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DEDECATION

In the name of my Creator, the Facilitator of my affairs,

and the Guardian of my destiny,

All praise and gratitude are due to You.

I dedicate this success first and foremost to myself, and then to everyone who

strived with me to complete this journey. May you remain my unwavering support forever.

To the one who is adorned with awe and dignity, to the one whose name I carry with pride,

to the one who removed the thorns from my path to pave the way for my knowledge, after the grace of God, what I am is due to - my father - the man who strived throughout his life for us to be better than him - my dear father -

To my angel in life, to the meaning of love, to the meaning of tenderness and devotion, to the smile of life and the secret of existence,

To the one whose prayers were the secret of my success and whose tenderness was the balm of my wounds,

Who was my mother, sister, and friend, my first supporter, and my guiding light from whom I draw strength - my beloved mother.

To my source of strength, my supporters, my solid ground and my strong wall, to those who watched over my salvation, reminding me of my strength and ability, who never discourage me and believe in my potential no matter how weak and slack I become, standing behind me like a shadow no matter how many mistakes I make,

To those who made an effort to help me and were a support and a pillar, to the candles that illuminate my path - my brothers and sisters -

And I do not forget the companions of the soul who shared with me the steps of this path,

To those who made the journey easier, to those who encouraged me to persevere and

complete the journey, to the companions of the years, I am grateful to you.

All thanks are due to You for granting me this moment, so all praise is due to Allah, Lord of the Worlds, and peace and blessings be upon His noble Prophet.

Your graduate, OUAHIBA

DEDECATION

Last but not least, I would like to express my deepest gratitude to ALLAH for everything

For his guidance, strength, and blessings through this journey.

Without His divine support and wisdom, this achievement would not have been possible. .

I want to thank me for believing in me, I want to thank me for doing all this hard work,

I want to thank me for having no days off, I want to thank me for never quitting, I want to thank me for always being a giver more than receive, I want to thank me for trying to do more right than wrong

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Love and for always believing in me .Your wisdom and guidance have been my constant

Source of strength. Wish you all to stay in good health

Your graduate, MALAK

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Finally, we stand in respect for all who contributed to teaching us even one letter in the various stages of our studies.

ABBREVIATION

USDA: United States department of agricultures

HDF: High- fat diet

GI: Glycaemic index

LDL: Low density lipoprotein

HDL: High density lipoprotein

VLDL: Very low-density lipoprotein

GOD: Glucose oxidase enzyme

AMPK: Activated Protein Kinase

H_2O_2: Hydrogen peroxide

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Introduction

Introduction

The mulberry family includes the figs (Ficus carica), which is grown across the world, including Asia, Africa, and North America, as well as in the Middle East and Western Asia. **(S. Bhattacharya (2023).** The common figs or Ficus carica is the most commercially significant species of fig. It comes in a variety of forms with a high degree of genetic variability **(Mellisa, 2014)**. For its edible fruit, figs have been grown for a very long period in many different parts of the world. It is thought that humans brought it to the Mediterranean from Western Asia. It is currently a necessary global crop as well. Brazil, California, Italy, Turkey, Egypt, Morocco, Spain, Greece, and other regions with generally warm summers and moderate winters. Fruits can be eaten raw, dried, canned, or in other preserved forms **(Shukranul et al., 2013).** These fruits vary in shape, colour, and flavour, and they have different technical and medicinal qualities as well. Forty variations, including edible variety and Capri, Aberkane figs types, were recently characterized by the Technical Institute of Fruit-bearing Arboriculture in Algeria. These forty cultivars are probably not even close to the total number of cultivars cultivated in Algeria.

Figs fruit, root, and leaves are used in traditional medicine to treat a range of ailments, such as gastrointestinal (colic, indigestion, lack of appetite, and diarrhea), respiratory (sore throats, coughs, and bronchial issues), and cardiovascular abnormalities **(Shukranul et al. 2013).** Figs also utilized as an antispasmodic and anti-inflammatory medication. Clinical research found that figs fruit contain a large number of bioactive substances, including cyanidin, luteolin, rutin, catchin, and chlorogenic acid, sugar, trace minerals. Dried figs also contain relatively high amounts of crude fibers higher than those of all other common fruits. More than 28% of the fiber is of the soluble type, which has been shown to aid in the control of blood sugar and blood cholesterol and in weight loss **(Toqaa, et al, 2022).** Other phytochemicals include carbohydrates, which can delay the process of digestion, and anthocyanin, which can regulate elevated blood sugar levels. Dried figs increase the antioxidant capacity of human plasma significantly. **(Candela et al, 2021).**

A common definition of obesity is an abnormal or excessive build-up of fat in the adipose tissue. Obesity is reaching epidemic proportions worldwide; it is correlated with various comorbidities, among which the most relevant are dyslipidaemia, diabetes mellitus type-2, fatty liver, cardiovascular diseases such as congestive heart failure and coronary heart disease **(Suresh et al, 2017)**. Although a number of pharmacological approaches for treatment of obesity have been investigated, but only few are safe and all of these have adverse effects. Further, the cause of

concern is the non-availability of drugs for its treatment and the short-term efficacy and limiting side effects of the available drugs. So, the alternative is to discover anti-obesity agents from plants or other natural resources which have less or no side effects. It is now clear that although a fat modified diet can significantly affect cardiovascular diseases risk, other components in the diet, such as dietary fibre, plant protein, and soy protein appear to confer additional protective effects that extend beyond the lipid-lowering effects of the recommended diets. Identification of additional dietary constituents that elicit favourable effects will facilitate the development of diets. Those are even more effective for both the prevention and treatment of cardiovascular and other chronic diseases.

In view of these studies, obesity and figs might be at least associated through a mechanism involving energy expenditure and food intake. This study was conducted for the first time to elucidate the effect of consumption of Algerian dried figs (Aberkane) on abdominal obesity and lipids metabolism in rats.

