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The Effects of Fasting in Ramadan on the Risk Factors of COVID-19 in Adolescents: A Brief Review

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Abstract

Each year, many of Muslims including children and adolescents fast in Ramadan. This year, the month of Ramadan is in the period of the outbreak of COVID-19, and due to its spread, fighting this disease has brought about a new challenge for all Muslims in the world. Given the lack of studies on this issue, as well as the direct effect of fasting on the body and soul in the period of COVID-19 pandemic, this study intends to reflect the positive results of fasting in a mini-review. Therefore, online databases such as Web of Science, Scopus, Medline, EMBASE and Magiran were screened using the key words including: "Fasting", "Ramadan", "COVID-19", "Coronavirus", "Obesity", "Mental health", "Muslim" for the latest information. These keywords were searched from November 2001 to November 2020 in Persian and English languages. This study revealed that fasting by reducing obesity can help people to control their diabetes and cardiac diseases which are among the underlying diseases of COVID-19. In addition, fasting has an effective role in reducing violence and social problems. Interestingly, avoiding eating and drinking will reduce the contact of infected hands with mouth and reduces infection through swallowing.

Key Words: COVID-19, Coronavirus, Fasting, Ramadan, Mental health, Muslim, Obesity.

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1- INTRODUCTION

"Believers, fasting is decreed for you as it was decreed for those before you; perchance you will be cautious" (1). This sentence from the Qur'an shows that it is obligatory for a Muslim to fast. In addition to considering morality, fasting is an action in which Muslims avoid eating and drinking for a full lunar month. The fasting begins at the Fajr prayer (preceding sunrise) just before dawn and is broken at Maghrib prayer (marking sunset). Due to geographical differences, fasting times vary around the world and are observed between 10 and 22 hours (2). However, it must be mentioned that, Islam has forbidden fasting for ill people. The Muslim population is almost 1.9 billion that, after Christianity it is the largest religious group in the world. Muslims live all around the world, particularly in Africa, the Middle East, and Asia (3). Thus, many studies on the effect of Ramadan fasting on metabolic changes and its consequences on health in different groups of the Muslim population have been performed. Previous review studies have assessed the effect of Ramadan on cardiovascular risk factors (body mass index (BMI) and lipid profile), athletes' performance, diabetes, and transplantation (4). There have even been several studies on the safety of fasting in children (5, 6). This year, Ramadan is between late April and early May, as COVID-19 spreads. COVID-19 is a highly contagious disease that is associated with high mortality and there is no approved drug or vaccine for this disease. SARS-CoV-2, a virus responsible for COVID-19, is a beta-corona virus (7). The World Health Organization (WHO) has introduced COVID-19 as an international public health emergency (8, 9). COVID-19 transmission is facilitated by close contact between individuals, as the virus is spread through respiratory droplets and contact with contaminated surfaces (10). Therefore, strict guidelines and physical spacing guidelines have been applied to limit the prevalence of the highly contagious COVID-19 disease, which will limit many Ramadan rituals and customs this year. As we all know, people at high risk for COVID-19 disease are the elderly, people with heart disease, people with diabetes, obese people with a body mass index (BMI) > 40, people with weakened immune systems and people with mental health problems (11). Therefore, considering the role of religious rites in mental and physical health on the one hand, and the importance of Ramadan as a religious month for Muslims, including Iranians on the other hand, this study aimed to evaluate the effect of fasting in Ramadan on risk of COVID-19 infection.

2- MATERIALS AND METHODS

The aim of this study was to review the effects of fasting in Ramadan on the risk factors of COVID-19. This research is a narrative review which has been acquired with searching in valid online databases such as Web of Science, Scopus, Medline, EMBASE and Magiran and also Google Scholar using the key words "Fasting", "Ramadan", "COVID-19", "Coronavirus", "Obesity", "Mental health", "Muslim" for the latest information. These keywords were searched from November 2001 to November 2020 in Persian and English languages through advance searches by two PhD students and one MSc student. Any disagreement at the end of searches were resolved through discussion and by approval of a corresponding author.

3- RESULTS

There have been no review studies on fasting and the risk of COVID-19 infection. Healthy people should be able to fast in this month of Ramadan, as in

previous months, while COVID-19 patients may consider religious permits for breaking the fast in consultation with their doctors, as is the case with any other illness. On the other hand, there have been several studies on the effect of fasting on mental and physical health during Ramadan (10, 11). This is especially important when the fasting person is a child or adolescent. It is undeniable that genetic background of the fasting person is a key element in COVID-19 disease and its mortality. In this regard, this study reviewed the direct and indirect effects of fasting on the underlying diseases, the immune system of the fasting person, and overall risk factors for COVID-19 disease (**Figure.1**).

