Effect of animal fats and vegetable oils on the weight and health of experimental animals

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1-Abstract

Animal fats (Tail fat - sheep belly fat - cow fat - free fat) were extracted using thermal oil and vegetable oils (sesame oil) extracted by cold pressing method and hydrogenated oil selected from the local markets. Turkish Altunsa oil .Then mix this fat at an average of 10% well with the diet of the international company and keep it in the refrigerator and feed the experimental animals with constant weights daily and monitor the health status and weigh the animals twice a week for a feeding period of 42 days.The results showed that the best treatments were oil for the Tail , with increased weight, activity, and health safety, with the color of the eyes, no ulceration of the tail, smoothness, and no hair loss, then followed by free fat, and the least hydrogenated oil compared to the standard.This is consistent with global warnings about the disadvantages of hydrogenated oils, and the most consumed groups were the group of Tail fat, then the free fat, and the least hydrogenated oil indicated the lack of palatability of hydrogenated oil among the treatments.

2- Introduction

Fats and oils play a role in many bio and physiological functions. The fats stored in biomass are useful commodities and have agricultural, economic and social importance. Historically, fats have been subject to intensive studies. The main efforts are to increase the energy density of the biomass of the cell and to manufacture oils designed for specific applications. (15).Fats are organic substances produced from the union of fatty acids with glycerine. Humans use fatty substances in the preparation of various foods and pies. Their presence in foods is very important, as they provide the body with fatty acids from natural sources that carry some important vitamins (E, D, A, K).Fat is also an important source of energy for the body, as it gives about twice as much thermal energy as protein and carbohydrates. Fats and oils are mainly obtained from plants and animals by traditional or modern extraction methods. Triglycerides, sterols, phospholipids, fatty alcohols, and tocopherols are components that determine the biochemical molecular composition of the source oils and fats. (17).The development that took place in the study of fats to become that research field of great importance due to its relationship to human food and health, so the multiple roles in cell biology, pathology and physiology became involved in the strategic metabolic union of fat pathways (18 countries participate in a scientific center, research institute or department in well-known American, British and German universities and other European countries) Updating the lipid classification system prepares an integrated approach to quantify, discover and reconstruct the pathway of lipids, genes and proteins of association with the level of systems biology. A key component of this approach is a bioinformatics infrastructure that includes a clear taxonomy of lipids, an up-to-date database system for molecular types and experimental data, and an easy-to-use toolkit to assist researchers. in lipids through the lipid bioinformatics map (LIPID MAPS)Lipids have become known as central metabolites affecting human physiology and pathophysiology (16).

3-Materials and methods

3-1 stage of extraction

3-1-1 Extraction of Plant Oils

Sesame oil was extracted after purchasing raw sesame seeds after harvesting and extracting it by Tail squeezing method using an Iranian-made device (BEKBDANEH MINI PRESS) with a net percentage of (36.70%) at the Hajj Muntazar press in Allawi Al-Hilla to obtain

sesame oil and residues of the cake. It is filtered to obtain natural virgin oil with hydrogenated oil, Turkish Altunsa oil was selected from the local markets of the city of Hilla (5)

3-1-2 Animal fat extraction

3-1-2-1 Cow fat

The cow fat was prepared, washed well, then cut into small cubes to increase the surface area for exposure to heat, and placed in a saucepan over a very low heat with continuous stirring and monitoring for a period of about two hours, or until the pieces of fat turn brown, indicating that the fatty substance has been depleted, and the fatty medium turns into a semi-clear medium, then left Let it cool and filter with a purity of 75%(5); (17)

3-1-2-2- Fat belly of sheep

In the same methods, the sheep belly fat is prepared, cut and placed in a pot on a slow cooker until the pieces of fat turn brown with continuous stirring and monitoring with a yield percentage of (77.77%) and left to cool and then filtered with a glass container to preserve and solidify the sheep belly fat after two and a quarter hours of filtering (5);(17).

3-1-2-3- tail fat

In the same methods, the tail fat is washed and cut into cubes, placed in a saucepan and closed over low heat for two hours, or until the fat turns brown with continuous stirring and monitoring. Then it is left to cool and filtered in a container with a net percentage of 61%. The tail fat is frozen at room temperature until preserved in the refrigerator to harden(5);(17).

