

The Effectiveness of a Suggested Indicative Program to Measure Cognitive Experiences Towards the Importance of Intermittent Fasting Diet and its Impact on Endemic Diseases in Najran Region

Thnaa Mahmoud Hashem Gouda* and Hind Eid Aljuhani

Home Economics Department, Food Science and Nutrition, Faculty of Education, Najran University, Najran, Saudi Arabia Kingdom

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Abstract: Metabolic syndrome represents a cluster of metabolic abnormalities that includes hypertension, obesity, insulin resistance, cardiovascular, immune diseases and atherogenic dyslipidemia, so we are in need for new dietary, lifestyle, and therapeutic options, include fasting emerged as a dietary method proposed for controlling metabolic risk factors. Intermittent fasting has gained attention as a diet for endemic diseases to metabolic health, hence there has been an increasing search to develop innovative therapies to decrease spread metabolic diseases. So this research was aimed the effectiveness of a suggested indicative program to measure cognitive experiences towards the importance of intermittent fasting regimen and its impact on endemic diseases in Najran region. Thirty volunteers persons from Najran region to awareness them towards the importance of intermittent fasting regimen and its impact on endemic diseases, the results showed that volunteers not have any awareness about the health benefits of intermittent fasting toward endemic diseases, thus, due to the awareness, increased their awareness about the intermittent fasting particularly, obesity, diabetic, and blood pressure diseases. The results have showed reduction and improvement post the intermittent fasting in the parameters such as, body weight from 95 ± 1 to 68 ± 1 kg, body mass index from 37.58 ± 1 to 25.1 ± 1.1 kg/m². Also, The laboratory results have showed reduction and improvement in blood glucose level from $170.5 \pm 1.8/95 \pm 2.0$ to $126 \pm 0.2/79 \pm 0.1$ mg/dl, triglycerides from 230.4 ± 3.0 to 201 ± 1 mg/dl, total cholesterol from 237.9 ± 1.2 to 198 ± 1.2 mg/dl, uric acid from 9.3 ± 0.1 to 3.6 ± 0.2 mg/dl, Creatinine 0.9 ± 0.11 to 0.72 ± 0.2 mg/dl, ALT from $(31.6 \pm 1.1$ to 14 ± 0.2 U/L, AST from 23.5 ± 0.8 to 13.5 ± 0.1 U/L and blood pressure level from $159 \pm 2/110 \pm 3$ to $123 \pm 1/86 \pm 1.1$ mm/Hg respectively. **Conclusion:** This research recommended by using the intermittent fasting diet as lifestyle due to its importance of endemic diseases as diabetic, obesity, blood pressure also immune diseases as cancer and covid-19. Also, it is one tool which has been proposed by health experts due to its benefits on weight management and cardiovascular health.

Keywords: Intermittent fasting, diabetic, Obesity, Cardiovascular diseases, Blood pressure immune.

1 Introduction

Intermittent fasting is one of the best choice for a healthier lifestyle [Kavitha Ganesan et al., 2018], it is the alternative methods of reducing kilocalories intake by refraining from eating for a specific period of time, for example 16 hours, and then eating meals, which lasts 8 hour [Brown et al., 2013], it is known by alternative day fasting and time restricted eating [Josip Vrdoljak et al., 2022], one meal consumed is usually eaten, which does not exceed 25% of the daily caloric [Varady et al., 2013], it is encompassing various programs that manipulate meal time to improve body composition and overall health [Tinsley and La Bounty, 2015]. Intermittent fasting has gained attention as a diet for weight loss and dysmetabolic diseases management and it has a role in improving metabolic diseases as diabetic, obesity, cardiovascular, immune [Izzah Vasim et al., 2022]. The remarkable effect of intermittent fasting result from a passive reduction in the production of damaging oxygen free radicals and its impact on health, aging, the life span and disease [Rafael de Cabo and Mark Mattson, 2019], also fasting improves the body safety [Speakman and Mitchell, 2011] and strengthens immune system [Longo and Mattson, 2014; Adawi

