

## The Effect of Fasting During Ramadan towards Improvement of Type 2 Diabetes Mellitus

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### Abstract

### Original Research Article

**Introduction:** Globally, the number of people with diabetes has been increasing trend in this modern day. Thus, this study aimed to explain the main factors of Type 2 Diabetes Mellitus (T2DM), to compare the random or fasting blood sugar before, during and after fasting month (Ramadan), and to determine the association between fasting and improvement of T2DM. **Method:** The total respondents of this study were 58 patients from Medical Outpatient Department. This study was used retrospective cohort study design. The data collected and recorded based on the inclusion and exclusion criteria. The fasting blood sugar for before, during and after the month of Ramadan was recorded in the designed form. The data were analysed by using SPSS version 20. **Results:** There were three factors of T2DM, obesity, smoking, and family history. There was no significant change of fasting blood glucose result for the comparison of three periods of time except one pair with p value of less than 0.05. There were no significant for the association between fasting and improvement of T2DM. In this study, researcher states that <0.05 was significant p-value. **Conclusion:** This study concluded that there was no association between fasting and T2DM. This might be related to many factors such as the behaviour and disciplined of people in desire of consuming food and limited data collection.

**Keywords:** T2DM, obesity, smoking, family history, fasting, improvement T2DM.

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## INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) is a common non-communicable disease in Malaysia. Todkar [1] stated that Diabetes Mellitus is called silent killer because it is a chronic non-communicable disease that may no symptoms. Diabetic Mellitus (DM) also a metabolic disorder that related to endocrine which may start to worst in a long time. However, Ginter & Simko [2] mentioned T2DM can be characterized when the person had the high level of glucose in blood and lead to insulin resistance and deficiency of relative insulin. The person may be diagnosed with T2DM if he/she experienced with polyuria, always thirst, weight loss and fatigue. According to [3], there is the increment of diabetes cases from 108 million adults in 1980 to 422 million in 2014.

There were a lot of factors that contribute to T2DM such as obesity, smoking, and family history. Obesity basically can be classified by BMI. The calculation for BMI is height in meters squared (kg/m<sup>2</sup>)

will divide body weight in kilogram. The dramatic acceleration of obesity and diabetes became the major issue global public health and they may lead to the risk of mortality and morbidity [4]. Hu [5] stated that western population has high prevalence of obesity and overweight compared to Asia. However, it may rise if the rapid and development of urbanization increase. On 31 December 2016, WHO [6] reported that people in Malaysia started to smoke from youth? Willi *et al.* stated that active smokers was associated with the high number of T2DM cases and followed by past smokers and never smokers [7]. Isomaa *et al.* [8] mentioned the risk to get T2DM is higher if both parents had the disease followed by if a sibling had T2DM. According to Berentzen *et al.* [9], the family history did not focus on the genetic only, it can be inherited lifestyle and environmental shared within families such as health behaviours and socioeconomic position or condition.

Ramadhan is the holy month of fasting for adult Muslims [10]. Fasting is not practiced by Muslim only. Non-Muslim also practicing it and called intermittent fasting. It is same with Muslim, intermittent

fasting is a volunteer to avoid food and drink in certain periods [11]. Patterson *et al.* [11] state that limits food taken daytime (intermittent fasting) can improve the metabolic health. This practice may cause hormonal and metabolic changes due to the limitation of the regular caloric intake [12]. Therefore, fasting can be one of the alternative treatments to treat T2DM and this study will explore the relationship between fasting and T2DM.

## MATERIALS AND METHODS

The study was ethically approved by the Kuliyyah of Nursing Postgraduate Research Committee (KNPGRC), International Islamic University Malaysia (IIUM) Research Ethics Committee (IREC), Clinical Research Centre (CRC) from HTAA, National Medical Research Register (NMRR), and Medical Research and Ethics Committee (MREC).

The sampling method used this study was purposive sampling. The sample was the group of patients who were diagnosed with T2DM. The sample size is 217 respondents. The patients' data will be recorded for pre – Ramadan, (three months before Ramadan) during Ramadan and post Ramadan (three months after Ramadan).

Inclusion criteria include the patient must be diagnosed with Type 2 Diabetes Mellitus only who age 18 years old and above. They were occasional came for check-up. For during month of Ramadan data, the patient's data will be chosen and recorded on or tenth day of the month. Both male and female were including. Lastly, the respondents had complete data for pre- Ramadan, (three months before Ramadan) during Ramadan and post Ramadan (three months after Ramadan) in 2017. Exclusion criteria include the respondents were non-Malaysian, the patient who diagnosed with Type 1 Diabetes Mellitus, and there was no data of fasting blood sugar (FBS).

### Data collection form

A designed form was used to fill the patient's data. The form was written in English. The form consists of socio-demographic data, body mass index, history of family with T2DM, activity of smoking, and fasting blood glucose result. The form filled by researcher only.