3-1-2-4-milk fat

The amount of butter is prepared and placed in a pot on a low heat for a period of two hours or more until the leftover milk mixed with the butter separates and is left to cool and filtered to separate the amount of milk to obtain the free, filtered fat in a bright yellow color with a purity of 52.97%. It also does not freeze at room temperature after being kept in the refrigerator(5);(17)

3-2- nutritional stage

3-2-1 The feeding experiment was conducted using adult male Norwegian white rats (Rattus norvegicus domestica) in the animal house of the College of Science, University of Babylon, at ages (6-5) weeks, with weights ranging from (145-77) g, in an air-conditioned room and vacuumed at a temperature (24- 23) ° C and a normal lighting period of (12-12) hours / day, light and dark. Experimental rats were divided into seven groups according to age and weight (6) rats for each group, with the tail marked with a number, colored with each weighing process on clean, sterile cages and pipettes, changing their water daily. The animals were given the first three days of a regular diet without any addition, then the addition of oil and fat began at an average of 10%, while monitoring the activity and safety of healthy animals represented by the color of red eyes, softness and hair loss. Tail ulceration, droppings control, adherence to a specific weight of the diet daily, calculating the remainder of the diet and the weight of droppings, monitoring the increase or decrease in weight of rats daily, and commitment to continuous sterilization, cleaning and providing them with water throughout the experiment period of (42) days(13).

3-2-2 Used feed

Diet manufactured by the International Company for Feed Industry Baghdad - Awereej, its components are as shown in Table (1) and were used to feed the rats during the experiment according to what was stated by (13) with the addition of 10% oil (hydrogenated and sesame oil) and fat (meat, sheep belly and fat) Bovine and ghee)This is done by melting the amount of animal fat (Tail fat - fat from the belly of sheep - fat from the stomach - beef fat - and free fat) and hydrogenated oil over a low heat, except for sesame oil, which is liquid in all circumstances, and adding the amount of oil or fat to a balanced amount from the diet with

stirring until the oil or fat is fully homogenized so that the pallet is ready. To feed the experimental rats with weights calculated daily with the wasted and remaining calculations, the metabolite energy can be calculated by (9) kilocalories/gm of oil or fat and (4) kilocalories/gm of carbohydrates or proteins

Table (1) Components of the diet used for feeding

ME	**3230**	**ARGININE**	**ADDED**
PROTEN	**19.5**	**VITAMINES**	**ADDED**
MOISTURE	**10.5**	**ANT-OXIDANT**	**ADDED**
METHIONINE	**ADDED**	**PH/TAST**	**ADDED**
LYSINE	**ADDED**	**CCIDIOSTAT**	**ADDED**
THREONINE	**ADDED**	**ENZYME**	**ADDED**
VALINE	**ADDED**	**PROBIOTIC**	**ADDED**

3-2-3 The water is given in plastic bottles containing absorbent waters specially prepared for experimental animals, washed well, and its water is replaced every morning, paying attention not to replace the bottles between the groups, and noting which groups consume water

3-2-4 Calculation of consumed feed - it is the amount of forage given with weights calculated in the morning of each day with subtracting the remaining and contaminated with excrement and waste to know the amount of forage consumed and its effect on the weight of the animal and as the following equation according to (19)

The consumed diet = the amount of diet given - the remaining, polluted and wasted diet

3-2-5 Change of weight before and after the experiment (gm).

Calculate the weight of the animals before starting the experiment and monitor the weights in the six standard groups at a rate of two to three times a week using a sensitive balance to follow up the animals by increasing their weight Or the decrease to be considered an indicator of the state of animal growth and knowing the effect of each type of fats and oils by applying the equations as stated by (12).

Weight gain = the weight of the animal before treatment - the weight of the animal after three days

Weight gain = the weight of the animal at the end of the research - the weight of the animal before starting the treatment

3-2-6 The efficiency of oil or fat treatment

The benefit of oil or fat was calculated every three days for each rat individually to follow up the change that occurred from the first day to the end of the experiment by applying the following equation (**11**).

