical settings. Although, intramolecular changes associate human fasting are to some extent unclear, improved health markers (at metabolic levels) were reported (Heilbronn and Panda, 2019). Substantial attention has been publicized in the aptitude of caloric restriction as a modifiable factor for various markers associated with a healthy extended lifespan (Trepanowski et al., 2011). It was well established that restricting eating in 6 hours and fasting for 18 hours can initiate a metabolic shift from glucose base to ketone-based energy. This results in excess stress resistance, declined disease incidence rates, including obesity-related disease and cancer leading to increased longevity (de Cabo and Mattson, 2020). Fasting of Ramadan month is religious fasting, which is practiced by all Muslims for 29 or 30 days annually. Besides, the metabolic changes associated with the whole day-time fasting, Ramadan is associated with a shift to a nocturnal eating pattern. Such changes result in intermittent glycogen depletion and repletion in the liver. Ramadan time is associated with several changes including circadian rhythms hormones, such as cortisol, growth hormones, sex hormones, etc. (Lessanand Ali, 2019).

Stroke is associated with high prevalence rates of morbidity and mortality worldwide (Knight-Greenfield et al., 2019; Zhang and Liang, 2019). Many risk factors have been linked to the etiology of stroke including hypertension, LDL cholesterol, and other cardiovascular events. Preventing such risk factors is essential in stroke management (Janot et al., 2019; Isabel et al., 2016). However, it was assumed that Ramadan fasting can enhance or modify the excess presence of some metabolic associated markers that contribute to the etiology of stroke such as bad lipids. Therefore, the present study aimed to assess diabetes and lipid profile fluctuations associated with Ramadan fasting among Saudi Stroke's patients

2. MATERIALS AND METHODS

In the present study, data denoting to 61 Saudi stroke patients were retrospectively recovered from King Khalid hospital (records), Hail, Northern Saudi Arabia. Data relating to patients attended during the period from April 2019 to June 2019. The sample included two months (Shaban (non-fasting) and Ramadan (fasting)) a full coverage sample. Attained data were organized in a standard data-sheet, and then entered a computer software statistical package for social science (SPSS) for analysis. Besides the demographical data such as age and sex, the retried information included; Fasting, non-fasting, stroke type, stroke severity.

Blood glucose was categorized in to: ≤4 mmol/L = Low; 4.1-7.1 mmol/L = Normal; ≥7.2 = High. Serum total cholesterol was categorized in to: ≤5.2 mmol/L = Low; 5.21-6.2 mmol/L = Normal; >6.2 = High. Serum HDL cholesterol was categorized in to: ≤1.0 mmol/L = Low; 1.1-1.5 mmol/L = Normal; >1.5 = High. Serum LDL cholesterol was categorized in to: ≤2.6 mmol/L = Low; 2.61-4 mmol/L = Normal; >4 = High.

Statistical analysis

Retrieved data were analyzed using SPSS software. Frequencies, percentages, cross-tabulations, and statistical significance were obtained. A 95% confidence level was employed to obtain the Chi-square test, P-value <0.05 considered statistically significant.

Ethical Approval

Ethical approval was obtained from the Ethical Committee at the College of Medicine, University of Ha'il, Saudi Arabia. Ethical approval number: HREC 00135a/CM-UOH.04/20. A written ethical agreement was also obtained from King Khalid hospital.

3. RESULTS

The present study investigated data devoting to 61 stroke patients, aged 34 to 98 years with a mean age of 61±16.9 years. Out of 61 patients 35(57%) were females and 26(43%) were males. The majority of patients were at the age group <45 years followed by 76+ and 66-75 years, representing 17/61(28%), 13/61(21%), and 12/61(20%), respectively. Most females were at the age groups <45 and 76+ years, constituting 13/35(37%) and 8/35(23%), respectively, whereas, most males were observed at the age groups 56-65 & 66-75 years, representing 6/26(23%) in each group. Out of the 61 patients, 35(57%) were non-fasting and 26(43%) were fasting, as indicated in Table 1, Fig 1.