## STATISTICAL ANALYSIS

Statistical analysis was performed using IBM SPSS software version 20.0. Descriptive statistics were used to examine variable such as gender, age, body mass index, race, smoking, family history of T2DM, occupational, and educational level. Paired T Test is used to make the comparison between the fasting blood glucose result between three period of time (before, during, and after Ramadan).

Finally, a Chi Square test is used to know the association between two categorical variables. For this research, p-value <0.05 were considered as statically significant result.

## RESULTS

There were three factors of T2DM, obesity, smoking, and family history. Figure 1, 2, and 3 showed the percentage of factors that contribute to respondents to diagnose with T2DM.

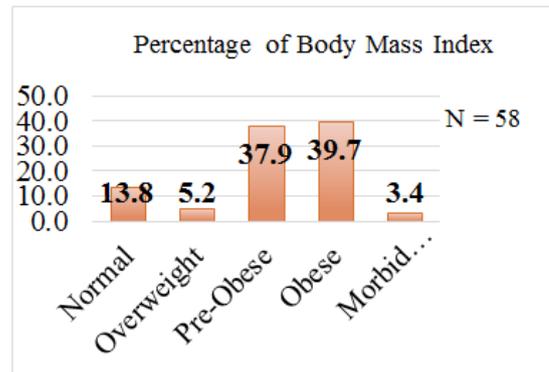


Fig-1: Percentage of BMI

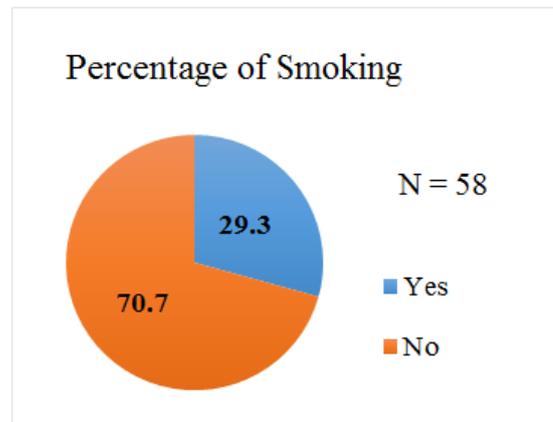


Fig-2: Percentage of smoking

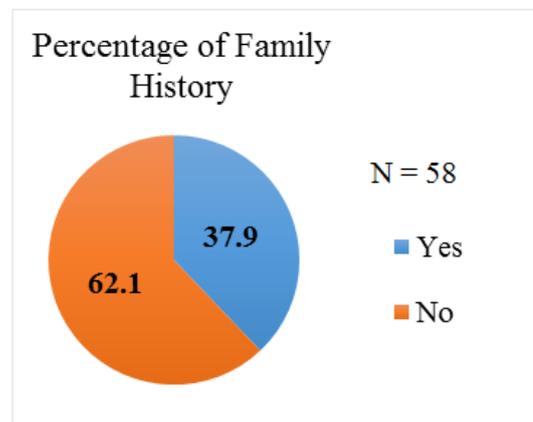


Fig-3: Percentage of family history

Figure 4 showed the prevalence and the comparison fasting blood glucose result before, during, and after Ramadan. The percentage was calculated based on 58 respondents.

The percentage of normal blood sugar result during Ramadan was higher than before Ramadan. However, the percentage declined after Ramadan but higher than before Ramadan. Furthermore, the highest blood glucose result which is 15.1 to 21 mmol/L and the percentage of blood glucose result during Ramadan lower than before Ramadan and the percentage increase

after Ramadan but lower than before Ramadan which were 13.7, 1.7, and 3.4 percent respectively.

Based on Table 1, there was no significant change of fasting blood glucose result for the comparison of three periods of time except one pair. Pair one, before Ramadan and during Ramadan ( $p = 0.02$ ), pair two, during Ramadan and after Ramadan ( $p = 0.2$ ), and pair 3, before Ramadan and after Ramadan ( $p = 0.056$ ). The significant value for this research was  $<0.05$ .

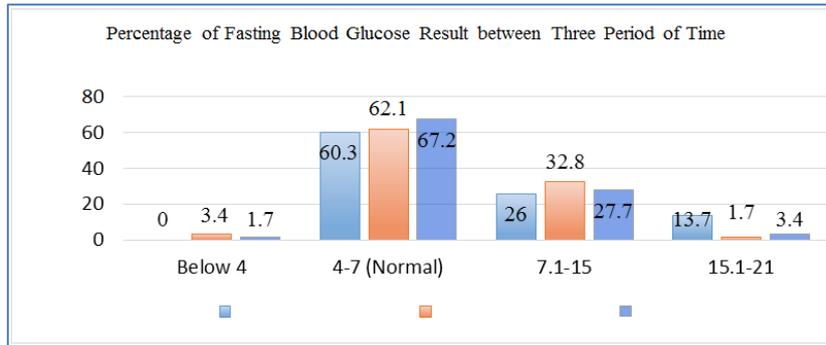


Fig-4: Percentage of fasting blood glucose result between three period of time

Table-1: Paired t test for fasting blood glucose

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	pre ramadan - during ramadan	1.5552	3.5774	.4697	.6145	2.4958	3.311	57	.002
Pair 2	during ramadan - post ramadan	-.5828	3.4199	.4491	-1.4820	.3164	-1.298	57	.200
Pair 3	pre ramadan - post ramadan	.9724	3.8027	.4993	-.0275	1.9723	1.947	57	.056