- Efficiency of treatment = increase in weight / amount of diet eaten x 100

3-2-7- Follow up on the health status of experimental animals

We record daily observations about any unusual condition of the animals, as well as the activity and vitality of the animal, the ability to eat the diet, the palatability of the type of oil or fat, the consumption of water, and the shape and condition of the droppings for attention. it diarrhea occurred, especially the diet fortified with 10% fats and oils, observing the bright red color of the eyes, the shape of the tail, and observing the hair color, texture and density (falling out).

4 -Results and discussion

4-1- effect of oils and fats on the movement, activity and appearance of experimental animals

Table (2), which is a record of daily observations of experimental animals, shows that the indicators proved that oils and fats have a good yield, and a clear activity indicator that diminished in the last week of the experiment due to weight gain, so that the animals tend to sleep, and the color of white hair (which is the distinctive characteristic), and a glossy texture with a smooth texture that was not exposed to For precipitation and hair analysis, it has the potential to provide an accurate and long-term historical record of ingested waste. (15)and two red eyes with a striking luster (this is called chromodacryorrhea, red tears, and it is the result of a natural dye that makes the eyes of rats and around the nose a pink color close to red), and their tails are covered with scales instead of hair, free from any ulceration. All treatments were not exposed to cases of diarrhea, except for the softness of the droppings for the group of sheep fat belly and less of it Tail fat fat in the first week and two days only, and it ended, and this is consistent with the findings of the Tail fat (8) Feed intake was the most consumed by the group of sheep belly fat and the least of which was the standard group. The Tail fat group, sheep fat belly and beef fat were the most in need of water, and this is the external description of all the treatments

Table (2) shows that experimental rats are monitored daily

water	diet	diarrhea	movement	tail	Eye	Hair	group
high	good	No	very good	non-ulcerating	Brilliant red	light white	Tail fat
high	Good	No	very good	non-ulcerating	Brilliant red	light white	Belly sheep
Good	good	No	very good	non-ulcerating	Brilliant red	light white	Sesame oil
high	Good	No	very good	non-ulcerating	Brilliant red	light white	beef tallow
Good	good	No	Medium	non-ulcerating	Brilliant red	light white	Hydrogenated oil
high	Good	No	very good	non-ulcerating	Brilliant red	light white	Free fat
Normal	Medium	No	Medium	non-ulcerating	Brilliant red	light white	standard

4-2 Effect of oils and fats on the weights of experimental animals

The experiment demonstrated the response of the animals to a clear weight increase that depended on the type of oil or fat compared to the standard group. The response was highest to the fats of the Tail fat with a weight of (1133) g for the group, at an average of (188.8) g for one rat, and the amount of diet ingested was (4532) g,a large difference from the standard group (686). grams for the group, at a rate of (137.2) per animal, with the amount of diet consumed (4006) grams, and waste (1612) grams during the experimental period of (42) days. Then followed by sesame oil, tail fat, bovine fat, and sheep fat (1080)(180)(445)-(960)(160)(4667)-(790)(158)(4567)-(941)(156.83)(4475) g, respectively, and the last of which was hydrogenated oil, with a weight of (702) (140.4) (4418) g, with the lowest weight gained and the lowest amount of diet consumed, indicating that the hydrogenated oil was not palatable, as shown in Table (8-4).This corresponds to what was reached by (2). As well as what was stated by(7) that those who ate fast food achieved the least

nutritional sufficiency of nutrients. As in Table (3)and to explain the amount of diet consumed and the weight gain, the highest diet consumed was the free fat group with a weight of (4667) gm, and the least leftovers after the standard weight (1620) gm and the free fat group ate more diet than the fat of the Tail fat that achieved the highest increase. The explanation for this case is that the process of weight gain or obesity is linked to several theories, meaning that increasing the amount of food will not be the first reason for weight gain. It is correct in the energy balance theory. The more the amount of food than the energy expended leads to weight gain. (4) But according to the fat cell theory, the process of weight gain depends on the number of fat cells that differ from one person to another, and the more cells there are, the greater the chance of obesity as well as the theory of biological balance for each person, a point of balance, and it is considered a point of sufficiency for the body, as there are people who eat foods in large quantities and will not have an increase On the contrary, there are people who eat less, but their weight increases (14).In addition to the theory of basal metabolism, there are people who are characterized by a low rate of basal metabolism, that is, they need simple calories for their vital activities, so they are more prone to obesity than normal (10).and this does not necessarily lead to obesity, as mentioned by(**1**).Many believe that obesity is caused by an excessive diet, but this is half the truth, and recent studies have proven that hormones are also a cause of obesity, as there are hormones that control a person's desire to eat foods. Also, the same group, the belly fat group of sheep, was subjected exposed to softness of droppings in the first week, which would not rise to the state of diarrhea, as well as the group of fat fat, which achieved the highest weight gain and a diet less than that of sheep belly. Despite the belief that vegetable oils are better than animal fats for cerebrovascular, cardiovascular, and cerebrovascular diseases, the effects of various vegetable oils and trans fats have been examined (11). (9) found a weight gain for the treatment of oils (soybean oil) from 134.60 g to 152.36 g.