Table 1 Study subjects by sex, age, and fasting status

Variable	Females	Males	Total
Age			
≤45 years	13	4	17
46-55	3	5	8
56-65	5	6	11
66-75	6	6	12
≥76	8	5	13
Total	35	26	61
Fasting Status			
Non-fasting	23	12	35
Fasting	12	14	26

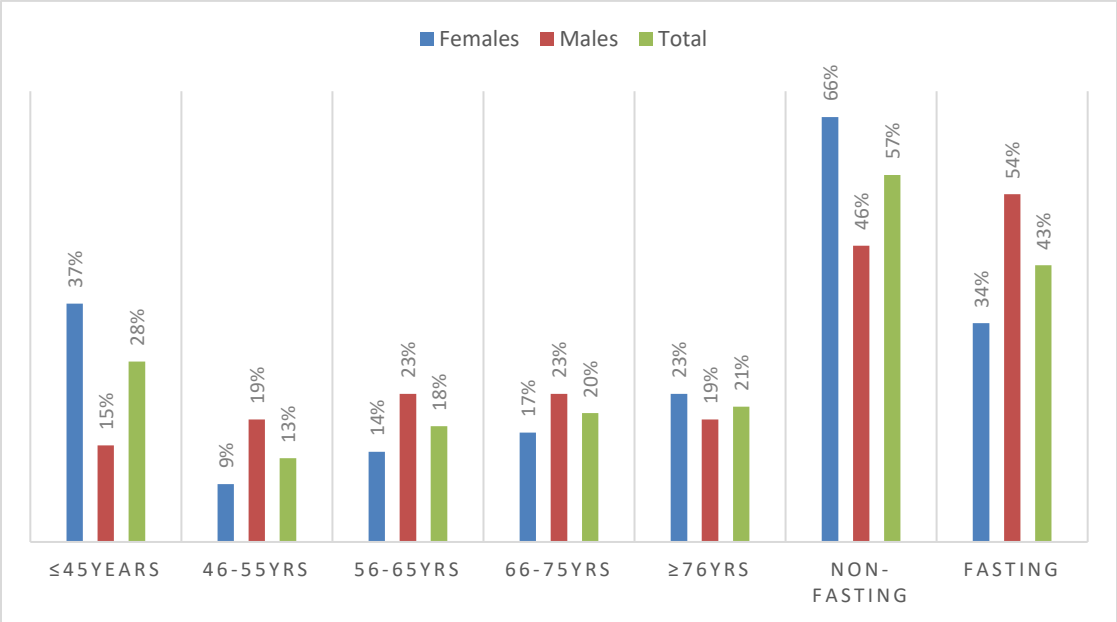

Figure 1 Sex by age

The majority of cases in this study attended with ischemic stroke representing 41/61(67%) followed by transient ischemic attack 19/61(31%). Ischemic stroke was predominant both in non-fasting 24/35(69%) and fasting 17/26(65%). Most cases attended with mild stroke state both in fasting and non-fasting, though proportions showing increased percentages of severity among non-fasting, as Table 2, Fig 2.

Table 2 Fasting status by stroke type and severity

Category	Variable	Non-fasting	Fasting	Total
Stroke type				
	Hemorrhagic	0	1	1
	Ischemic	24	17	41
	Transient ischemic	11	8	19
	Total	35	26	61
Stroke severity				
	NIHSS1-4 (Mild)	19	16	35
	NIHSS5-15 (Moderate)	13	8	21
	NIHSS16-20 (Severs)	3	2	5
	Total	35	26	61