Table-2: The association between fasting and improvement in T2DM

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.000 <sup>a</sup>	1	.983
Continuity Correction <sup>b</sup>	.000	1	1.000
Likelihood Ratio	.000	1	.983
Linear-by-Linear Association	.000	1	.983
N of Valid Cases	58		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.03.

Table 2 showed the Chi-Square Test, which was a test to know the association between two categorical variables, fasting and improvement of T2DM, the significant p-value is 0.983 which was more than 0.05 indicated that there was no significant result.

## DISCUSSION

The highest percentage body mass index that suffered from T2DM was obese which was 30 to 40kg/m<sup>2</sup>. Obesity is the main cause of T2DM. The increasing of the number of obesity and body mass index (BMI), many studies and authors stated will increase the number of diabetes [13]. Dixon, Zimmet, Alberti, and Rubino [4] considered that obesity was the

main risk factor of T2DM because T2DM is increasing in the population who were in severe obese compared to the population who had a healthy weight. After that, non-smoker was the higher in the percentage that diagnosed with T2DM compared to smoker. The result got affected by the number of respondents. In addition, according to Kowall *et al.* [14], the individuals who active smoker had the risk to get T2DM. Then, the passive smoker who exposed to the smoke also one of the factors of T2DM. Therefore, it could be a reason for female being diagnosed with T2DM if the husband was an active smoker. Lastly, the respondents who did not have a family history of diabetes got the highest percentage in this study. It meant that from 58 samples, minority inherited the T2DM from the family. Family history was not the primary factor of T2DM. It was as a helper in getting the disease. Poor physical activity and sedentary lifestyle were the primary factors of T2DM. In addition, Berentzen *et al.* [9] also claimed that the individuals who had families with the history of diabetes tended to get the motivation to and awareness about the disease. Therefore they may change their lifestyle and risk for both T2DM and CVD may be reduced if lifestyle modification is applied.

The p-value for the comparison of the fasting blood glucose before and during Ramadan was less than 0.05 which means the result showed a positive result. Fasting gave positive effect to the improvement of T2DM. As Longo & Mattson [15] said fasting is one of the ways to restrict the caloric. However, when comparing fasting blood glucose during and after Ramadan, the p-value of more than 0.05. It meant that the eating habit of the respondents not correct anymore and may get the origin glucose result. Usually, after the month of Ramadan, people thought of freedom and ate as much as they wanted. Furthermore, after the month of Ramadan, Muslim will be celebrated 'Hari Raya Aidilfitri' and the dish served very high in calorie such as 'Rendang', 'Ketupat', 'Satay', and others. Therefore, if the person did not discipline him or herself, the blood glucose will back to its origin reading which was before the month of Ramadan. Lastly, the comparison between before and after Ramadan showed slightly more than 0.05 for the p-value. It could be shown there was no significant while applying fasting to improve the T2DM. It is because of the behavior of the person did not have healthy lifestyle after the month of Ramadan.

The result for chi-square test was p-value 0.983 which was more than 0.05. It was mean that the result was not significant. Based on this research's results, fasting in the month of Ramadan will not improve T2DM. Fasting actually gave a big help in improving T2DM by applying it in the correct ways. Fasting in the month of Ramadan accompany with right ways is absolutely give positive effect to their health [16, 15]. According to Longo & Mattson [15], intermittent fasting with at least minimal reduce of calorie intake can be achieved if the subjects do not

overeat to break the fast. However, the community loved food more than their health. It is because they feel healthy when consuming the food as desired.

## CONCLUSION

This study concluded that there was no association between fasting and T2DM. This might be related to many factors such as the behavior and discipline of people in desire to consume food after Ramadan and limited sample. Thus, no improvement in T2DM even fasting in the month of Ramadan.

## LIMITATION/RECOMMENDATION

Firstly, retrospective cohort studies. Many data were rejected because the complete socio-demographic data recorded hard to found. It is recommended to change the study design from retrospective to prospective cohort study design because this design is applicable to collect data presently and in future. After that is limited number of respondents make the result insignificant. Therefore, by expanding the setting of study, the number of respondents will increase and contribute to more significant result.

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