

The Effect of Intermittent Fasting in some Physiological and Biochemical Aspects of New Zealand Rabbits

Muntaha M. Al-Qattan

Department of Biology/ College of Science/ University of Mosul

Hadeel T. Al-Shalash

Medical Laboratory Technology Department/ Al-Noor University College/ Iraq

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corresponding author:

Muntaha M. Al-Qattan

muntsbio17@uomosul.edu.iq

Hadeel T. Al-Shalash

hadeel.tariq@alnoor.edu.iq

ABSTRACT

Modern lifestyle has an unhealthy routine, including overeating and less physical activity, full of many complications such as chronic and degenerative disease in which the function and structure of tissues and organs deteriorate with advancing age due to lack of exercise and an unhealthy diet. IF is one of the ways that it has proven successful as a preventive method as well. IF was shown to be successful for short term weight loss in a systematic analysis of the four groups studied. However, long-term follow-up and randomized controlled trials are required to evaluate diet adherence and long-term maintenance of weight loss without regaining lost weight. Also, it is reducing levels of oxidative stress in all cells of the body, and improves the body's ability to resist stress at the cellular level by increase the total antioxidant capacity. IF forces the body to use fat as a fuel source, which means weight loss. The study also showed an increase in the level of the hormone adiponectin, which helps in fat metabolism, protects against heart disease and helps lose weight. The results also showed the occurrence of hyperthyroidism and the production large amount of the hormone thyroxine, caused an increase in the rate of metabolism, which resulted in weight-loss. This study and previous studies showed the positive results of IF in a well-studied scientific way, but there is a need to implement this protocol to distinguish the most effective time period in reduce oxidative stress and increase TAC level.

Keywords: Adiponectin, Intermittent Fasting IF, T.S.H, T₃, T₄, TCA.

INTRODUCTION

The harmful practices of the modern lifestyle, such as overeating and inactivity, lead to a number of issues, including chronic and degenerative diseases. To live healthfully, it is necessary to follow a preventive approach. The easiest and available method is IF which is the healthiest procedure to get rid of the problems of a good modern lifestyle that has led to many complications. Obesity is an ugly nightmare of everyone because it increases the chances of metabolic illnesses like type 2 diabetes, cancer, and cardiovascular disease as well as reduced immune system performance (Margină *et al.*, 2020).

A recent development in nutritional intervention is intermittent fasting. IF mandates that people abstain from eating anything with calories during the fasting period, and the phrase "intermittent" emphasizes the benefits of alternate fasting periods. It can involve both continuous and IF, time-restricted feeding, and modified fasting techniques. Calorie restriction is associated with improved weight, blood pressure, and insulin sensitivity in humans. IF is a dietary intervention similar to calorie restriction, which uses the principle of food intake restriction (Duregon *et al.*, 2021). However, regarding mealtimes, IF is emphasized. A day or a week, whatever comes first. A subset of alternate-day fasting may include a 24-hour period of fasting followed by a 24-hour period of eating. This subset can be practiced several times each week, as in the 5:2 approach, which alternates 2 fasting days with 5 days of no restrictions. Variations for quick time-limited programs include 16-hour fasts with 8-hour feeding windows, 20-hour fasts with 4-hour feeding windows, or other comparable versions (Dong *et al.*, 2020).

Although IF has been shown to have favorable health effects in a number of animal studies, its practicality and effectiveness in clinical settings are still debatable. A detailed evaluation of non-specific tissue and biological alterations in animal models is essential to understanding the mechanism of IF and evaluating its possible negative consequences in humans because dietary therapies like IF have systemic effects. IF leads to increased β -hydroxybutyrate levels in obese persons who fast indicate a ketogenic state (Adeva *et al.*, 2019). Ketone levels can be detected after 6 to 8 hours of fasting, signaling a switch from fat storage to fat utilization with a fall in low-density lipoproteins (LDL-C) levels and an increase in high-density lipoproteins (HDL-C) levels (Hwangbo *et al.*, 2020; Al-Hamdany and Al-Flayeh, 2019). This change from using glucose as energy to using fatty acids and ketones for energy is called "intermittent metabolic switching." Additionally, a ketogenic diet encourages weight reduction because it consumes more energy to process ketones (Mattson *et al.*, 2018). IF benefits from higher fat metabolism, which leads to better weight and lipid profiles, and contains features of a ketogenic diet. Importantly, the ketogenic diet, which emphasizes a large intake of animal fats, may not be as advantageous as IF. A ketogenic diet has been reported to increase levels of trimethylamine oxide, a molecule linked to increased cardiovascular risk, therefore consuming too much fat can be detrimental (Dong *et al.*, 2020). Despite the lack of adherence to a circadian rhythm, weight loss is likely to occur due to limited consumption of calories. The change in weight may also be related to the use of fatty acids for energy, which is consistent with a ketogenic state. They have a daily fasting period of up to 20 hours, during which ketogenesis which occurs the metabolic conversion from liver-derived glucose to fat-cell-derived ketones occurs daily or several days each week. (d'Avignon *et al.*, 2018)