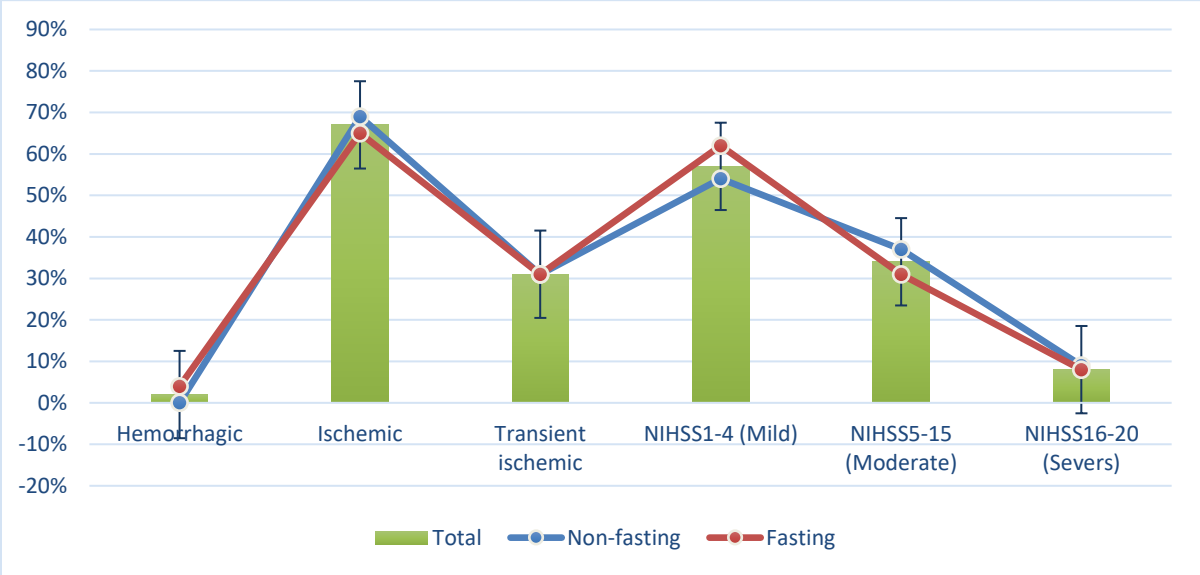

Figure 2 Fasting status by stroke type and severity

Table 3 and Fig 3 show the distribution of the patients by sex and glucose & lipid fluctuations. High glucose level was found in 36/61(59%) of the patients, of whom 20/35(57%) were females and 16/26(62%) were males. Low and high cholesterol levels were seen in 29/42(69%) (17/35(49%) females & 12/26(46%) males) and 8/42(19%) (6/35(17%) females & 2/26(8%) males), respectively. Low and high triglyceride levels were seen in 29/40(73%) (15/35(43%) females & 14/26(54%) males) and 11/40(28%) (6/35(17%) females & 5/26(19%) males), respectively. Low and high high-density lipoproteins (HDL) levels were seen in 30/42(71%) (17/35(49%) females & 13/26(50%) males) and 11/42(26%) (6/35(17%) females & 2/26(19%) males), respectively. Low and high Low-density lipoproteins (LDL) levels were seen in 16/37(43%) (11/35(31%) females & 5/26(19%) males) and 13/37(35%) (7/35(20%) females & 6/26(23%) males), respectively.

Table 3 Distribution of the patients by sex and glucose & lipid values.

Category	Variable	Females	Males	Total
Glucose				
	Low	2	0	2
	Normal	13	10	23
	High	20	16	36
	Availability	35	26	61
Cholesterol				
	Low	17	12	29
	Normal	12	3	5

	High	6	2	8
	Availability	35	17	42
Triglyceride				
	Low	15	14	29
	Normal	0	0	0
	High	6	5	11
	Availability	21	19	40
HDL				
	Low	17	13	30
	Normal	1	3	4
	High	6	2	8
	Availability	24	18	42
LDL				
	Low	11	5	16
	Normal	4	4	8
	High	7	6	13
	Availability	22	15	37