Table (3) shows the weight of the rats, the difference in gain, and the amount of diet and droppings

Increase each rat's weight	Group weight gain	droppings weight	Efficiency of food intake	The eaten diet	final weight	initial weight	group
137.2	**686**	**1612**	**17.124**	**4006**	**1201**	**515**	Tail fat
188.8	**1133**	**1620**	**25**	**3682**	**1905**	**772**	Belly sheep
156.8	**941**	**1759**	**21.207**	**4475**	**1769**	**828**	Sesame oil
180	**1080**	**1729**	**24.242**	**4455**	**1850**	**770**	beef tallow
158	**790**	**1481**	**20.757**	**4567**	**1401**	**611**	Hydrogenated oil
140.4	**702**	**1764**	**19.067**	**4418**	**1384**	**682**	Free fat
160	**960**	**1446**	**20.569**	**4667**	**1583**	**623**	standard

4- 3 Effect of oils and fats on the amount of diet ingested.

The amount of diet. The free fat group consumed the highest quantity of diet by (4667) gm, a difference from the standard (4006) g of diet it consumed, then it was followed by (4567) gm (4532) g (4475) g (4455) g of diet it consumed for bovine fat, oil for Tail ry, fat for sheep belly and sesame oil respectively, and the last of them is hydrogenated oil, with the lowest intake value of (4418) g, indicating the low palatability of hydrogenated fat and the great palatability of ghee Efficiency of food intake was the

highest food efficiency of the fat of the Tail fat 25 and the highest weight gain of 188.8 gm, but it would not be the group that consumed the most diet, as it reached 3628 gm of diet consumed, then followed by the efficiency of food intake of 24.242 achieved by the sesame oil group by achieving a weight of 180 g and diet consumed of 445 gm of diet consumed.Then sheep belly fat with food intake efficiency of 21.027, then bovine fat and ghee with food intake efficiency of (20,757-20569), respectively, then the last of them is hydrogenated oil with food intake efficiency of 19.067. We note the treatment of high food intake efficiency and achieved a high weight gain with a lower intake diet than its counterpart, such as the Tail fat or a high intake diet, and a lower intake food efficiency and lower weight gain, because it is not necessary to increase the cause of weight gain, and its interpretation is the theories of obesity and weight gain depend on physiological factors mentioned in the subject of obesity And obesity .as shown in Table No. (8-4)

5- Conclusion

The results showed that animal fats, especially Tail fat ,ghee and sesame oil, are more palatable and accepted by experimental animals than hydrogenated oil.This is because the essential fatty acids lose their biological activity as a result of their conversion from (SIS) to (TRANS), which causes a change in the functional and nutritional properties and is considered one of the dangers of meals containing fats from hydrogenated sources. It is not recommended to eat more than 5 g per day (US Food and Drug Administration) (FDA) and the percentage of saturated fatty acids with the type (TRANS) in hydrogenated oils is 30-40%, and it is not allowed that the acids are more than 20%, so the risks of hydrogenated oils are more than animal fats.. (17) As mentioned (16) Hydrogenated oil is harmful to unwanted functions and(3) the relationship of hydrogenated oils to manic-like behavior and oxidative damage to the brains of rats (18) recommended finding an alternative to hydrogenated fats in the confectionery and pastry industry, which is very important.The results also showed that the best intake food efficiency was for the fat of the Tail fat with a value of (25), then for the sesame oil treatment 24.242 food intake efficiency, and the least food intake efficiency was for the hydrogenated oil with a value of (19.076).

6-References

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