The IF is another emerging area of research that has better results than other fasting regimens; it entails caloric restriction for a number of hours each day, alternating days or a number of days each week, including a feast period during which fasters are permitted to consume food at their leisure. However, fasters are permitted to drink water at their leisure at all times during the fast period (Hu *et al.*, 2020). It is well known that IF, even when done without calorie restriction, has a number of positive effects, including extending life span and improving glucose regulation and neuroprotection. IF also increases insulin sensitivity, which lowers blood sugar and improves glucose tolerance, it also increases cellular resistance to stress of all kinds and improves immune function (Hoddy *et al.*, 2020; Antarianto *et al.*, 2022). Many scientific studies were conducted to

evaluate the effect of IF on potential health outcomes, and it was discovered that IF resulted in extending lifespan and preventing a variety of discrepancies including (CVDs), renal diseases, various cancers, and diabetes. IF was also observed to provoke the positive effects in cardiovascular health, including lower heart rate and blood pressure, increased post-exercise heart rate variability, and other outcomes. Additionally, gender differences in impacts on glucoregulatory health were noted. While IF was seen to improve insulin sensitivity in male individuals but not in females, glucose tolerance was seen to be reduced in female subjects while no change was seen in male subjects (Moon *et al.*, 2019). While it has been demonstrated in numerous experiments that lipids and carbohydrates have no impact on lifespan, protein restriction has been shown to extend maximum lifespan by up to 20%, which may be related to a reduction in the amino acid methionine (Guo *et al.*, 2021).

A periodic dietary restriction known as IF has been found to lengthen life, support energy metabolism, and lower the chance of acquiring a number of age-related diseases (Meng *et al.*, 2020). In mouse models, it has been shown that IF could ameliorate diabetes-related retinopathy, prevent central nervous system autoimmunity, improve adipose tissue browning, and decrease insulin resistance via changing the composition of the gut microbiota and microbial metabolites (Morales-Suarez-Varela *et al.*, 2021; Liu *et al.*, 2019). Since the AMPK-sirtuin 1 signaling pathway is activated by energy deprivation, these alluring processes have helped IF receive a lot of attention as a weight management strategy. But it's important to remember that losing weight on its own can help with metabolic problems associated with cardiovascular illnesses and low-grade inflammation that goes along with them, in order to reach useful conclusions for researchers, dietitians, doctors, and other health professionals, a critical evaluation focusing there must be research on the overall impacts of IF diets on weight loss (Welton *et al.*, 2020; Santos and Lavie, 2021; Lari *et al.*, 2021). In animal models, IF is a diet-restricted regimen (DR) that allows eating only every other day, which can reduce oxidative stress and neuroinflammation, as a result, it's critical to alter present eating patterns and develop a fresh, easily implemented approach to stop these health risks. A novel dietary restriction technique called IF has been shown to increase body metabolism, reduce body fat and weight, and improve cognitive function (Holmer *et al.*, 2021; Liu *et al.*, 2019; Hu *et al.*, 2019).

The objective of the current study was to evaluate the potential benefits and harms of IF for different periods of time 12, 24 and 48 hours on some biological variables and antioxidants and its effectiveness in affecting weight.

MATERIALS AND METHODS

The experiment was conducted in Animal House / College of Science/ Department of Biology/ University of Mosul.

In this study, 20 New Zealand white male rabbits (Scientific name: *Oryctolagus cuniculus*) aged (8-9) months, and their weights ranged from 1 kg to 1300 kg, obtained from local markets were used. After making sure that they are free from diseases, they were placed in metal cages specially designed for this purpose, under suitable temperature conditions of 25-28°C, daily lighting and good ventilation for 14 hours, and for the purpose of adapting to them place and feed. Feed was provided using plastic utensils in equal quantities and in a fixed sequence to all rabbits, and water was introduced into plastic containers fixed to the cage. To prevent it from spilling.

Prepare the diet

In this study, a special diet for rabbits with a protein content of 16% was used. Evaluated by the National Research Council (NRC) (Santos, 2022). these ingredients were mixed as adopted by Meng *et al.*, (2020) in addition to providing Variety of green fodder.