*Corresponding author e-mail: drthnaa@yahoo.com

et al., 2017], It is help in modification of triglyceride, high density lipoprotein cholesterol [El Bilbeisi et al., 2019]. On the other hand [Halgord Ali Farag et al., 2020] investigated the impact of Ramadan fasting on immune system function during pandemic viral infection as COVID-19 pandemic, and revealed that modifying the eating pattern and lifestyle induces physiological changes in the body and modulates the immune system, in addition fasting can be reduce the inflammations and increasing the cellular activity of the immune system. Lifestyle interventions were efficacious in the prevention treatment of obesity, reduction in body weight, cardiovascular risk factors [Carmen Galani and Heinz Schneider, 2007], blood pressure, blood cholesterol, blood glucose levels and the prevention of diabetes [Lindström, 2003]. [Karolina Nowosad and Monika Sujka, 2021] investigated the effect of various types of intermittent fasting on weight loss and improvement of diabetic in human, the results showed that intermittent fasting reduce body weight and reduce diabetes parameters such as fasting glucose, fasting insulin [Mattson et al., 2017; Rona Antoni et al., 2018], and it can be considered as an alternative and non-medicinal treatment for patients diabetics, but with supervision by the physician [Michael Albosta and Jesse Bakke, 2021], also metabolic regulation of glucose and lipids can be affected by change in meal time [Potter et al., 2016]. According to Fan Yang et al., (2021).

who carried out the effect of intermittent fasting on cardiometabolic risk factors and showed improvement body weight, body mass index, blood pressure, total cholesterol, triglycerides, and blood glucose. Also dietary patterns decrease hypertension and improve cardiac health, intermittent fasting is considered of the dietary pattern which reducing oxidative stress, optimization of circadian rhythms, and ketogenesis, additional to improve cardiovascular risk, as involves limiting calories consumed to improve in weight, blood pressure [Rizza et al., 2014], and insulin sensitivity in humans [Tiffany et al., 2020]. [Catenacci et al., 2016] confirmed that intermittent fasting may be decreased caloric intake, so it has control glucose in both humans and animals, also it has cardiovascular, neurodegenerative diseases like Alzheimer and Parkinson diseases benefits [Martin et al., 2006]. According to Cong Yin et al., (2021) investigated effect of intermittent fasting on non-alcoholic fatty liver disease, there were significant differences in body weight, body mass index, alanine aminotransferase and aspartate transaminase between the control and fasting group, but no significant difference in triglycerides and total cholesterol, so intermittent fasting is beneficial for weight management and liver enzyme improvement. The impact fasting on immune cell dynamics and mucosal immune responses, the nutritional status potentially influences immune responses; fasting reduces the number of lymphocytes by 50%. Thus, nutritional signals are critical in maintaining gut immune homeostasis [Motoyoshi Nagai et al., 2019]. On the other hand, excessive food intake with a lack of exercise causes the incidence of obesity [World Health Organization, 2016], which is a significant risk factor for cardiovascular disease, metabolic syndromes, and cancer [Basen Engquist and Chang, 2011] and inflammation due to obesity is indicated to the development of these diseases [Visscher and Seidell, 2001]. Intermittent fasting is considered a possible tool for host defense against SARS- CoV-2 infection because of calorie restriction, autophagy, immune response and the beneficial role of fasting in strengthening immunity [Brandhorst et al., 2015] and autophagy [Bagherniya et al., 2018] that may preventive against COVID-19, the individuals who are older adults or with comorbidities and compromised immunity have a higher risk of contracting COVID-19, so strengthening immunity by follow intermittent fasting is the best way to survive this disease [Abdul Hannana et al., 2020], thus intermittent fasting could be become a preventive strategy against COVID-19.

2 Subjects, Materials and Methods

Participant's baseline characteristics (Subjects)

Thirty of Participants volunteers of Najran region women, by age (30-45 years), BMI (>30 kg/m²), the weight (90 ± 5kg), high (159± 3 cm) suffering from diabetic type 2, high blood pressure and cholesterol. All participants had an elevated waist circumference of >80 cm. There is a light change in participant's weight (±3 kg) over the preceding 3 months. The study obtained a favorable opinion from the University of Najran ethics committee (NU/RG/SEHRC/11/1) and was conducted in accordance with the guidelines laid down.

Sample size considerations

According to Antoni et al., (2016), changes in lipaemia was selected as the primary outcome, the improvement in lipaemia would be greater following weight loss.

Study design

The study carried out participants numbered thirty volunteers women by age (30-45 years), BMI (>30 kg/m²), waist circumference (>80 cm), sex, ethnicity and homeostasis model assessment of insulin resistance to ensure balanced group allocation. To control for the degree of weight loss, study measurements were taken at baseline, participants had attained a 5 % weight loss, which it has significant impact on cardiometabolic risk factors. The follow-up phase, consisting of a pre questionnaire and the same questionnaire administered after 2 months.

Intermittent energy restriction diet.