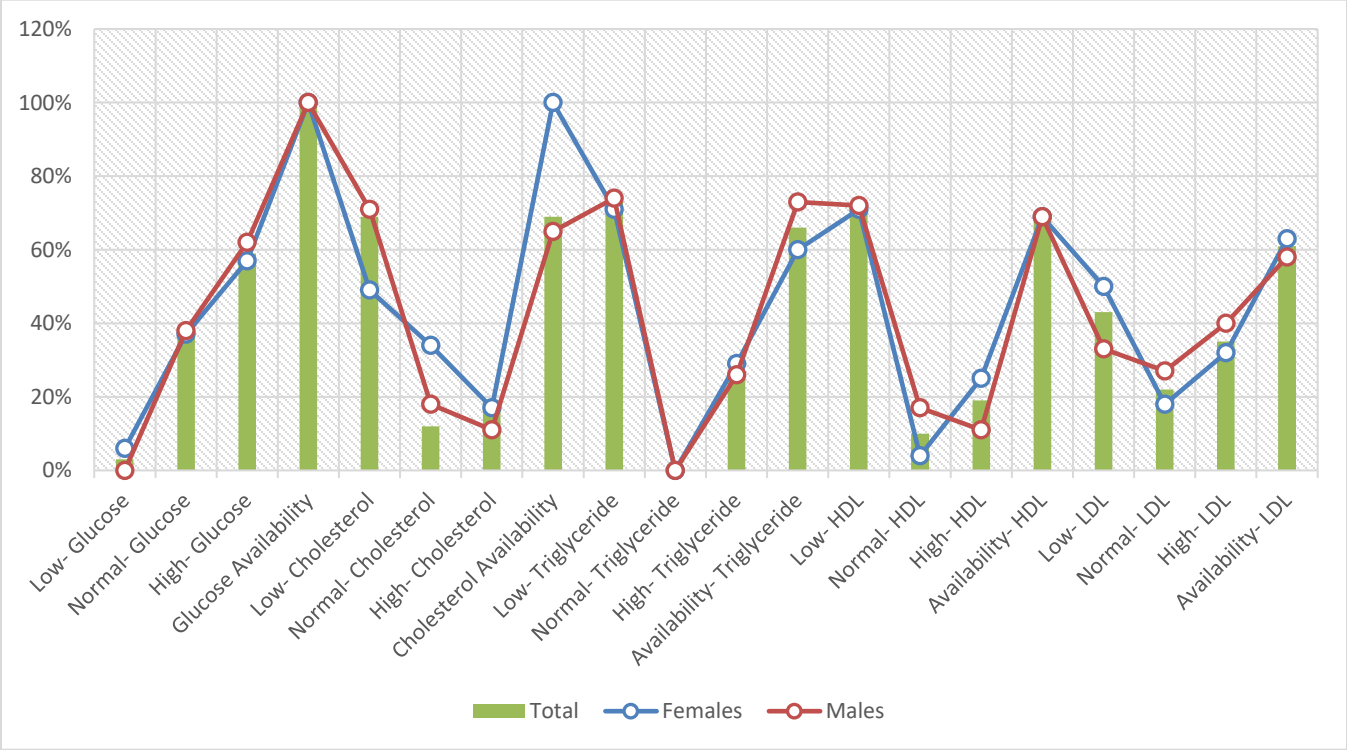

Figure 3 Patients by sex and glucose & lipid fluctuations

High blood glucose levels were identified in 34/61(55.7%) of the patients 20/34(59%) were non-fasting and 14/34(46%) were fasting. The risk of high blood glucose associated with non-fasting and relative risk (RR) and 95% confidence interval (CI); RR (95%CI) was 1.0612 (0.6719 to 1.6762), P = 0.7989. High cholesterol levels were identified in 6/40(15%) of the patients 3/6(50%) were non-fasting and 3/6(50%) were fasting. High triglyceride levels were identified in 11/40(28%) of the patients 4/11(36%) were non-fasting and 7/11(64%) were fasting. High HDL levels were identified in 8/42(19%) of the patients 8/13(62%) were non-fasting and 5/13(38%) were fasting. The reverse risk of LDL associated with fasting; RR (95%CI) = 2.4783 (0.5639 to 10.8922), P = 0.2296. High LDL levels were identified in 13/37(20%) of the patients 8/8(75%) were non-fasting and 2/8(25%) were fasting. The reverse risk of HDL associated with fasting; RR (95%CI) = 1.0909 (0.4416 to 2.6948), P = 0.8504, as indicated in Table 4 and Fig 4.

Table 4 Distribution of the patients by Fasting status and glucose & lipid values.

Category	Variable	Non-fasting=35	Fasting=26	Total=61
Glucose				
	Low	1	1	2
	Normal	14	11	25
	High	20	14	34
	Availability	35	26	61
Cholesterol				
	Low	16	13	29
	Normal	2	3	5
	High	3	3	6
	Availability	21	19	40
Triglyceride				
	Low	19	10	29
	Normal	0	0	0
	High	4	7	11
	Availability	23	17	40
HDL				
	Low	15	15	30
	Normal	2	2	4
	High	6	2	8
	Availability	23	19	42
LDL				
	Low	11	5	16
	Normal	3	5	8
	High	8	5	13
	Availability	22	15	37