Table 1: Feed ingredients

Ingredients	Percentage%	Crude protein%
Wheat bran	47	7.50
Local crushed barley	38	3.60
Soybean meal	10	4.40
Protein concentration (44%)	2	1.0
NaCL	1.5	-
Premix	0.5	-
Total	100%	16.5%

the amount of energy was 2213 kg calories / kg diet (Meng *et al.*, 2020).

Experience design

Rabbits were randomly divided into four groups by five rabbits/group, the initial weights of each group were taken and fixed as the initial weight, and after being starved (12, 24, 48 hours) compared to the control treatment (the control group) the final weight of each group was taken after the end of Experiment (4 weeks) with a sensitive electronic scale:

- 1- The first group (the control group): this group was treated by giving it a standard diet, and the average weight of the rabbits for this group was 1400 kg, for thirty days.
- 2- The second group: This group was treated with a standard diet after being starved for 12 hours, and with a different dose of green fodder, and the initial weight of this group of rabbits was 1405.80 kg.
- 3- The third group: This group was treated with a standard diet after being starved for 24 hours, and a varied dose of green fodder, and the initial weight of this group of rabbits was 1416.6 kg.
- 4- Fourth group: This group was treated with a standard diet after being starved for 48 hours, and a varied dose of green fodder, and the initial weight of this group of rabbits was 1399. kg.

Blood samples were drawn directly from the heart by puncture syringe using a 10ml medical syringe and the samples were placed in airtight, dry tubes free of anticoagulant materials and left at room temperature for 20 minutes to coagulate the blood. Then it was placed in a centrifuge at 3000 revolutions per minute for a period of 15 minutes to obtain the serum, which was kept by freezing at -20 temperature until the biochemical and hormonal tests were performed.

Hormonal assays: Adiponectin was determined using a ready-made assay kit manufactured in the American company MyBioSource. For thyroid-stimulating hormone, thyroxine, and thyronine, an assay kit manufactured at the US AccuBind ELISA Microwells Company was used.

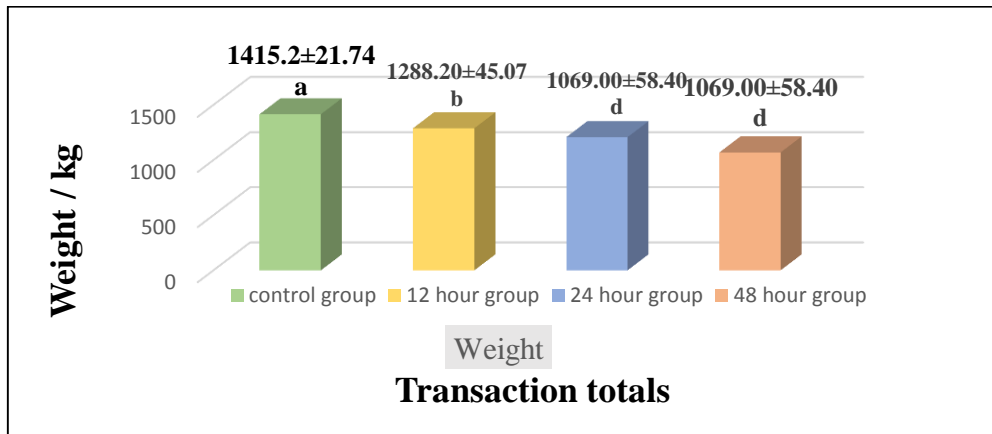
Determination of the total antioxidant capacity in blood serum: The quantitative capacity of antioxidants in serum was estimated using several analyzes from the American company MyBioSource using ELISA technology and using a semi-automated ELIZA reader device produced by Rayto German company, and the wavelength was estimated at 450 nm Then the final results were obtained with the values of the standard curve suitable for the device.

Statistics

Data are expressed as mean \pm SEM. Significance levels between groups were calculated using Student's t-test after establishing a normal distribution. Multiple comparisons were made by means of factorial analysis of variance (ANOVA) adjusted for SPSS. Statistical significance is indicated as $P < 0.01$.

RESULTS

It was observed from the results of Figure 1 that there was a significant decrease in the weights of the groups of male rabbits at the probability level ($P \leq 0.01$), as it was noted that the weights decreased the longer the food interruption period for male rabbits, and the arithmetic mean of the lowest weight in the fourth group after the 48 hour food interruption was 1.069 ± 58.40 and the highest arithmetic mean in the second group after being cut off from food for 12 hours was $1.288.20 \pm 45.07$ kg, compared to the control treatment whose arithmetic mean was $1.415.2 \pm 21.74$ kg.