Generality on Figs

1. Generality on Dried fig

1.1. Dried fig (Ficus carica)

1.1.1. Overview

Typically, the term "figs" refers to the figs tree Ficus and its fruit, also called the Common figs (Ficus carica). According to **Khatib, and Vaya, (2010)** the common figs are a large, deciduous shrub or small tree that is native to southwest Asia and the eastern Mediterranean region. Its scientific name, Caria, comes from an ancient settlement known for its figs, which is now in the southwest of Turkey**. (Marcotuli, et al., 2020).**

Due to its simple preservation by drying, figs provided high energy food for people of all socioeconomic classes not just during the ripening season but all year round. In ancient times, figs were one of the principal sources of nourishment for the Mediterranean people. The significance of figs fruits is further evidenced by the fact that the ancient Greeks prohibited their export and gave the duty of stopping smuggling to special gatekeepers known as sycophants. **(Egizia, 2020)**

The photochemistry of Figs shows that it is a potent source of flavonoids and polyphenols and various other compounds like arabinose, b-amyrins, b- carotines, glycosides, b-setosterols and xanthotoxol. Alkaloids, flavonoids, coumarins, saponins and terpenes have also been reported in aqueous extract of the ripe dried fruit of Fig. **(Soni et al; 2014).**

Dried figs have become a well-liked super food as consumer demand for organic and healthy food products rises. Both consumers and food makers love it because of its adaptable flavour and potential health benefits.

1.1.2. Historic Origin

The figs (Moraceae) are a traditional fruit tree from antiquity that is linked to the start of gardening in the Mediterranean region. Sometime during the Early Neolithic era, it is thought to have been domesticated from a collection of various spontaneous figs that were found in the Mediterranean region’s east and south. Although they frequently intergrade into Mediterranean figs, large fruited fig trees found in the deciduous forests of the Colchic district of northern Turkey and the Hyrcanic district of Iran and surrounding areas are thought by some botanists to be a distinct ecotype of F. carica and to be a separate species, F. colchica Grossh, and F, hyrcanica Grossh. One of the most diverse and originating centres that one may find is

Transcaucasia see all phases of the domestication of fig in the southern Caucasus, where wild, transition, and modern fruit growing still exists **(Mallikarjuna , et al, 2010).**

The best varieties of figs were selected for cultivation from the wild ones that thrived in the Holy Land prior to domestication. Even now, it is common to discover wild figs or domesticated figs that have returned to their wild form in rock crevices by watercourses, such as those around the Dead Sea and the Jordan River. They most likely come from seeds that humans or animals have transported. **(Springer, 1965).**

Because fresh fruit has a limited shelf life after harvest seven to eight days if refrigerated it is frequently dried for later use. Dried fruit may be kept for six to eight months and is a popular product in commerce. Approximately 75% of Turkey's dried figs output is exported, making it one of the world's top producers of the dried fruit. Greek dried figs are highly prized for their unique organoleptic qualities, which include their light colour, pleasant scent, and sweet flavour. Sicily, Calabria, Campania, Puglia, and other southern areas of Italy account for the majority of the country's output **(Shokoohi, ET al. 2022).**

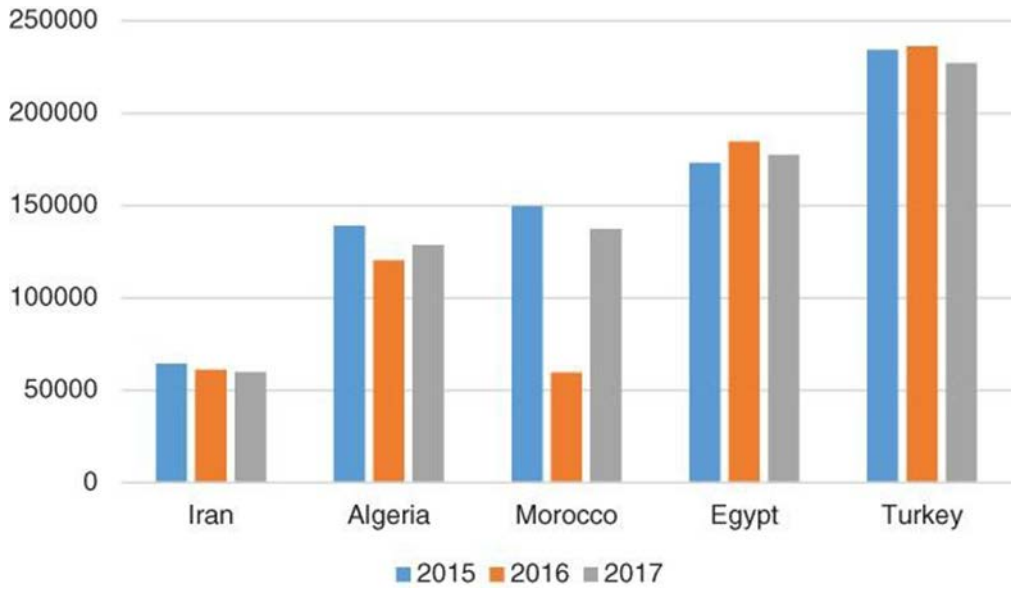


Figure 1: Figs production area in the major producer countries.

(Shokoohi, ET al.2022)

1.1.3. Botanical Studies

Studies on the dried figs by botanists have provided information on the taxonomy, morphology, genetics, and photochemistry of this unique fruit.

1.1.3.1. Taxonomy

The genus of figs. comprises about 735 species in the world. The taxonomy of the genus of figs is highly complex, with 6 subgenera, 19 sections, and 27 subsections, Co-speciation between specialized pollinators and their hosts might account for the extreme species diversity of Figs compared to other genera of the family. Pollination in Figs is species-specific changes in the chemical composition of the attractants may have played a role in speciation. The presence of latex and the syconium uniquely distinguish the genus Figs from other families. The genus can be recognized by the presence of waxy glandular spots on the leaf lamina beneath and on the base of the midrib. Taxonomically Ficus (section Ficus) with F.palmata Forssk and F.iidaiana Wilson, The term carica come from Caria in Asia Minor where excellent figs were grown in ancient times **(Gaaliche et al, .2022)**