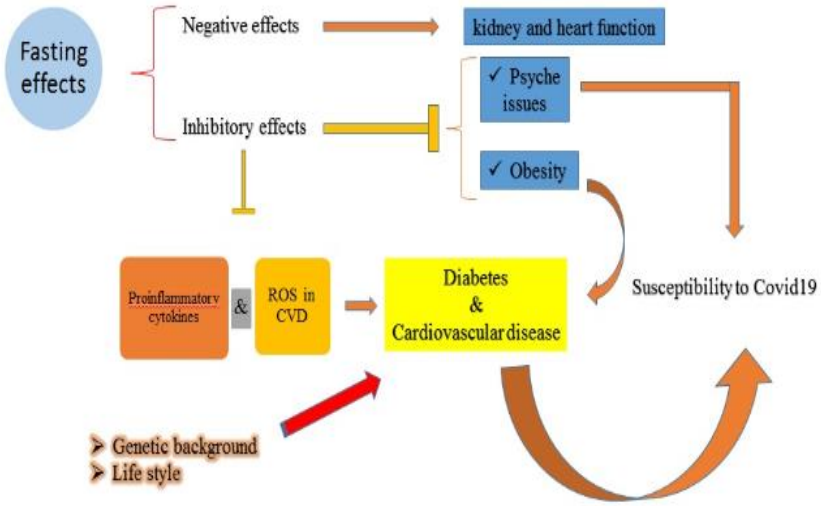

Fig.1: Fasting during Ramadan, with a positive effect on obesity in individuals, can reduce the susceptibility to COVID-19 by reducing the risk of diabetes mellitus and cardiac diseases, which are underlying diseases of COVID-19. Fasting also can reduce cardiac disease by reducing a number of pro-inflammatory cytokines. On the other hand, in some studies the positive effect of fasting on the mental state of fasting people has been reported. It is noteworthy that in all cases of each of these factors, the genetic background and lifestyle of individuals are also involved. It is very important that in patients with kidney or cardiac disease fasting must be under the supervision of a physician.

3-1. Multifactorial disorders and genetic background of COVID-19 patients

Growing evidences have revealed that Diabetes type 2 (T2D) and cardiovascular disease (CVD) patients could both share a similar genetic background like some polymorphisms (10), and also lifestyle conditions including (e.g. obesity, smoking, high blood pressure, alcoholism and lacking physical movements) (12). Some cohort studies have reported that risk of promoting CVD and cardiac death in patients with T2D is greater than in non-diabetic people (13, 14). Also, recent genome-wide association studies (GWAS) have demonstrated several genetic variants related to T2D and CVD (15, 16). It is noteworthy that, some previous studies have showed a significant link between T2D-susepting variants and increased risk of CVD in the common individuals (17) and in patients with T2D (18). Recent studies on COVID-19 patients support an effective role of these diseases on COVID-19 infection.

3-2. Obesity and the risk of developing COVID-19

In a previous study, which looked at the effects of obesity on COVID-19, obesity (BMI> 30), and severe obesity (BMI> 35)

were found to be 47.6% and 28.2%, respectively. Studies showed that there is a high incidence of obesity in hospitalized patients. In the intensive care unit for SARS-CoV-2, the severity of the disease has increased with BMI. Obesity is a dangerous factor in the severity of the disease caused by SARS-CoV-2 and more attention and preventive measures are needed in this sensitive situation (20). These studies showed that obesity was associated with a 6-fold increase in the risk of COVID-19 in patients with impaired fat metabolism (MAFLD). Notably, this association between obesity and COVID-19 severity remained significant even with age, sex, smoking, diabetes, hypertension, and dyslipidemia. Data showed that COVID-19 had a higher risk in individuals with developing obesity than people without MAFLD (20). Previous studies have also shown that there is a positive and significant correlation between weight loss during the fasting period and a significant reduction in fat percentage between before and after Ramadan in people who are overweight or obese.

3-3. Fasting and its effects on obesity

Although in most studies weight loss during Ramadan was common, weight gain is more common in later months. A meta-analysis of pre-Ramadan lipid profiles compared to post-Ramadan values showed that total cholesterol and triglycerides in men decreased and high-density lipoprotein increased in women. For diabetics and fasting people, diabetics need to know that medical, nutritional, and physical counseling is essential for people with diabetes who want to fast during Ramadan and while published studies show that fasting during Ramadan does not have a serious negative impact on children, it is strongly recommended that pregnant women refrain from fasting due to study limitations. The effect of fasting on the immune system during Ramadan is desirable (21).

3-4. Fasting and its effect on the immune system

Studies have shown that fasting during Ramadan may reduce the concentration of IL-6, IL-1β, TNF-α and the number of leukocytes and monocytes. High concentrations of pre-inflammatory cytokines (IL-6, IL-1β, and TNF-α) have been identified as a risk factor for cardiovascular disease, insulin resistance and cancers. The proposed mechanism is that fasting during Ramadan may reduce oxidative stress and cause lower levels of activated oxygen species (22).