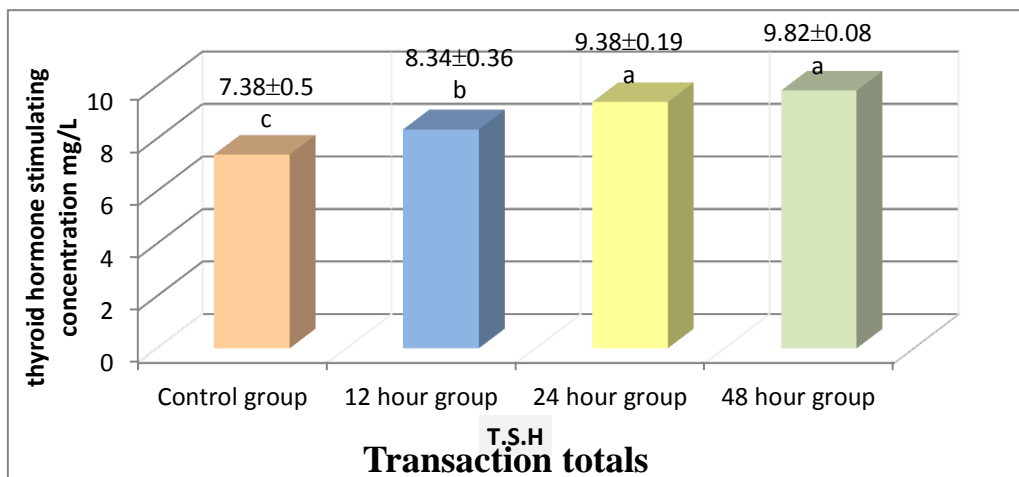


The values are expressed as the arithmetic mean ± standard deviation, number of rabbits / groups = 5

The figures followed by different letters mean that there is a significant difference at the probability level ($P \leq 0.01$).

Fig. 1: The effect of fasting on the weight of healthy male rabbits

Fig. (2) shows a significant increase at the probability level ($P \leq 0.01$) in thyroid stimulating hormone (TSH) concentration, after a 48-hour food interruption. The mean of this group was 9.82 ± 0.08 mg/L compared to the control group. Also, a significant decrease in the concentration of thyroid stimulating hormone (TSH) with decrease the body weight was observed, 12 hours after the interruption of food. For this group it was 8.34 ± 0.36 mg/L compared to the control group which was 7.38 ± 0.50 mg/L.

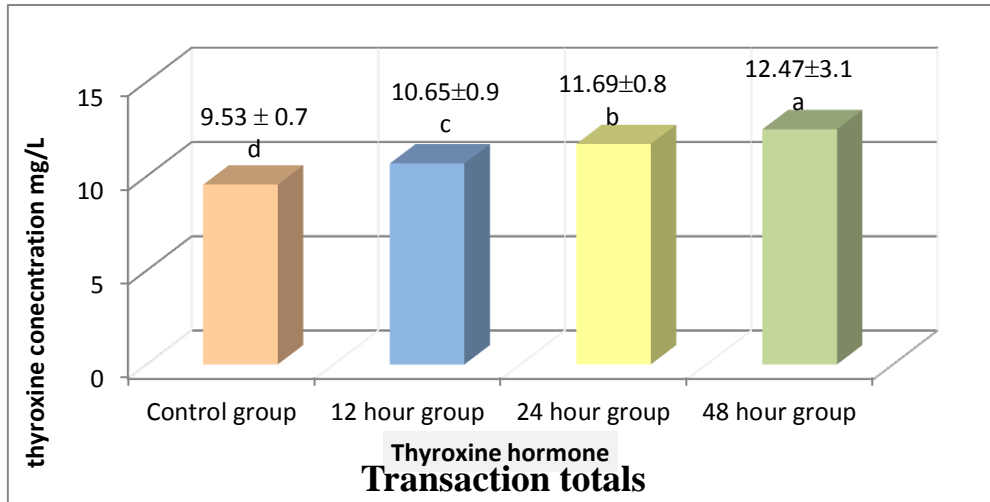


The values are expressed as the arithmetic mean ± standard deviation, number of rabbits / groups = 5

The figures followed by different letters mean that there is a significant difference at the probability level ($P \leq 0.01$).

Fig. 2: Effect of fasting on Thyroid Stimulating Hormone

Fig. (3) shows a significant increase at the probability level ($P \leq 0.01$) in the concentration of thyroxine (T_4) the longer the period of abstinence from food in male rabbits compared to the control. It was 12.47 ± 3.1 mg/L after a 48-hour break from eating for a month, while the arithmetic mean for the comparison treatment was 9.53 ± 0.7 mg/L.

