Journal of Advances and Scholarly Researches in Allied Education
Vol. 15, Issue No. 11, November-2018, ISSN 2230-7540

Study on Effective Ways to Control Blood Sugar

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Abstract – Diabetes is one of the fastest increasing metabolic diseases in the world today. Lifestyle changes have led to increased level of diabetes across all age groups. Initially, diabetes was known as sweet urine because in a chronic state of the disease, glucose is passed to the urine. The main objective of this paper is to evaluate the effect of irregular food intake (fasting) on the health of diabetics. The topic about the effect of fasting on the health of diabetics especially during Ramadan touches a real situation that should be addressed appropriately. Diabetes is a disease that has killed many people and provision of information about its effects is an essential way of ensuring that people know more about the disease. Fasting is an essential element of strengthening the faith of Islam and Muslims need to have adequate information about their health especially in the case of diabetics. In order to comprehensively address this issue, it is important to understand the meaning of diabetes, the pathology, symptoms, and control of diabetes. In this paper we study about the impact of fasting on the Health of Diabetics.

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INTRODUCTION

The human body requires food in order to function well and remain in good health. The energy required by the body is generated from the food consumed which is broken down through the digestion process into sugar commonly referred to as glucose. The glucose is absorbed in to the blood and transported into different parts of the body. The brain is the main body part that requires a lot of glucose as a source of energy. This clearly means that the glucose circulates to reach the brain and other parts of the body which is used as fuel to give the body energy. The circulation of the glucose into the cells is enhanced by the presence of a hormone known as insulin which is produced by the pancreas (Kelkar 2005). In the case of a healthy individual, the pancreas produces enough insulin to regulate the level of blood glucose. However, in the event that the pancreas is non-functional, insufficient insulin is produced and the process of circulating glucose into the blood cells is affected. The process of glucose circulation breaks down making the blood sugar level to increase which results in diabetes. In essence, diabetes is referred to as a metabolic disorder because it is a chronic condition that affects the normal process through which the body uses energy generated from food.

Diabetes which is generally referred to as diabetes mellitus is a set of metabolic diseases in which the body fails to control the amount of sugar in the blood due to lack of insulin. Diabetes is a metabolism disorder whereby less insulin is produced by the pancreas. This makes the body cells fail to respond appropriately to the insulin produced by the pancreas. This state results to building of glucose in the blood which cause diabetes. It is essential to provide an overview about the extent to which the body breaks down food into sugar which is used as a source of energy.

Type I Diabetes

Type I diabetes is normally referred to as juvenile or insulin-dependent diabetes as it is a disorder associated with the body immune system. Type I diabetes occurs when the immune system attacks beta cells in the pancreas and pancreatic islets which affects the production of insulin (Wasserman 2009). In such a case, the regulation of glucose is usually affected hence a person is diagnosed with Type I diabetes. This is an illustration of how the blood sugar is produced and controlled to ensure that a person remains in a healthy condition. It has not been established the reason that make the immune system to attack beta cells and pancreatic islets. However, certain factors such as genetics, viruses, autoimmune, and environmental factors are believed to make the body immune system to attack the beta cells.

Type II Diabetes

One of the most common types of diabetes is Type II diabetes and about 90% of people with diabetes are diagnosed with this disorder. Type II diabetes is also known as non-insulin dependent diabetes mellitus or adult onset diabetes mellitus. Risk factors of type II diabetes include obesity, old age, lack of exercise, and family history of gestational diabetes (Sari et al. 2004). In the United States,

Type II diabetes is high among African Americans, Mexicans living in America, Hispanics, Indians, and Pacific Islanders. Type II diabetes occurs due to insulin resistance which results from high blood sugar levels in the blood.

EFFECTS OF FASTING ON DIABETES

Every year Muslims observe the holy month of Ramadan as one of the key pillars according to their faith. During the holy month of Ramadan, Muslims fast whereby they refrain from oral medications, food, smoking, sexual activity, alcohol, and physical activity. All these activities are observed between the hours of dawn and sun set. Physicians usually advise diabetics to avoid fasting due to certain effects. Fasting has the effect of metabolic alterations as food is taken at dawn and sun set during the month of Ramadan (Salti et al, 2004). Due to metabolic alterations as a result of fasting, the concentration levels of glycogen increases which leads to a decrease in insulin concentration. This leads to the effect of fatty acid oxidation and glycogenolysis which cause severe outcomes to the fasting diabetic. The adverse effect of fasting for individuals with diabetes is hypoglycemia. If the situation is not well controlled, it can lead to coma. It is important for Muslims to seek medical advice before fasting so as to avoid the effect of hypoglycemia. Another way of reducing the risk to an acceptable level is by taking a snack before bed time so as to control the blood sugar level during the night hours.