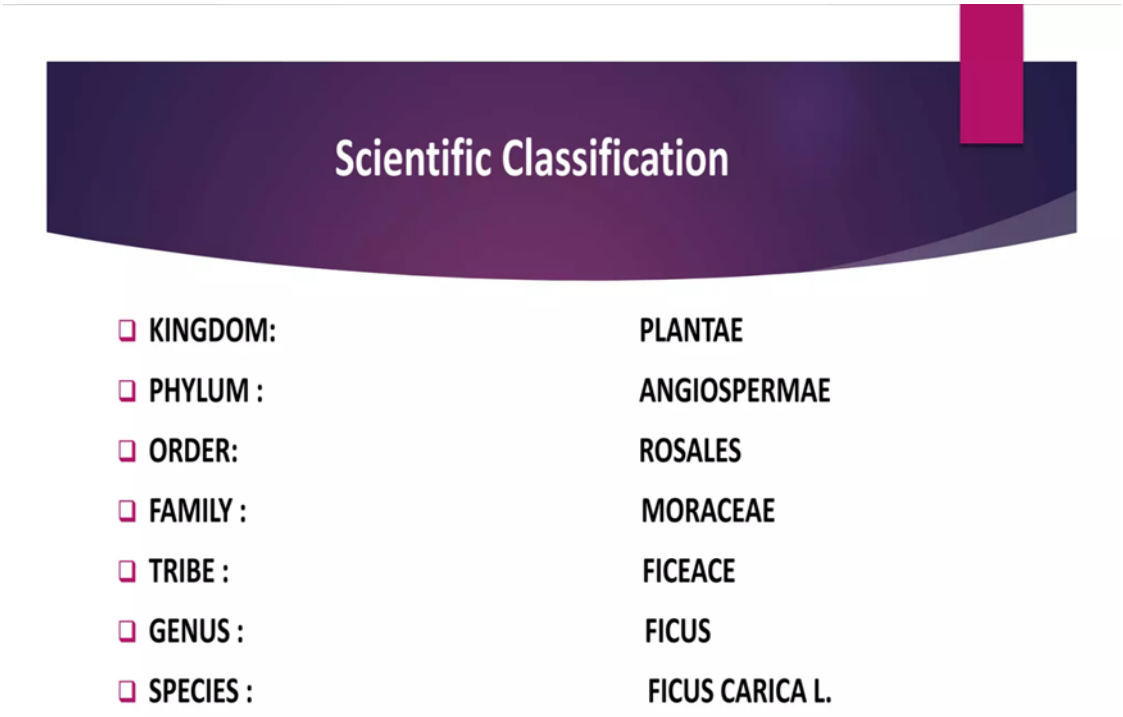


Figure 2: Classification of figs (Haq et al , 2018)

1.1.3.2. Genetics

The genetic diversity of fruit species highlights the critical need to protect current genetic resources. It is best to employ phenotypic features for related initiatives that include gene pool conservation and use. The right features should be carefully chosen, and the morphological variety in the collections should be precisely evaluated, in order to better conserve and exploit genetic resources. The development of breeding programs to enhance landraces of figs species requires the gathering and analysis of genotypic and phenotypic differences within its gene pool. The morphological variety of edible figs accessions has been documented in a number of previous studies, which have also proposed the use of morphological features to classify accessions worldwide. Furthermore, uncommon research on the morphological diversity of Capri figs germplasm and its capacity for caprification of edible figs has been**. (Khadivi, ET, al; 2018)**

1.1.3.3. Morphology

Since the term "figs" refers to the fruit and the tree, this section will include information on each of the tree's sections.

1.1.3.3.1. Figs Tree

Figs trees are tiny, bushy trees that typically reach a height of 10 to 12 meters. They have many spreading branches, smooth, dull bark that can be either grey or white, and a trunk that is seldom larger than 7 inches **(Snafi, 2017).** The plant can withstand harsh conditions due to its shallow root system and vigorous spreading habit. According to **Chawla et al. (2013),** roots can reach a depth of 20 feet and cover around 50 feet of the ground.

Figure 3: Figs Tree (Stover, et al, 2007)

a. Leaves

The tree's leaves are aromatic, about thick, and measure 12–25 cm in length and 10–18 cm in width. The underside of the fig leaves is soft and hairy, while the upper surface is harsh. When broken, the leaves and stem of the plant release white latex, which is known as abundant milky latex **(Frodin, 2004).**

Figure 4: Figs Leaves (Truchan et al, 2015)

b. Flowers

According to **Rahmani, et al 2017**, Flower of the deciduous plant is either staminate (male) or pistil late (female) and is enclosed with inflorescence structure. Long-styled female flowers are characteristics of garden and orchid fig tree that bear edible fruits while short-styled female flowers produce inedible fruits

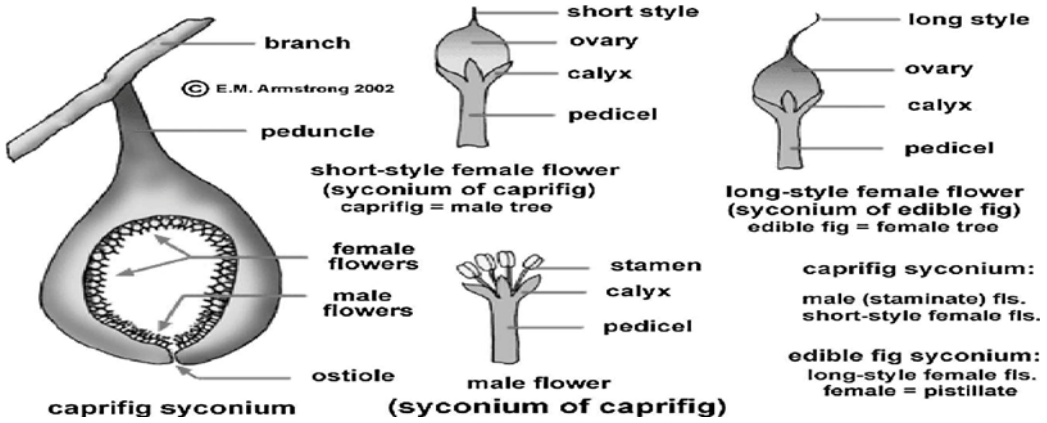


Figure 5: Figs Flower (Stover, et al, 2007).