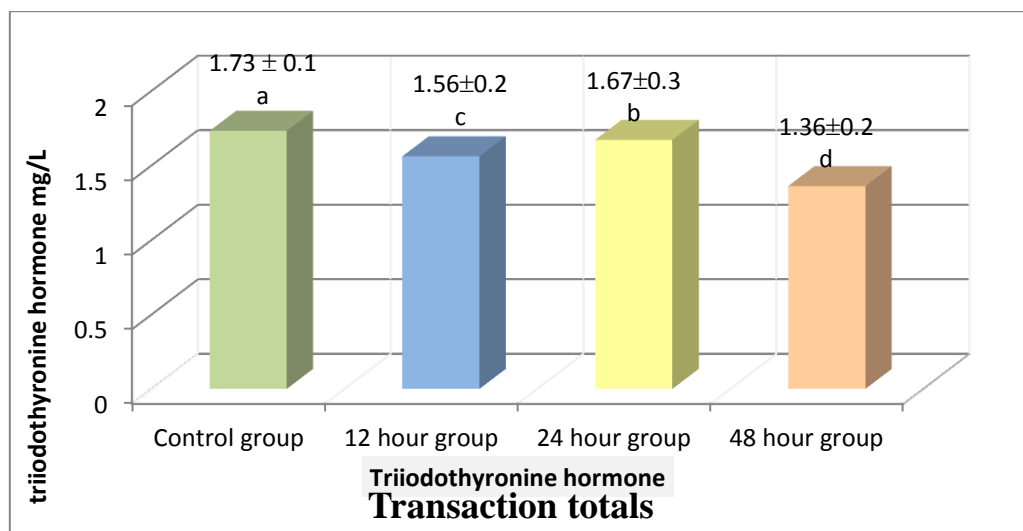


values are expressed as the arithmetic mean \pm standard deviation,
number of rabbits / groups = 5

The figures followed by different letters mean that there is a significant difference at the probability level ($P \leq 0.01$).

Fig. 3: Effect of fasting on concentration of thyroxine

Fig. (4) shows a significant increase at the probability level ($P \leq 0.01$) in triiodothyronine (T_3) concentration in male rabbits after male rabbits stopped eating for a period of time. 48 hours compared to the control. The calculation of both species was 1.73 ± 0.1 mg/L after one month of the experiment, while a significant decrease in T_3 concentration was observed in the group of rabbits that were kept from food for 12 hours and the mean was 1.56 ± 0.2 mg/L. L after 1 month compared to the control.

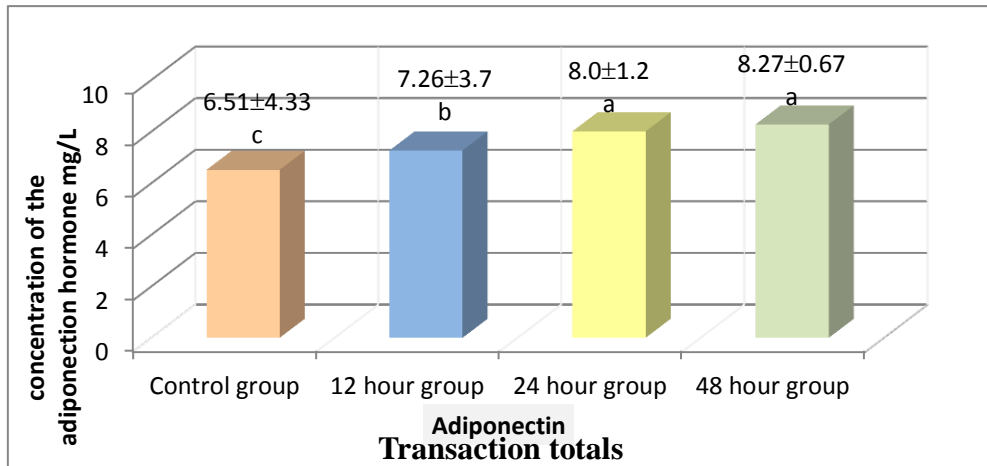


The values are expressed as the arithmetic mean \pm standard deviation,
number of rabbits / groups = 5

The figures followed by different letters mean that there is a significant difference at the probability level ($P \leq 0.01$).

Fig. 4: Effect of fasting on triiodothyronine hormone

The results in Fig. (5) showed a significant increase at the probability level ($P \leq 0.01$) in the concentration of adiponectin hormone in the fourth group after a 48-hour food break, compared to the control treatment and the average of this group. It was 8.27 ± 0.67 mg/L after 1 month of the experiment. Also, a significant decrease in the concentration of adiponectin hormone was observed in the blood serum of male rabbits from the first group after eating a 12-hour food break compared to the control treatment. With a mean of 6.51 ± 4.33 mg/L, while the mean was an arithmetic group 7.26 ± 3.7 mg/L.