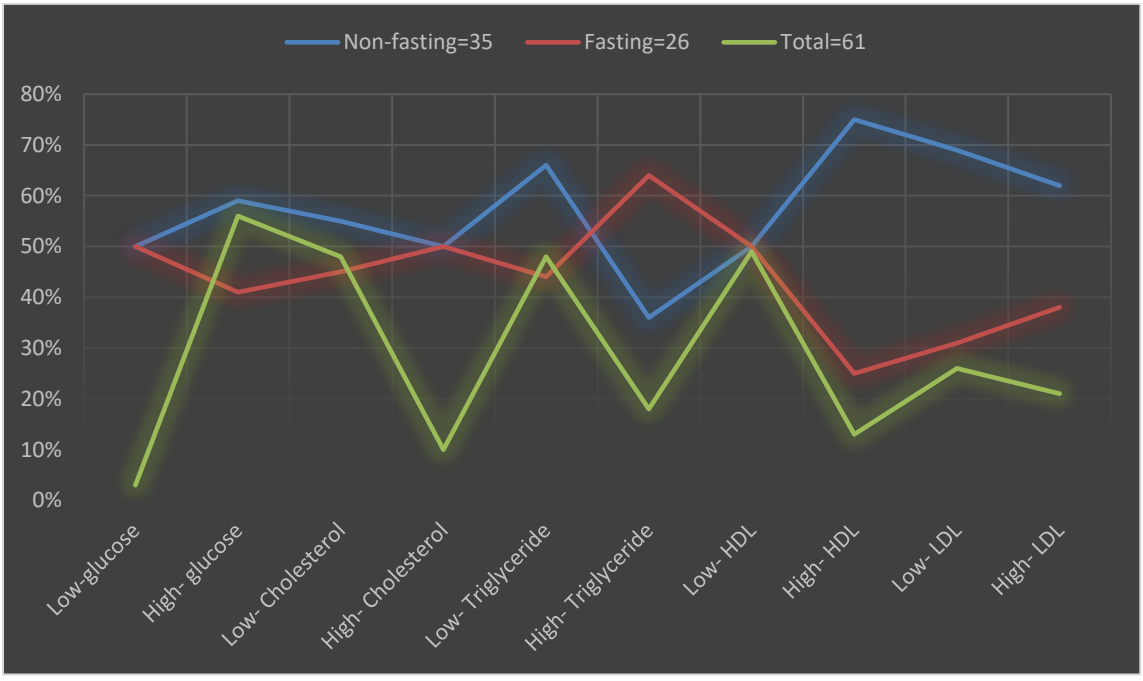

Figure 4 The patients by Fasting status and glucose & lipid values

4. DISCUSSION

Recent reports from Saudi health care providers showing that stroke is a major health problem due to an increasing state of its risk factors such as hypertension and obesity (Hothan et al., 2016; Alhazzani et al., 2018; Al-Senani et al., 2018). Consequently, the present study aimed to assess diabetes and lipid profile fluctuations associated with Ramadan fasting among Saudi Stroke patients. The overall cases of the stroke among fasting individuals were proportionally reduced 43%, it didn't show any statistically significant indication. Similar findings were previously reported in similar studies (Bener et al., 2006; Assy et al., 2019). However, several studies have indicated the benefit of fasting in decreasing the effects of stroke-related risk factors including obesity-related comorbidities (Al-Ozairi et al., 2019). Studies linking the Ramadan fasting to changes in blood pressure didn't report any significant relation (Seker et al., 2019). However, it was reported that Ramadan fasting reduces the blood pressure in patients using diuretics (Aslan et al., 2020).

However, the main focus of the current study was to assess the fluctuation in glucose and lipid profile measurements as supposed to be the most altered parameters during the fasting month. Increase the relative risk of glucose among non-fasting individuals was observed in the present study. A study compared the fasting blood glucose levels before and after Ramadan found that fasting can efficiently alter some biochemical markers including blood sugar in healthy individuals (Kul et al., 2014). Another study has investigated the influence of Ramadan fasting on blood glucose and glycated hemoglobin, found beneficial outcomes throughout Ramadan on glucose homeostasis (Khaled et al., 2006). Although none of the investigated lipid parameters have shown statistically significant alterations with fasting and most of them showing favored outcomes with fasting. Such findings were previously reported. In a meta-analysis conducted in this context, a moderate enhancement was witnessed in lipid profile parameters during Ramadan fasting, mostly in HDL. Moreover, fasting was more beneficial for athletic males (Mirmiran et al., 2019).

Nevertheless in the present study there was an apparent decrease in HDL and relatively elevation in LDL. A study found that there was a significant decrease in HDL and an increase in LDL in Ramadan. This might be attributed to the dietary, biochemical response, and metabolic events (Ziaee et al., 2006). Another study has reporting conflicting findings of increasing HDL with the beneficial effect of serum lipoprotein in young healthy adults (Lamine et al., 2006). The current data showing diverse fluctuation in relation to sex differences, through proportional fluctuation, yet, there no significant merit for Raman fasting. Although the present study made available a very rare type of information, it has several limitations. The timing of obtaining the sample within the fasting month was unavailable, which may influence the results, as the samples harvested in the first week of Ramadan surely containing sugar and lipids parameters differ from in samples collected at the 4th week of the month. Furthermore, the small sample size, and missing some parameters for some patients were other contributors to the limitations of this study.

5. CONCLUSION

Though Ramadan fasting showed a relative decrease in the incidence of stroke, improvement of blood glucose, and lipid profile but none of these factors showed a statistically significant correlation with fasting. Further studies adjusting factors such as the timing of sample collection within the fasting month, accompanied comorbidities, physical activity status can give more accurate indicators.

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Conflicts of Interest: The authors declare no conflict of interest.

Ethical approval

Ethical committee approval code number: HREC 00135a/CM-UOH.04/20.

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