c. **Bark and Stem**

The bark is silky in texture; the outer bark has rounded uneven flakes that peel to a silvery grey or ash colour; the centre regions of the bark have a tint that is either pale reddish brown or brownish; the inner section is composed of layers of granular tissue with an orange-brown or light yellowish tint **(Badgujar, et al, .2014**). The stem is woody, upright, cylindrical, and has several monopodial branches; the trunk and major branches have a rough, pale brown or greyish-brown exterior with lenticels, a few transverse fissures, and longitudinal wrinkles; the main trunk measures 30 to 70 cm in diameter and is 5 to 15 meters tall. The juvenile stems and terminal branches are angular, thinner, polyhedral, and have short internodes that are between 0.2 and 0.4 cm in diameter and 1 to 3 cm in length. **(Taha et al, .2010).**

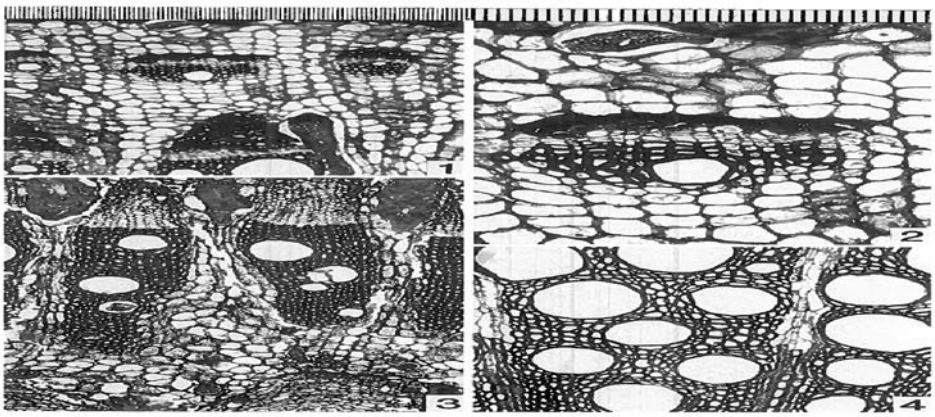


Figure 6: Figs stem-bark. Transverse section magnified. (Carlquist et al, 1996)

d. **Roots**

A year old tap root is a fusiform tap root topped by a root stock. The external surface of the cylindrical root stock is dark brown and wrinkled. Its measurements are 3 to 5 cm in diameter and 25 to 50 cm in length. The outer surface of the root is longitudinally striated and tough, with a dark brown colour. It is a terete, densely rootlet-filled root with numerous secondary roots and heavy branching. Young roots are malleable and leak latex when they get cut. According to M. **Taha et al. (2010)**, the rhizome branches may grow to a length of 15 to 30 cm and a diameter of 4 to 7 cm.

1.1.3.3.2. Figs fruit

Depending on the kind, figs can weigh anywhere from 30 to 65 grams. Spherical fruits, figs are. It consists of a pigmented exterior skin layer and an inner layer known as latex that is high in

lipase and protease. These two portions account for ten and twenty present of the fruit's weight **(Ouaouich et al., 2005).**

Figure 7: Figs Fruit (Zameer, et al 2021).

- **Outer shell or skin:** Figs are a vital food source for wildlife and a harvest crop that humans may consume both fresh and dried. When fully grown, edible figs have a thick skin and a delicious pulp made up of small seeds that, while usually indiscernible, might give a little crunch when chewed. The pigment components found in different fig kinds cause the skin hue to vary from green to black-violet. Both fresh (peeled or not) and dried ones are consumed **(Amandeep et al, 2023).**

- **Seeds:** The sole purpose of seed propagation is to create new cultivars. In soil that has been properly prepared, the tiny seeds can sprout with ease. By floating them in water, fertile and sterile seeds may be distinguished from one another. In order to get rooted plants by mid-summer, one-year-old branches can be air-layered in the early spring **(Badgujar, et al., 2014).**

- **Latex:** Found in the veins of all Ficus species offers protection and self-healing against external harm. Typical plant cell organelles such as nuclei, mitochondria, vacuoles, and ribosomes are found in the cytoplasmic fluid of lactiferous tissues, which constitutes latex. The substance is an aqueous suspension of a complex combination of compounds that are produced by specialized secretory cells in plants called laticifers. These cells synthesis and store a wide range of secondary metabolites in considerable amounts. These consist of tannins, sterols, alkaloids, proteins, and terpenoids. **(Melisa et al, 2014).**

1.1.4. Types of Figs

Based on the sort of pollination used and the sex of the flower, figs have been further divided into four categories:

- **Common Figs**: Composed of fruit that originated from a parthenocarpy and female flowers with long, stylized pistillates. Common cultivars include Kadota, Mission, Brown Turkey, Pune, and Concordia.

- **Smyrna Figs**: Only wasps are able to pollinate male figs blooms, which is how fruits are generated. Among the significant types is Cali Myrna.

- **Capri figs**: also called the wild figs, is composed of short-styled pistillate blooms and functional staminate flowers. This kind of garlic is cultivated not for human use but rather to provide habitat for garlic wasps, which are vital to the growth and pollination of fruits.

- **San Pedro Figs**: In a single planting season, this type produces two harvests. While the second fruit has to be pollinated, the first fruit sets spontaneously.(**Zameer, 2021)**

1.1.5. Figs Composition

1.1.5.1. Phytochemical composition of figs:

a. Figs fruit:

A variety of phytochemical components, including as carotenoids and polyphenol compounds, as well as vitamins, minerals, organic acids, amino acids, and dietary fibers are all found in abundance in figs. Comparatively speaking to other fruits, figs' health advantages are underappreciated. Awareness the health advantages of include fruits in one's diet requires an awareness of the phytochemical makeup of fruits **(Amandeep et al, 2023).**

b. Peel and Pulp:

Various volatile constituents of five Portuguese varieties of Figs fruits (pulps and peels) have been isolated which include aldehydes: 3-methyl-butanal, 2-methyl-butanal, (E)-2-pentanal, hexanal, heptanal, octanal, and nonanal, alcohols: 1-penten-3-ol, 3-methylbutanol, benzyl alcoholnonenol, and phenyl ethyl alcohol, ketone: 6-methyl-5-hepten-2-one, esters: methyl

hexanoate, methyl salicylate, and ethyl salicylate, monoterpenes: limonene, menthol, -pinene, -pinene, linalool, eucalyptol, sesquiterpenes: -cubenene, copaene, -caryophyllene, -muurolene, -cadinene, and germacrene D, norisoprenoid: -cyclocitral, and miscellaneous compounds: eugenol **(Oliveira et al ,.2010).** Peel represent 27% of the total weight of Figs and its importance is oriented for nutrition, such as tocols, organic acids, flavonoids, and phenolic acids **(Yahya.et al, 2024).**

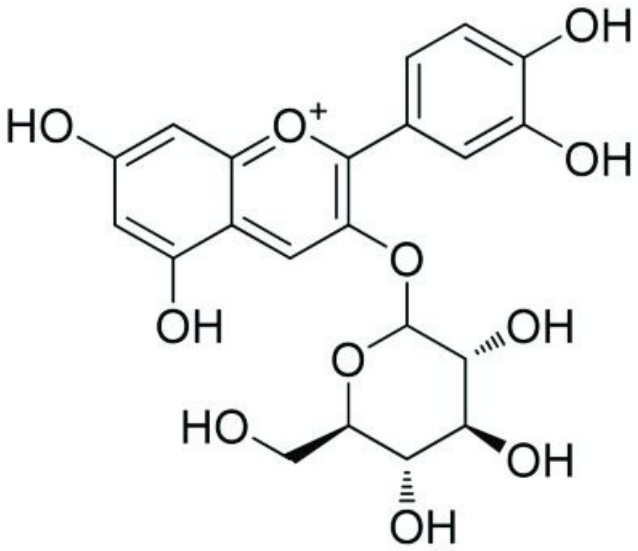
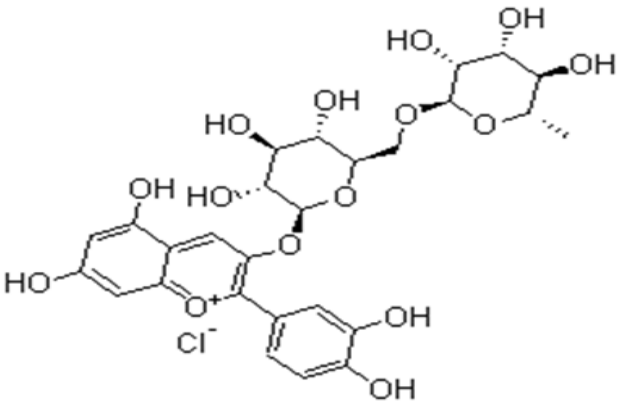
c. Bark

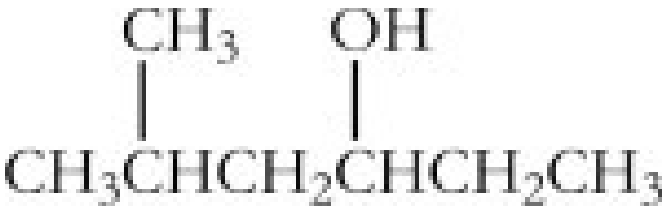
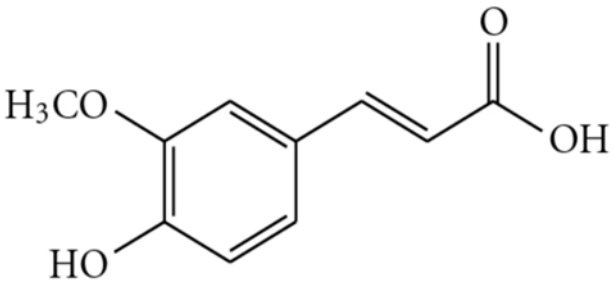
Bark contain cardiac glycosides, tannins , polyphenols and flavonoids Quantitative phytochemical screening of the figs bark confirmed the presence of polyphenols in ethanol and aqueous extracts as 48.36±11.25 mg/g and 28.60±2.03 mg/g (Gallic acid), respectively, flavonoids content 7.66±1.02 mg/g, 26.32±2.40 mg/g (Quercetin acid) and 19.25±1.11 mg/g (Quercetin acid) in hexane, ethanol and aqueous extracts, respectively , Total phenolic content of fruits were 10.90 μg, saponins (0.59 g/100 g) dry weight, total flavonoids **(Azam et al,. 2018).**

d. Seeds

Figs seed essential oil contains fatty acids like oleic acid, linoleic acid, linolenic acid, Palmitic acid, stearic acid and arachidic acid **(Chawla, et al, .2012)**

Table 1: Main constituent of the different parts of the figs tree and its fruit

Components	**Phytochemical Composition**
Figs fruit	• Anthocyanin Exemples : Cyanidine-3-O-glucoside, Cyanidine-3-O-rhamnoglucoside **(Solomon, et al 2006).**  Cyanidine-3-O-glucoside (**Javad, 2022**)  Cyanidine-3-O-rhamnoglucoside
	• Glucose Examples: Gallic acid, Coumaric acid, Chlorogenic acid Rutin, Syringic acid **(Vallejo, et al 2012)**

Pulp and Peel	• Aldehydes Examples: 3-methyl-butanal, 2-methyl- butanal, (**Oliveira et al,2010)**  3-methyl-butanal **(Robert .2015)** • Phenolic acids Examples : 3-O and 5-O-caffeoylquinic acids , Ferulic acid Quercetin-3-O-glucoside (**Oliveira et al, 2009)**  Ferulic acid **Zhihong et al (2012)**
Figs Seed	Fatty acides **(Chawla, et al, .2012)**

Figs Leaves	• Aldehydes Exemples: methyl-butanal, 2-methylbutanal, (E)-2-pentanal, Hexanal, and (E)-2-hexanal, • Alcohols Examples: 1-penten-3-ol, 3-methyl-1-butanol, 2-methylbutanol, heptanol, benzyl alcohol, (E)-2-nonen-l-ol, And phenyl ethyl alcohol. • Ketone 3-pentanone, esters: methyl butanoate, methyl hexanoate, Hexyl acetate, ethyl benzoate, and methyl salicylate. **Source: (Oliveira et al, 2010)**
Figs Latex	6-O-linoleyl-β-D-glucosyl-β-sitosterol, 6-O-Oleyl-β-D-glucosyl-β- Sitosterol, 6-O-palmitoyl-β-D- glucosyl-βsitosterol, caoutchouc, resin, albumin, cerin, sugar and malic acid, rennin, proteolytic enzymes, diastase, Esterase, lipase, catalase, and peroxidase29 **(Chawla et al, 2012).**