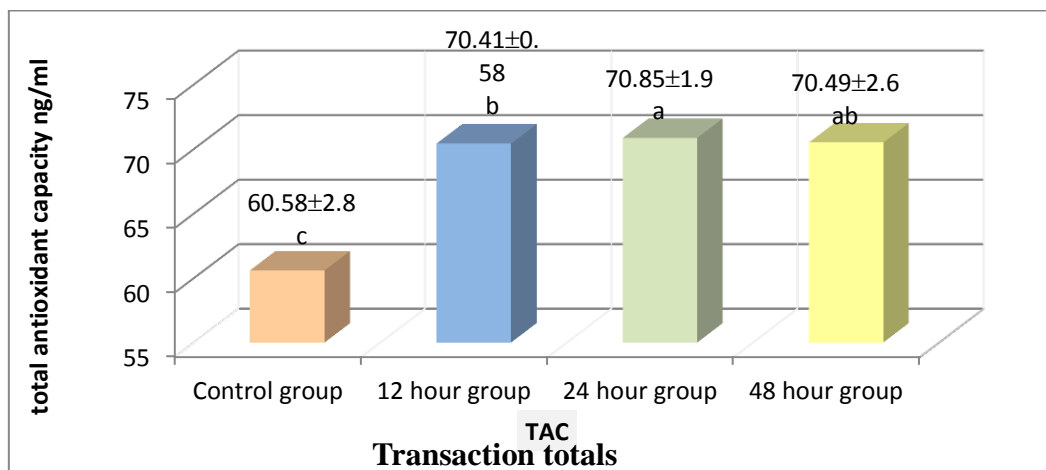


The values are expressed as the arithmetic mean \pm standard deviation, number of rabbits / groups = 5

The figures followed by different letters mean that there is a significant difference at the probability level ($P \leq 0.01$).

Fig. 5: Effect of fasting on in the concentration of the hormone adiponectin

Fig. (6) shows that there is a significant increase in the total antioxidant capacity (TAC) in the blood of the tested male rabbits subjected to fasting for different periods at the probability level ($P \leq 0.01$) compared to the control group that was examined. arithmetic mean for this study is 60.58 ± 2.8 ng/ml after a month period. While the highest arithmetic mean was reached in the males of the third group after fasting 24 hours with a mean of 70.85 ± 1.9 ng/ml after a month.



The values are expressed as the arithmetic mean \pm standard deviation, number of rabbits / groups = 5

The figures followed by different letters mean that there is a significant difference at the probability level ($P \leq 0.01$).

Fig. 6: Effect of fasting on in the total antioxidants capacity (TAC)

DISCUSSION

There is evidence to support the claim that IF offers both short- and long-term advantages for health and exercise performance. Despite its extensive use, there is still conflicting research

regarding the most effective method of application for health. Both ancient and contemporary communities have adopted IF practices on a widespread basis. Recent iterations of IF also restrict calorie intake to predetermined times and abstain from typical social eating practices that are followed by a 24-hour period of light. When it comes to eating, which is typically done over an eight to ten-hour period or longer (Mandal *et al.*, 2022).

Eating intervals alternate with fasting periods to avoid rigid calorie restriction throughout the day. Carlson and Huelzel were the first to describe this feeding regimen for laboratory animals after they saw a small prolongation of mouse lifetime (Faris *et al.*, 2021). IF has been demonstrated to lower obesity and improve several diseases (Jahrami *et al.*, 2021).

Treatment with various green forages resulted in a significant increase in the concentration of adiponectin, which can be explained by the dependence on the active ingredients in the green forage.

Adiponectin is secreted from adipose tissue, liver cells, myocardial cells, and skeletal muscle, and was first discovered in 1995, and there are two forms in the bloodstream, either full-length or as spherical pieces (Wang *et al.*, 2020).