On 5 consecutive days of the week, participants consumed foods very-low energy (1000 kcal) of total energy as carbohydrate, protein and fat, which delivered approximately 30 % of their energetic needs; all foods were selected by participants. Participants are required to drink little of (600 ml) water before eating any meal, then they consumed fresh vegetables such as lettuce, watercress or salad, followed immediately by eating low calories proteins such as meat, chicken or fish, then eating whole wheat bread or three spoons (60 gm) of rice or pasta, example, the breakfast as follow: One egg or low fat cheese with 10 gm beans, 25 gm whole wheat bread, one cucumber or carrot, 200 ml green tea or red tea, the lunch include grill chicken or meat or fish, salad or fresh vegetables, vegetable soup and 2 spoons rice or pasta and then, preventing eating the food for 16 hours daily until the follow day, but at the night should be recommended drink some beverages without sugar such as green tea, red tea, water, coffee. Recommend with non drink the milk during fasting period, this diet was followed five days weekly for six months to decrease the intake calories, with recording the differences in the weight, blood pressure, blood glucose, total cholesterol and triglycerides monthly.

Table 1: Intermittent energy restriction protocol / 5 days for six months.

Meals	Foods	Beverages allowed in the intermittent fasting
Breakfast	One egg, low fat cheese with 10 gm beans, Quarter of a loaf of whole wheat bread, one cucumber or carrot.	600 ml water before the breakfast, 5 gm apple vinegar, mixed in 500 ml water, 200 ml green tea, red tea or coffee.
lunch	Grilled chicken or meat or fish, salad or fresh vegetables, vegetable soup and 2 spoons rice or pasta.	Fresh vegetables such as lettuce or watercress, salad, eating the fruits such as oranges, apple or bananas before the meal.
The night period	Night time depends on drinking low-calorie drinks without eating any solid food	Beverages allowed during the intermittent fasting period such water, as green tea, red tea, apple vinegar,, ginger, coffee, black Nescafe.

Statistical analysis

Data analysis was done by SPSS software, to examine the relationship between anthropometric status and age and hypertension, t-test were used. There is relation between blood pressure and obesity according to [WHO, 2016] they mentioned that increasing BMI and waist hip ratio led to increasing blood pressure, diabetes, and dyslipidemia. A NOVA was used to test for statistical differences between subgroups, In addition Meta regression analyses were conducted to examine the impact of weight reduction on BP, weight loss has been independently correlated with BP change.

3 Results and Discussion

Baseline characteristics of volunteer’s participants

Data in **table 2** showed recording of baseline characteristics of volunteers participants like age, sex, high, AW, PW, BMI, DBP and SBP during the intermittent fasting for six months, the results showed a significant improvement in all parameters respectively (68±1, 60±1, 25.1±1.1 and 123±1/86±1.1) compared to the results before treatment (95±1, 60±1, 37. 58±1 and 159±2/110±3). These results agreed with Cabo and Mattson, (2020) investigated the effects of intermittent fasting on health, aging, and disease, several studies published confirm that intermittent fasting can be a useful and safe therapeutically option for obesity and its potential benefits on overall human health. According to Headland et al., (2019) investigated the effect of intermittent on weight loss and weight maintenance after 12 months in healthy overweight or obese adults, the results showed that intermittent fasting decrease the weight and treated the obesity, also it improves cardiovascular health in animals and humans, including blood pressure; resting heart rate; levels of high-density and low-density lipoprotein cholesterol, triglycerides, glucose, and insulin; and insulin resistance. In addition, the systemic inflammation and oxidative stress reduction, those are associated with atherosclerosis [Most et al., 2018].

Table 2: baseline characteristics of volunteer’s participants.

Parameters	Results	
	Before used intermittent fasting	Post used intermittent fasting

	0	1	2	3	4	5	6
Age / years	30-45	30-45	30-45	30-45	30-45	30-45	30-45
Gender	women	women	women	women	women	women	women
High Cm	159±3	159±3	159±3	159±3	159±3	159±3	159±3
AW Kg	95±1	93±0.5	90±0.7	85±1.0	81±1	75±1	68±1
PW Kg	60±1	60±1	60±1	60±1	60±1	60±1	60±1
BMI Kg/m ²	37.58±1	36.79±1	35.59±1.5	33.62±1	32.04±2	29.67±1.2	25.1±1.1
SBP mm/Hg	159±2	152±1	146±2	138±3	133±1.1	128±1	123±1
DBP mm/Hg	110±3	107±5	105±1	100±2	96±0.5	90±2	86±1.1