3-5. Fasting and its effects on the psyche

Many researches have been done to investigate the effect of fasting on mental health and depression. In these studies, the data were supplemented by questionnaires containing demographic information and 12 standard criteria for depression with Farrell and Beck questionnaires. A few days before the month of Ramadan and again the same number of days after the month of Ramadan, the samples were studied and the average scores were compared. The results of these studies showed that fasting during Ramadan can be an important factor in reducing depression and improving mental health (11). On the other hand, obesity itself is one of the causes of depression, and fasting can be a solution to this problem.

3-6. Disadvantages of fasting during COVID-19

During Ramadan, individuals with chronic illnesses, including type 1 diabetes mellitus that are on insulin therapy through either several regular injections or constant subcutaneous insulin infusion treatments, require checking their glucose regularly to be aware of the risk of evolving hypoglycemia and/or hyperglycemia (23). Also, people in Ramadan are two times more at risk of calculus of ureter in contrast to calculus in other places of the urinary tract, especially when Ramadan is

in the summer season. In a previous study in kidney patients no significant difference was reported in the incidence of urinary stones during Ramadan months (24). In stage 3 or sever CKD (chronic kidney disease) patients, Ramadan fasting during the summer was reported to be in association with worsened renal function. Therefore, physicians must inform CKD patients against fasting (25). On the other hand, the majority of people with stable cardiac disorders can fast during Ramadan without any significant negative effects (26). During COVID-19, laborers are also unprotected against extra risks due to the nature of their job, such as higher levels of thermal strain and increased breathing effort from using half- or full-face respirators, in addition to the recognized physical, cognitive and emotional demands of the pandemic (27).

4- DISCUSSION

In Muslim countries, children often voluntarily fast in the month of Ramadan, which can be effective on their growth and metabolism. Moreover, Ramadan is usually synchronized with the school time; also, the influences of fasting on mental and physical condition are undeniable. This year Ramadan was synchronized with COVID-19 pandemic, thus caring for children is very important. To date, as of early November, about 50 million people in the world have been diagnosed with COVID-19, of which 360,000 have been reported in Iran (28). Several underlying factors including genetic background and also various diseases (physical or mental) have been considered effective in the incidence and mortality of COVID-19. In both of these aspects of humanity, life style is important. Numerous factors can affect a person's mental health, one of the most important is spiritual and religious beliefs, especially fasting (11). On the other hand, fasting can reduce the risk of heart disease and diabetes by affecting a person’s weight, which can indirectly eliminate the risk of coronary heart disease or reduce the risk of death from the disease (29). Also, since obesity itself is a risk factor for coronavirus, reducing obesity directly can affect the rate of coronavirus infection. Pulmonary function studies have shown a limiting pattern and reduction in lung volume in obese individuals. In addition, pulmonary features have been shown to be desirable for weight loss following surgery in obese individuals. On the other hand, obesity and metabolic syndrome are thought to increase type 2 inflammations, which may occur in lung and bronchial parenchyma. In this case, obesity and/or metabolic syndrome are associated with increased levels of interleukin 6 (IL-6). Abnormal secretions of adipokines and cytokines such as TNF-α and IFN-α indicate a low-grade chronic inflammation in abdominal obesity and may impair the immune response. On the other hand, body fat decreases during Ramadan, reducing the secretion of pre-inflammatory cytokines (30).

Also, smoking should be banned during Ramadan; so studies have shown that a significant amount of smoke is reduced in public places, which may reduce mortality. In addition, evidence suggests that smoking increases TC and LDL, low blood sugar control and increases the risk of developing type 2 diabetes, low birth weight and shortening gestational age, dysfunction of dendritic cells and the change in the number of immune cells are related (21, 31-33). Fasting in believers can help in calming the believers and also increase their patience. This patience can reduce family disputes and violence against women and children, which has been exacerbated by staying at home due to Corona virus. Therefore, fasting has an effective role in reducing violence and social problems. Also, avoiding eating and drinking will reduce the contact of infected hands with the mouth and reduce infection through swallowing. Although this study

shows promising results from fasting during the COVID-19 time and can be a recommendation for people, especially people with obesity, extensive studies are needed, especially in the clinical field.

5- CONCLUSION

Since children are more prone to disease, caring for their health is very important. In this regard, fasting can help their mental and physical behaviors by keeping them away from eating and drinking and also making them happy after their fasting time. In addition, in obese children fasting can reduce their weight and reduce the probability of diabetes and CHD in these individuals. All of these properties make fasting a good behavior in COVID-19 pandemic. Therefore, due to prevalence of obesity in people especially in developed countries and the positive effects of fasting on the main risk factors in developing COVID-19 and its effect on mental health, fasting in these communities can affect the prevalence of COVID-19 pandemic.

6- ABBREVIATIONS

BMI: Body mass index.

CVD: Cardiovascular disease

GWAS: Genome-wide association studies

CKD: Chronic kidney disease

CHD: Chronic heart disease

MAFLD: Metabolic associated fatty liver disease

T2D: Diabetes type 2.

7- CONFLICT OF INTEREST: None.

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