Previous studies have shown that various green feeds contain vitamin C, which inhibits the secretion of corticosterone from the suprarenal adrenal gland, and the inhibition of this hormone increases the secretion of thyroxine (TSH), the concentration of thyroxine (T_4) and triiodothyronine hormone (T_3). The thyroid hormones thyronine and thyroxine are hormones derived from amino acids that are made in the cytoplasm of cells (Liyun *et al.*, 2022). Thyrotropin as well-known as thyroid stimulating hormone (TSH), is a protein-carbohydrate hormone released by the anterior lobe of the pituitary gland. Its half-life is 60 minutes, and its molecular weight is 28000. It attaches to the thyroid cell surfaces and stimulates the release of thyroid hormones, which in turn stimulates the release of hormone (TSH) through pituitary and negative feedback mechanisms. If thyroid hormones, particularly thyroxine, stimulate the hormone's release from the hypothalamus, which travels to the pituitary gland and stimulates the release of the hormone (TSH), and it has been discovered that psychological emotions increase the hormone's release, the hormone's level in the blood will rise, low TSH levels indicate hyperthyroidism. If there is a rise in thyroid hormones, the pituitary gland produces less TSH, and low weight for rabbits subjected to IF indicates hyperthyroidism (Scholtens *et al.*, 2020; Irwig *et al.*, 2020).

The hormones T_3 and T_4 are secreted from the thyroid gland located in the neck on either side of the trachea, where the thyroid gland collects iodine from blood plasma and binds it to the amino acid tyrosine. Proteins and their binding to receptors in the cell walls of organs. These hormones regulate the growth and specialization of the body's cells, and also serve to increase the body's basic metabolism and consumption of carbohydrates and fats, thus increasing the breakdown of proteins and weight loss (Fudla *et al.*, 2021).

The content of green forage maintains vitamin C on the Leydig cells responsible for secreting testosterone and protects them from oxidation (Arini, 2021) and the current study noted that there is an increase in TAC in the blood of male rabbits at the probability level ($P \leq 0.01$). For the green forage groups without the effect of food interruption on males with a mean of 70.49 ± 2.6 , 70.85 ± 1.9 and 70.41 ± 0.58 ng/ml compared to the comparison treatment. Cho and his group (2019) that the total antioxidants capacity has the ability to measure all antioxidants, not just the antioxidants of just one component

These results are consistent with what Berry and his group (2020) that flavonoids increase the overall antioxidant capacity. The antioxidant activity may be due to the presence of the content of ascorbic acid and its bioactive secondary metabolites, which have been known to display significant antioxidant activity (Wilhelmi de Toledo *et al.*, 2020).

While fat was previously thought of as a simple tissue for storing energy, the results of the current study showed a significant increase in thyroid hormone levels (T_3 , T_4) compared to those in the control group. Furthermore, growing evidence suggests that fat can produce and secrete a

variety of biologically active substances known as adipocytokines. Adiponectin, one of them, plays a significant part in controlling fatty acid and glucose metabolism and preventing atherosclerosis. A collagen-like protein is called adiponectin (Moon *et al.*, 2020). This approach has been extensively studied in several experimental models including the dog, fruit fly, rodent and non-human primates. IF as the potential to reduce the initiation of certain diseases such as atherosclerosis, cardiomyopathy, cancer, diabetes, kidney disease, neurodegenerative diseases and respiratory diseases (Henderson *et al.*, 2021). These days, a lot of researchers are bringing back this nutritional strategy. It has significant effects like improved energy, weight loss, and type II diabetes reversal. Further, it includes key supporting documentation for IF's health claims in the envelope. with particular emphasis on oxidative stress indicators, coronary heart disease, and cancer insulin sensitivity and stress (Plotti *et al.*, 2020). A study indicated that IF may cause a decrease in the concentration of glutathione (GSH) in the brain tissue, its vitality and the thickness of the layers of pyramidal and hippocampal granulos cells. and lower Body weight, serum lipids, GFAP protein expression, H score, and brain MDA concentration tissues, improving memory performance, while it significantly increased the GSH concentration in Brain tissue, and its vitality (Hazzaa *et al.*, 2020). A previous study by Samar *et al.* (2022) indicated that IF it may increase some antioxidants, but it does not protect neurons of transient global ischemic insult. If positive IF practices appear in metabolic health in the short term, with the most recent systematic study revealing significant weight reductions These findings, which were confirmed in both Restricted Calories studies, show that there is a physiological advantage even when calorie consumption is restricted for thirty days. It is assumed that this effect may improve the health of individuals through Reducing the risk of long-term disease Recent research has demonstrated that insulin and blood sugar levels raise the possibility of a time-of-day difference in the metabolic response to calories in relation to chronic inflammation and metabolic regulation. Finding an increase in adiponectin provides evidence in favor of this idea (a key regulator of the circadian system linked to improved blood sugar control and insulin sensitivity). Diets need to be influenced by ongoing lifestyle and behavior modification in order to be sustained. When combined with a weight loss diet, diets may automatically reduce an overweight patient's daily calorie intake by a certain proportion (Al-Kattan and Al-Ishlash, 2012; Adafer *et al.*, 2020; Dong *et al.*, 2020; Welton *et al.*, 2020).