Results are presented as mean± SD, intermittent fasting group; $p < 0.05\%$. AW: Actual weight
 PW: Perfect weight BMI: body mass index SBP: Systolic blood pressure
 DBP: Diastolic blood pressure

Blood glucose, triglycerides and total cholesterol parameters

Data in **table 3** was showed blood glucose, triglycerides and total cholesterol levels for six months of treatment with the intermittent fasting. The results recorded a significant improvement in these parameters during the sixth month respectively ($126\pm0.2/79\pm0.1$, 201 ± 1 and 198 ± 1.2) compared to the results before treatment ($170.5\pm1.8/95\pm2.0$, 230.4 ± 3.0 and 237.9 ± 1.2), these results agreed with the study by María Morales Suarez Varela et al., (2021) studied the possible benefits of intermittent fasting in obesity, diabetes, and multiple sclerosis, it has effects on the lipid, weight loss and a modification of the distribution of abdominal fat in people with obesity and type 2 diabetes, as well as an improvement in the control of glycemic levels, also reduce the risk for cardiovascular disease with improvement in weight control, hypertension, dyslipidemia, and diabetes [Tiffany A. Dong et al., 2020]. On other hand, intermittent fasting may be aid in the improvement of the lipid profile in healthy, obese and dyslipidemic men and women by reducing TC, LDL, TG and increasing HDL levels [Heitor O. Santos and, Rodrigo C.O. Macedo, 2018].

Table 3: Blood glucose, triglycerides and total cholesterol parameters.

Analysis	Results						
	0	1	2	3	4	5	6
BG	170.5±1.8/ 95±2.0	162±1.0/ 92±1.1	157±2.0/ 90±0.7	149±2.5/ 87±0.3	141±0.1/ 84±0.5	135±1.2/ 82±0.2	126±0.2/ 79±0.1
TG	230.4±3.0	226±1.4	222±1.0	218±2.0	212±0.8	207±1.2	201±1
TC	237.9±1.2	234±1.1	230±0.4	223±1.0	217±1.0	211±1.0	198±1.2

BG: Blood glucose

TG: Triglycerides

TC: Total cholesterol

Kidney and Liver function analysis

Data in **table 4** showed liver and kidney function analysis. The results are recorded a significant improvement in uric acid, creatinine, ALT and AST levels in the sixth month as follows (3.6 ± 0.2 , 0.72 ± 0.2 , 14 ± 0.2 and 13.5 ± 0.1), compared to the results before treatment with intermittent fasting (9.3 ± 0.1 , 0.9 ± 0.11 , 31.6 ± 1.1 and 23.5 ± 0.8) respectively. These results agreed with Cong Yin et al., (2021) investigated effect of intermittent fasting on non-alcoholic fatty liver disease; the study concluded that intermittent fasting is beneficial for weight management and liver enzyme improvement. Intermittent fasting has positive effects on health, aging [Rafael de Cabo and Mark P. Mattson, 2019] and disease such as obesity [Most et al., 2018], diabetes mellitus, cardiovascular disease, cancers, and neurologic disorders [Harvie et al., 2013; Moro et al., 2016].

Table 4: Kidney and Liver function analysis.

Analysis	Results for six months						
	0	1	2	3	4	5	6
Uric acid mg/dl	9.3±0.1	8.7±0.6	6.15±0.1	5.2±0.5	4.39±0.5	4.00±0.1	3.6±0.2
Creatinine mg/dl	0.9±0.11	0.85±0.003	0.81±0.007	0.78±0.1	0.75±0.3	0.72±0.01	0.72±0.2
ALT, U/L	31.6±1.1	26±0.5	21±0.6	19±0.2	17±0.4	15±1.2	14±0.2
AST, U/L	23.5±0.8	20±1.5	18±2.1	17.5±0.1	15.5±0.1	13.5±0.1	13.5±0.1

5 Conclusions

Intermittent fasting has gained considerable popularity in the past decade, where individuals consume 25-30% of energy needs. In this study have been performed to test the effects of intermittent fasting on endemic diseases such as overweight, obesity, total cholesterol, blood pressure and blood glucose, this study have been performed on populations suffering from obese (BMI 37.58 ± 1 kg/m²) with higher blood pressure and hyperglycemia. These findings suggest that intermittent fasting is effective for weight loss, blood glucose, total cholesterol, triglycerides and heart diseases in normal weight and overweight persons. Generally, intermittent fasting improves cardiovascular health in humans, including blood pressure, resting heart rate, triglycerides, glucose, and insulin and insulin resistance.

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