1.1.5.2. Nutritional Value and Chemical Constituents

a) Carbohydrate

Figs are a fruit that is rich in carbohydrates and a strong source of dietary fiber. Figs have a carbohydrate content of 19. 2 g/100g of fresh fruit weight. Sugars make up around 92% of the carbohydrates found in figs (**Gani et al., 2018**). This fruit's primary sugars are sucrose, fructose, and glucose. Dietary fiber, insoluble cellulose found in skin, and soluble protein found in fruit make up the remainder. Figs have a total sugar level of 16.3 g/100 g and a dietary fiber value of around 5 g/100 g. β-D glucans with significant antibacterial action have been found in certain fig cultivars **(Morton, 1987).**

b) Vitamin and Mineral

When it comes to widely consumed fruits, figs are the most mineral-rich. They include trace elements like iron, zinc, manganese, nickel, copper, and strontium as well as necessary minerals like potassium, sodium, magnesium, calcium, and phosphorus (**Kunkalikar;2023**) .The best fruit for vitamins is figs. There is an abundance of vitamin B and vitamin A. The water-soluble group is mostly composed of thiamine, riboflavin, vitamins B5, and B6. Certain fig types also include vitamin E and C. Products made from dried figs have been shown to contain vitamin K. (**Morton, 1987).**

c) Fat

The quantity of fat in figs is quite small—0.3g per 100g of fresh fruit. Some of the lipid components isolated from figs fruit include triacylglycerol's, free and mono esterified sterols, mono and galactosyl diglycerides, ceramides, glycosides, cerebrosides, esterified sterol glycosides, and phosphatidyl glycerols (**Kolesnik et al., 1986**). According to **Marwat et al. (2009),** common fatty acids found in figs include myristic acid, palmitic acid, stearic acid, oleic acid, linoleic acid, and linolenic acid. Sterol, particularly sitosterol, may also be found in abundance in the fruit of the figs tree.

d) Fibre

The lignin and a few glucides, including cellulose, hemicelluloses, pectines, resistant amidons, and non-digestible oligosaccharides, are collectively referred to as dietary fibers. They are split into two groups based on their Water solubility: soluble, viscous, and fermentable fibers and

insoluble, non-viscous, and slowly fermentable fibers **(Ramulu ET al, 2003**). Where there is a 5 g of dietary fibers for every 100g of fat-free milk are found in it, with 2 g of soluble fiber and 2 g of insoluble fiber accounting for 48% of the total fiber content.

e) Lipids

Figs contains a low quantity of lipids around 1.9%, despite their low content; lipids have a fundamental influence on the storage life, the organoleptic properties and the nutritional and biological value of the figs.

The following table, which is adapted from the United States Department of Agriculture, shows the nutritional content of 100 grams (g) Source and dried figs Trusted Source in kilocalories (kcal), g, milligrams (mg), and micrograms (mcg): **(Caporuscio, 2019)**

Table 2: Chemical composition of dried fig fruit. Source United States Department of Agriculture (USDA**). (Caporuscio, 2019)**

constituents	Nutritive value per 100g
Calories	249 kcal
Protein	3.3 g
Lipids	0.93 g
Fiber	9.8 g
Sugar	47.92 g
Calcium	162 mg
Iron	2.03 mg
Magnesium	68 mg
Phosphorus	67 mg
Potassium	680 mg
Vitamin C	1.2 mg
Folat	9 mcg
Choline	15.8 mg
Vitamin A	0 mcg
Beta-carotene	6 mcg

f) **Proteins:**

Figs contains relatively lower amount of proteins (0.8 g/100 g) among all edible fruits. However, the fruit is known to comprise of highest number of amino acids among all fruits. **(Soni et al., 2014).** The major amino acids present in figs are Lucien, tryptophan, phenylalanine, lysine and histidine. Many proteolytic enzymes such as diastase, esterase, lipase, catalase and peroxidase are extracted from figs for commercial purposes. The latex of the fruit is also a rich source of enzymes such as ficin, proteases, lipodiastases and amylase. **(Canal et al. 2000).**

Table 3: Amino acids composition of figs **(Lim, T.K (2012).**

Amino acids	**Figs (mg/100)**
Aspartic acid	176
Glutamic acid	72
Alanine	45
Arginine	17
Cysteine	12
Histidine	11
Isoleucine	23
Lucien	33
Lysine	30
Methionine	6
Phenylalanine	18
Proline	49
Serine	37
Threonine	24
Tryptophan	6
tyrosine	32
Glycine	25

1.1.6. Production of figs

In addition to its global production, figs are also widely grown in several region of Algeria, particularly in Bejaia, Jijel and Tizi Ouzou.

1.1.6.1. International production

Egypt and Algeria are currently the world's two biggest producers of figs. With a cultivated area of approximately 3020 hectares, Brazil is the world's largest producer of figs in the Southern Hemisphere. It ranks seventh globally in terms of production (26,476 t) and fifth globally in terms of productivity (8.76 t·ha−1). Brazil is also the primary exporter of fresh fig fruit to the world's largest fruit consumers, the Egyptian, Turkish, and Lebanese markets. **(Paulo et al, .2018)**

Rank	Country	Production Volume	Production Share
1	Turkey	305.45K	29.2%
2	Egypt	167.62K	16.0%
3	Algeria	131.80K	12.6%
4	Iran	70.18K	6.7%
5	Morocco	59.88K	5.7%
6	Syria	43.10K	4.1%
7	United States	31.60K	3.0%
8	Brazil	26.91K	2.6%
9	Spain	25.22K	2.4%
10	Tunisia	22.50K	2.1%

Figure 8: the largest figs producing countries in the world (maouchi, 2020).