The antioxidant defenses and stress response are activated by IF, which has also been demonstrated to protect the heart from ischemia injury. IF has also been noticed to have an impact on the heart in an earlier study found that IF decreases glutathione peroxidase activity in muscle, despite no changes in glutathione redox state. This prevents glutathione oxidation and protein carboxylation. Interestingly, short-term IF significantly affected the liver's ability to produce energy. It does not affect other organs and expands the respiratory system's capability (Stekovic *et al.*, 2020). Adiponectin is a lipoprotein produced by adipocytes that regulates glucose level by increasing glucose uptake and increasing fat catabolism. Therefore, intermittent fasting can reduce obesity and related insulin resistance by reducing calories and metabolic reprogramming by raising adiponectin levels. (Vasim *et al.*, 2022)

CONCLUSIONS

IF was shown to be successful for short-term weight loss in a systematic analysis of the four groups mentioned. However, long-term follow-up and randomized controlled trials are required to evaluate diet adherence and long-term maintenance of weight loss without regaining lost weight. According to our research, there is There is a positive relationship between IF and weight loss, with the need to emphasize eating green food rich in vitamin C, which is one of the powerful and important antioxidants for the body. Also, IF reduces levels of oxidative stress in all cells of the body, and improves the body's ability to resist stress at the cellular level by increase in the total antioxidant capacity (TAC). IF forces the body to use fat as a fuel source, which means weight loss. The study

also showed an increase in the level of the hormone adiponectin, which helps in fat metabolism, protects against heart disease and helps lose weight. The results also showed the occurrence of hyperthyroidism and the production of a large amount of the hormone thyroxine, which caused an increase in the rate of metabolism, which resulted in weight loss.

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Author's Declaration:

- Conflicts of Interest: None.
- We hereby confirm that all the Figures and Tables in the manuscript are mine ours. Besides, the Figures and images, which are not mine ours, have been given the permission for re-publication attached with the manuscript.
- The author has signed an animal welfare statement.
- Authors sign on ethical consideration's approval.
- Ethical Clearance: The project was approved by the local ethical committee in University of Baghdad.

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تأثير الصيام المتقطع في بعض النواحي الفسيولوجية والكيميائية الحيوية للأرانب

هديل طارق ال شلاش

قسم تقنيات المختبرات الطبية/ كلية النور الجامعة

منتهى محمود الفطان

قسم علوم الحياة/ كلية العلوم/ جامعة الموصل

الملخص

أن أسلوب الحياة الحديث له روتين غير صحي، بما في ذلك الإفراط في تناول الطعام وقلة النشاط البدني، وهو مليء بالعديد من المضاعفات مثل الأمراض المزمنة والتكسبية التي تتدهور فيها وظيفة وهيكل الأنسجة والأعضاء مع تقدم العمر بسبب قلة التمارين واتباع نظام غذائي غير صحي. الصيام المتقطع هو أحد الطرق التي أثبتت نجاحها كطريقة وقائية أيضاً. ثبت أن الصيام المتقطع ناجح في إنقاص الوزن على المدى القصير في تحليل منهجي للمجاميع الأربعة المدروسة. ومع ذلك، فإن اتباع طريقة الصيام المتقطع لمدة طويلة مع الالتزام بالنظام الغذائي يعمل على فقدان الوزن دون استعادة الوزن المفقود. كما أنه يقلل من مستويات الإجهاد التأكسدي في جميع خلايا الجسم، ويحسن قدرة الجسم على مقاومة الإجهاد على المستوى الخلوي عن طريق زيادة مضادات الأكسدة. الصيام المتقطع يجبر الجسم على استخدام الدهون كمصدر للوقود، مما يعني فقدان الوزن. كما أظهرت الدراسة زيادة في مستوى هرمون الأديبونكتين الذي يساعد في التمثيل الغذائي للدهون، وبقي من أمراض القلب ويساعد على إنقاص الوزن. كما أظهرت النتائج حدوث فرط نشاط الغدة الدرقية وإنتاج كمية كبيرة من هرمون الثايروكسين مما أدى إلى زيادة معدل التمثيل الغذائي وفقدان الوزن. للصيام المتقطع في هذه الدراسة والدراسات السابقة أظهرت نتائج إيجابية بطريقة علمية مدروسة جيداً، ولكن هناك حاجة لتطبيق هذا البروتوكول لتمييز الفترة الزمنية الأكثر فاعلية في تقليل الإجهاد التأكسدي وزيادة مستوى TAC.

الكلمات الدالة: الصيام المتقطع، اديبونكتين، T.S.H، T₄، T₃، TCA.