CONTROL OF DIABETES

Diet

Physical exercise and proper dieting are effective ways through which blood sugar can be controlled and hence ensure that diabetics remain healthy (Wasserman et al, 2010). It is recommended that diabetics should avoid taking excess fats so as to control their weight. In addition, diabetes can be controlled by eating a balanced diet containing vegetables, fruits, milk, grains, meat, and whole grain foods. A patient with diabetes should avoid alcohol, smoking and fatty foods. This is because smoking and taking alcohol worsen the condition of diabetes as various body parts such as pancreas, liver, and lungs are affected. Once the body parts that produce insulin are affected the patient experiences major health complications. In addition, obesity is a health condition that is associated with diabetes therefore individuals should maintain a standard weight to avoid diabetes.

In addition, monitoring of blood glucose, proper management of acute health complications and administration of medical care are essential to ensure that diabetics are safe during fasting (Ragala et al. 2008). These are essential considerations that ensure fasting is done safely for diabetics during the month of Ramadan.

Insulin dependent

Insulin injection is also another way through which diabetes is prevented (Thaker & Barton 2012). This aims at balancing the level of insulin which is essential for controlling blood sugar level. Insulin is very important in regulating the level of blood glucose. Insulin is also involved in metabolism of fats and proteins which are potential sources of sugar which is needed by body tissues. The brain utilizes most of the glucose which is controlled by insulin and the rest of the glucose is utilized by body tissues. Safe fasting is essential and it is important for Muslims to take a lot of care and monitor the blood sugar level so as to ensure that diabetes is controlled.

REVIEW OF LITERATURE

According to Al-Arouj et al. (2010), “Fasting during Ramadan has been uniformly discouraged by the medical profession for patients with diabetes.” This claim is actually made because the findings of the Epidemiology of Diabetes and Ramadan study, which was conducted on 12,243 diabetics from 13 Islamic countries who fasted during Ramadan, state that these individuals “showed a high rate of acute complications” (Al-Arouj et al. 2010). The high rate of acute complications is mainly due to the incidence of hypoglycemia, hyperglycemia, diabetic ketoacidosis, and dehydration and thrombosis, which are all believed to be associated with fasting. Therefore, based on this claim by the EPIDIAR study, fasting during Ramadan is clearly not safe for diabetics.

However, the authors of the study somehow contradict themselves in their other statements about fasting vis-à-vis diabetes and Ramadan. In fact, Al-Arouj et al. (2010) themselves said that “the medical ramifications of fasting among patients with diabetes are largely unknown,” which means that the results of the EPIDIAR study may not be altogether inconclusive as to the possibility that fasting is safe for diabetics. It may therefore be true that fasting caused complications among the diabetics but perhaps the rate of incidence of these complications has not reached statistical significance.

Moreover, according to the findings of M’guil et al. (2008), “Ramadan fasting had no major effect on energy intake, body weight, body mass index, blood pressure, and liver enzymes.” Contrary to those reported by the EPIDIAR study, “fasting and post-prandial glucose levels decreased, while insulin levels increased” (M’guil et al. 2008). Furthermore, the study concluded that “diabetes was well-controlled in patients with dietary/medical management, without serious complications”

(M'guil et al. 2008). There is therefore proof that fasting for diabetics during Ramadan is indeed not harmful to the physiology of the patient. Nevertheless, the catch is that this is the case only because there is "dietary/medical management" (M'guil et al. 2008).

Fasting indeed seems to be safe for diabetics. According to a study by Reiter et al. (2007), 65% of those who fasted, which was 37 out of 56 subjects, were "successful" and that "there were no serious side-effects of fasting." Nevertheless, it was noted that the remaining patients who underwent fasting – the remaining 35% of the sample – "terminated their fast in the presence of either hypoglycemia or hyperglycemia" despite a high adherence to medical protocol (Reiter et al. 2007). Therefore, although had "no serious side-effects," it remains a fact that the deadly pathophysiological conditions of hypoglycemia and hyperglycemia occur in the patient. In fact, these conditions occur regardless of the strict adherence of the patients to medical protocol, which means that they were receiving standard adequate care and medication at the time of fasting. Nevertheless, the study was not conducted among respondents who fasted for Ramadan, hence there could be a difference in the results. Moreover, there was no statistical confirmation that 35% of a 56-subject sample would qualify as statistically significant.