1.1.6.2. National production

Particularly in the dry parts of Algeria, figs farming are equally important to dates and citrus fruit agriculture. There are small figs plantations in almost every northern region of Algeria, including Oran, the region around Mostaganem, Mascara, and Constantine; nevertheless, the bulk of these trees eighty percent of them are located in the Tizi-Ouzou and Bejaïa districts. For this reason, the Kabyle figs grove is the foundation of Algerian production (**Anonymous, 2005).** Figs tree agriculture has been especially developed in the Kabylie area due to its optimal socio-cultural environment. The climatic component is still present and is characterized by intense fall rains, which provide a major obstacle for conventional drying stations.

1.1.7. Traditional and Current Uses

Due to the various benefits of figs, it is applicable in various sectors as detailed below:

1.1.7.1. Medicinal Uses:

Medicines pertaining to respiratory, cardiovascular, metabolic, antispasmodic, and anti-inflammatory disorders have long been associated with figs. It's commonly referred to as "Figs." The leaves, fruits, and roots of Figs are used in the indigenous medicine system to treat a range of ailments, such as gastrointestinal (colic, dyspepsia, diarrhea, and appetite loss), respiratory (sore throats, cough, and bronchial problems), inflammatory, and cardiovascular. Fruits from Figs can be eaten fresh, dried, or preserved as jam. Figs are a fantastic source of minerals, vitamins, carbohydrates, and dietary fiber since they are low in fat and cholesterol and high in amino acids. Furthermore, according to **Mawadies et al. (2013),** figs have been used historically for their laxative, circulatory, respiratory, antispasmodic, and anti-inflammatory effects.

1.1.7.2. Cosmetic Uses:

Figs may be beneficial to skin health, especially for those with allergic dermatitis, a disease where allergies result in dry, itchy skin. A cream made from dried figs fruit extract and used twice daily for two weeks was shown to be more successful in treating the symptoms of dermatitis in 45 children than hydrocortisone cream, the standard therapy for the condition. Moreover, an animal and test-tube study revealed that a blend of fruit extracts, including figs extract, had antioxidant effects on skin cells, decreased the breakdown of collagen, and improved the appearance of wrinkles. However, it's difficult to determine if these positive effects are due to the figs extract or any other extracts being studied further investigation is needed to determine figs' effects on skin health **(Shoemaker, 2020).**

1.1.7.3. Culinary Uses

While figs that are dried have firmer, entire skin and typically ripen faster, figs that are used for tables have sensitive skin, few seeds, and a lengthy ripening process. Among the most traditional and well-liked dried fruits are dried figs. In addition, fruit is processed to create a variety of goods, including powder, juice, wine, jam, and preserved fruit **(Mir et al., 2018**). Figs are also limed or crystallized and used in confections. Since figs are a highly perishable fruit that spoils in less than three days, drying them is usually advised. Furthermore, figs are fermented to

produce wine or used to make a paste for stuffing in various confections. Moreover, ground and roasted figs can occasionally be used in place of coffee (**Morton, 1987).**

1.2. Biological Properties of Figs and its Health Benefits

Figs are beneficial to biological mechanisms because of their phytochemical components, which also offer many health benefits to the system**:**

1.2.1. Anti-oxidative effect

Naturally occurring antioxidants found in various fruits and vegetables, including phenolic compounds, organic acids, vitamin E, and carotenoids, are beneficial substances that can also be found in figs. These substances can stop the production of free radicals by giving or reducing hydrogen to other substances. Although there are significant components of colour, flavour, and scent, phenolic compounds are the most well-known among them because of their well-known antioxidant properties. Flavonoids and phenolic acids are the two main classes of phenolic chemicals. **(Olga et al, 2019).**

1.2.2. Anti-inflammatory effect

Inflammation is a natural response of body against microorganism and toxic materials. Various medicinal plants have proven their role as anti-inflammatory agent without any severe side effect. Experiment was performed based on different type's extract of figs branches to examine abilities to scavenge free radicals and inhibit inflammatory reactions. Finding of the study revealed that the ethyl acetate fraction contained the largest amount of phenolic compounds and showed the highest free radical scavenging activity. Furthermore, all fraction of figs, especially ethanol extract and the ethyl acetate and hexane fractions inhibited nitric oxide production in RAW264.7 cells Another experiment was performed to check the effect of anti-inflammatory activity of leaves through different types of extract. Finding of the study demonstrated that ethanol extract showed maximum ant inflammatory effect that was 75.90% in acute inflammation and in chronic study showed 71.66% reduction in granuloma weight Furthermore, extract such as petroleum ether, chloroform, and ethanol showed significantly reduced edema**. (Rahmani; et al; 2017)**

1.2.3. Anti-Lipidemic:

Figs leaf extracts have been shown to have anti-hyperlipidaemia traits in both animals and humans. In type 2 diabetes mellitus with obesity as a risk factor, developed by a high-fat diet (HFD) and streptozocin, figs therapy may help reduce cholesterol levels. Hydro ethanol extract of Figs fruit reduced triglycerides, cholesterol, LDL, and very low-density lipoprotein (VLDL) while increasing high-density lipoprotein (HDL) protective benefits. Additionally, Figs fruit ethanol extracts inhibited pancreatic lipase, an enzyme that digests lipids and allows absorption into the intestinal lumen. According to these studies, Figs prevents the build-up of cholesterol and triglycerides and might be used to cure or prevent atherosclerosis and coronary heart disease. These investigations also support the traditional application of Figs and its therapeutic advantages for illnesses linked to metabolic syndrome. Figs lipid-lowering impacts might be attributable to tannins and flavonoids, which are essential in lipid mobilization and metabolism. Further research into how figs mediate its anti-hyperlipidaemia traits will report more pertinent knowledge and. (**Yahya et al, 2024).**

1.1.4. Anti-diabetic

Studies using experiments have demonstrated the ant diabetic properties of Figs and its extract. An investigation into the anti-diabetic activity of a methanolic extract of stem bark revealed that the extract demonstrated substantial defence and returned blood sugar levels to normal. A further investigation was conducted to assess the hypoglycaemic impact of a leaf aqueous extract. The study's conclusions demonstrated that the extract clearly had a hypoglycaemic effect in diabetic rats receiving treatment as opposed to those not**. (Rahmani et al, 2017)**

Material and Methods

2. Material and methods:

2.1. Animal and Diets

Male Albino Wister rats, obtained from an animal house (Animal Biology Department, University of Brother's Mentouri, Constantine 1), weighing 40-60g were used. They were individually housed in well-ventilated metal cages. Room temperature was kept at 18-24 °C on a 12 h light-dark cycle (light on 8:00 AM to 20:00 h).