Based on the ideas gleaned from the conclusions of the aforementioned studies, the hypothesis that "fasting during Ramadan is safe for diabetics" is being challenged by the fact that certain patients who underwent fasting during Ramadan experienced hypoglycemia, hyperglycemia as well as other complications. Therefore, this study will find out what the extent and significance of these complications are and whether their occurrence will disprove the hypothesis. For now, if the hypothesis were true, then it would also be true that fasting during Ramadan is successful only if "advice regarding exercise and medication will [simply] have to be modified during this period" (Velayudhan 2012).

Another proof that somehow fasting during Ramadan was safe and manageable was that in an experiment of 41 men with type 2 diabetes, "none of the patients…experienced severe hypoglycemia or neuroglycopenic symptoms" (Uysal et al. 1998). Since hypoglycemia is one of the most lethal complications that could possibly arise from fasting during Ramadan, as reported by the EPIDIAR study, the fact that this particular complication is absent in even an earlier study somehow brings to light the idea of patient management, which may have been absent in the EPIDIAR study (Al-Arouj et al. 2010). Nevertheless, regardless of whether the absence of hypoglycemia in the experiment by Uysal et al. was indeed due to proper patient management or not, the fact remains that it is possible for hypoglycemia to be prevented even during fasting. Moreover, one implication of which is that fasting during Ramadan may be done safely by diabetics.

The findings of Uysal et al. (1998) also indicated that "no statistically significant change was observed in mean body weight, total cholesterol level, or LDL cholesterol level [as well as] the mean triglyceride level." Moreover, "available data on the effect of Ramadan on lipid profiles are inconclusive and contradictory" (Uysal et al. 1998). The mere fact that the LDL levels and the mean triglyceride levels of the patients in the study are stable, as confirmed by statistics, somehow implies that fasting during Ramadan has no dangerous effects on one's lipid metabolism and thus does not alter it. Moreover, stable triglyceride and LDL levels translate as the absence of harm towards the heart and the whole cardiovascular system. Fasting during Ramadan for diabetics, therefore, is not expected to cause thrombosis, which was one of the complications reported by the EPIDIAR study (Al-Arouj et al. 2010). In fact, there is "favorable lipid profile" after fasting as proven by a "reduction in weight and improved metabolic control" (Uysal et al. 1998). Based on this statement, it means that fasting does not only cause no harm but also causes positive changes in one's cardiovascular system. This statement clearly supports the hypothesis. Nevertheless, its verity still has to be confirmed through this research.

The key to the complication-free results of the fasting that the subjects underwent was that they were on a "fixed caloric intake" and that the patients were under "oral hypoglycemic agent," or OHA, therapy (Uysal et al. 1998). The use of OHA has been confirmed by the findings of Benaji et al. (2006) a few years later, who concluded that "Ramadan fasting does not affect glycaemia in balanced type 2 patients treated with OHA drugs and diet, or treated with OHA drugs alone." This statement means that OHA drugs alone may be effective in preventing complications associated with diabetes when one fasts during Ramadan. Although such results do not necessarily include the plight of type 1 diabetes patients and may not shed light on other complications like hyperglycemia and ketoacidosis, the facts imply that, just like the previously mentioned findings of M'guil et al. and Veladyuhan, the key to the successful prevention of complications when fasting during Ramadan is proper patient management. Perhaps, this is the one thing that the EPIDIAR study did not consider. Nevertheless, Uysal et al. (1998) emphasized that the results of their study only referred to type 2 diabetes patients, which means that type 1 diabetes patients may not be entirely safe when fasting during Ramadan.

The study by Benaji et al. (2006) sheds more light on the matter of whether proper patient management is only for type 2 diabetes patients or also for those with type 1 diabetes as well. Based

on the findings of Benaji et al. (2006), "Ramadan fasting would be acceptable for patients with well-balanced type 2 diabetes who are conscious of their disease and compliant with their diet and drug intake." However, the problem with this is that type 1 diabetes may not exactly share the same good effects that type 2 diabetes patients have from OHA drugs and proper disease management. Another implication is that the main factor behind the strikingly different results between those of the EPIDIAR study and other studies is that perhaps the diabetes patients in the EPIDIAR study were not conscious of their disease or were not compliant with their diet and medication, or both.

Moreover, it has been found out by Benaji et al. (2006) that if patients with type 1 diabetes feel compelled to participate in the fasting during Ramadan, then they should be able to "undertake control of their glycaemia several times a day." Type 1 diabetes patients who wish to fast should also be managed with "fast absorption insulin" so as to achieve results that are free of complications associated with the disease (Benaji et al. 2006). This implies one thing – although it is relatively more difficult to manage type diabetes patients in order to prevent them from having complications when fasting during Ramadan, it remains a fact that proper management and scheduled medication are still the keys to a successful fasting. The only difference is that while type 2 diabetes patients should be managed with OHA drugs, type 1 diabetes patients should be managed with fast absorption insulin (Benaji et al. 2006).

FINDINGS

Lastly, heredity somehow plays a role in diabetes since research suggests that "individuals born small for gestational age are at increased risk of rapid postnatal weight gain, later obesity and diseases in adulthood such as type 2 diabetes, hypertension and cardiovascular diseases" (Morgan et al. 2010). Moreover, according to Arner et al. (2011), the development of type 2 diabetes is promoted by "a genetic predisposition [in terms of] abnormalities in storing excess lipids in the abdominal subcutaneous adipose tissue." Thus, based on the idea that diabetes could be hereditary in an individual, the 40 patients in our study should have been more careful with their weight considering that around 60% of them have one or both diabetic parents. Nevertheless, the fact that they have diabetic parents somehow translate as their having already been predisposed to diabetic complications, and so this is to blame for the undesirable symptoms that the 40 patients might have experienced, and fasting itself might not be the one responsible for the symptoms.

CONCLUSIONS

Based on the aforementioned data and information concerning the effect of fasting on diabetics, it is possible that people who have diabetes can fast during Ramadan but only if their physiology is monitored by a medical professional and only if they take certain measures. The complications associated with fasting are numerous if one is a diabetic. Diabetic ketoacidosis will severely reduce insulin dosages in the body and thus bring forth a host of other complications including hyperglycemia and even death, as well as very uncomfortable symptoms like nausea, vomiting and stomach pain. Hypoglycemia or low blood sugar may also result from fasting and may also be caused by medications that prevent hyperglycemia. Although not particularly lethal, hypoglycemia may make the body weak because of the severity of its symptoms that include hunger, weakness, anxiety, nightmares and other symptoms that somehow mimic those of a mental illness. Hyperglycemia, the opposite of hypoglycemia, is suspected as the cause of several microvascular and macrovascular complications including ischemic stroke. In short, hyperglycemia somehow links diabetes with stroke. Lastly, dehydration and thrombosis that result from fasting when one is a diabetic are two events which are directly linked. Dehydration, which is a result of an imbalance in the osmotic pressure of cells from too much glucose in the blood, eventually causes thrombosis. This then becomes the reason for a possible myocardial infarction and stroke in the patient. These are all the findings of the EPIDIAR study as well as other equally authoritative researches on the topic.

RECOMMENDATIONS FOR SAFE FASTING

The general recommendation for Muslims who go on a fast during Ramadan is "to not undertake fasting" (Al-Arouj et al. 2010). However, since patients insist on fasting, they need to be aware of the risks and they should remain obedient to the recommendations that their health care providers have given them (Al-Arouj et al. 2010).

Certain general considerations that should be given attention include, first of all, the individualization of management plans because every diabetic is unique and so the management plan must suit the needs of every particular patient (Al-Arouj et al. 2010).

Another consideration that is extremely important is the task of every patient to monitor his blood glucose levels several times in a day. This practice is common among those with type 1 diabetes as well as those who have type 2 diabetes (Al-Arouj et al. 2010).

However, perhaps, two of the most important general considerations is nutrition and exercise. In the case of nutrition, one should eat a balanced diet during Ramadan whose "aim [is to] maintain a constant body mass" (Al-Arouj et al. 2010). Based on the rules and conventions of nutrition, a diabetic should not "[ingest] large amounts of food and fat, especially at the sunset meal" (Al-Arouj et al. 2010). Simple carbohydrate-rich food must be the hero of your sunset meal. Exercise must follow a good and healthy diet, and whose goal is to maintain normal levels of physical activity. The problem is that exercise might bring about hyperglycemia (Al-Arouj et al. 2010).

Aside from insulin treatment, then the following medications must be administered to the patient: Metformin, Gitazones, Sulfonylureas and short-acting insulin (Al-Arouj et al. 2010).

In the case of diabetic ketoacidosis, there must be continual insulin replacement, replacement of fluids and electrolytes, and that the cause of the condition will be found and treated ("Diabetic Ketoacidosis" 2012). In the case of a life-threatening situation, thrombolytics have to be observed (Dinsmoor 2008).

For hypertension, hypotension and thrombosis, the patient's glucose metabolism must be enhanced. In this particular case only the drugs glimipiride, repaglinide, and insulin glargine must be administered to the patient (Cesur et al. 2007).

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