2.2. Experimental Procedure

Rats were fed a poor diet, in a two-way design, diets with or without 10% dried figs (Aberkane). Dried figs (Aberkane) were obtained from Bejaia, Bani Maoush, cut into small pieces and added to diet **(Fig. 9)**. Supplementation of dried figs was made at the expense of poor diet. Rats were divided into two groups of 6 rats each, the Control group (C) and the 10% dried figs (Aberkane) group (F). After 5 weeks of consuming diets, food was removed from the metal cages at 07:30 h and rats were lightly anesthetized with chloroform and killed between 11:00 h and 14:00 h. Blood was collected by heart puncture using portal vein sampling and they were allowed to clot on ice. Serum samples were obtained by centrifugation (3000 rpm for 20 min). Abdominal adipose tissues (Epididymal and perirenal adipose tissues) and liver were immediately removed, weighed, and stored at -20°C until use.

Figure 9: Preparation of dried figs (Aberkane) (Original)

2.3. Analytical Procedure:

Biochemical assays for total cholesterol, triglycerides, and creatinine using kits from BIOMAGHREB, CEBIO, and BIOLABO were conducted using the preserved serum. Prior to the start of the laboratory tests, every tube had the proper label. All guidelines were rigorously

followed during the conduct of these tests at the polyclinic of Larbi Ben M'hidi, Constantine EPSP.

2.3.1. Quantitative test for Total Cholesterol:

- **Principle:**

Following oxidation and enzymatic hydrolysis, the cholesterol amount is determined. The following reactions occur when hydrogen peroxide and amino 4 -antipyrine is combined with phenol and peroxidase to generate the quinonimine indicator:

$$\text{Cholesterol esters} + H_2O \xrightarrow{\text{cholesterol esterase}} \text{Cholesterol} + \text{Fatty acid}$$

$$\text{Cholesterol} + O_2 \xrightarrow[\text{Peroxidase}]{\text{cholesterol oxidase}} \text{Cholestene-4-one-3} + H_2O_2$$

- **Procedure**

The BIOMAGHREB testing kit was used, and 14 labelled tubes were inserted into a tube rack. The first tube was used for the blank reagent tube, the second for the standard tube, and the remaining 12 tubes were divided into six groups: the control group and the experimental group. Each of the tubes with labels received 1000 microliters of the cholesterol reagent that had already been produced. The standard tube was filled with 10 microliters of the standard serum; the same procedure was followed for the Sera from the experimental group (F) and the control group (C). Following a 10-minute incubation period in a water bath at 37 degrees Celsius, the tubes' concentrations were tested directly using a spectrophotometer calibrated to measure wavelengths of 500 nm.

2.3.2. Quantitative test for triglyceride:

- **Principle**

Triglycerides are digested to produce glycerol through a series of linked processes that are used to test them enzymatically in serum. Next, hydrogen peroxide (H2O2) and glycerol oxidase are used to oxidize glycerol.

- **Procedure**

1000 microliters of the previously prepared triglyceride reagent were measured into each of the 14 labelled tubes using the BIOMAGHREB test and adhering to the previously specified protocol. The first tube is always designated for the blank reagent, and the second tube is used for the standard. Ten microliters of the standard serum were added to the standard tube, and the 12 allotted tubes received ten microliters of serum from the C and F groups, respectively. The incubation period was Five minutes in a water bath with a temperature of 37 degrees Celsius. A spectrophotometer with a wavelength of 578 nm was used to measure the concentrations.

2.3.3. Quantitative test for creatinine:

- **Principle**

The creatinine-picric acid complex is a red complex that is created when creatinine and alkaline picrate combine. The measurement window selected prevents influence from other components of the serum. The amount of creatinine present in the sample directly correlates with the color's intensity. This idea is predicated on Jaffe's response.

- **Procedure**

Using the CEBIO testing kit, 800 microliters of the first reagent (R1), which contains sodium hydroxide and disodium phosphate, were added to each of the 14 tubes while keeping their original positions. Next, 100 microliters of the standard serum, control group serum, and experimental group serum were added to the appropriate tubes. The second reagent (R2), which contains picric acid and sodium dodecyl sulphate at a pH of 4.0, is then added in 200 microliters. Then, using a Spectrophotometer set at 500 nm, the concentrations of the contents of the tubes were measured kinetically/instantaneously. This process did not require an incubation period.

2.3.4. Qualitative test for Glucose

- **Principle**

This idea is based on the Tinder method, which states that when GOD oxidizes glucose to gluconic acid and hydrogen peroxide, POD and POD combine to produce a red quinonimine through a reaction with chloro-4-phenol and PAP.

- **Procedure**

1000 microliters of the already produced glucose reagent were measured into each of the 14 labelled tubes using the BIOLABO testing kit, keeping the locations of the test tubes the same. The first tube, as always, was designated for the blank reagent, and the second tube for the standard. Ten microliters of the standard serum were added to the standard tube, and the 12 allotted tubes received ten microliters of serum from the C and F groups, respectively. The incubation period was five minutes in a water bath with a temperature of 37 degrees Celsius, and the concentrations were measured in-person using a 500 nm wavelength spectrophotometer.

2.4. Statistical Analyses

All results were tested for statistical significance by Student's t-test.

Results and discussion

3. Results and Discussion

3.1. Effect of 10% dried figs on gain body weight:

The results showed that 10% dried figs (Aberkane) feeding slightly decreased gain body weight, but not significant but ($P < 0.05$, **Fig. 10**). Our results are in agreement with the study done **(Brown et al, 1999, Aljamal et al, in 2023)**. The high content of soluble fibre in dried figs contribute to weight loss by slowing absorption of macronutrients, leading to increased insulin sensitivity and increased satiety which cause lower overall energy intake.

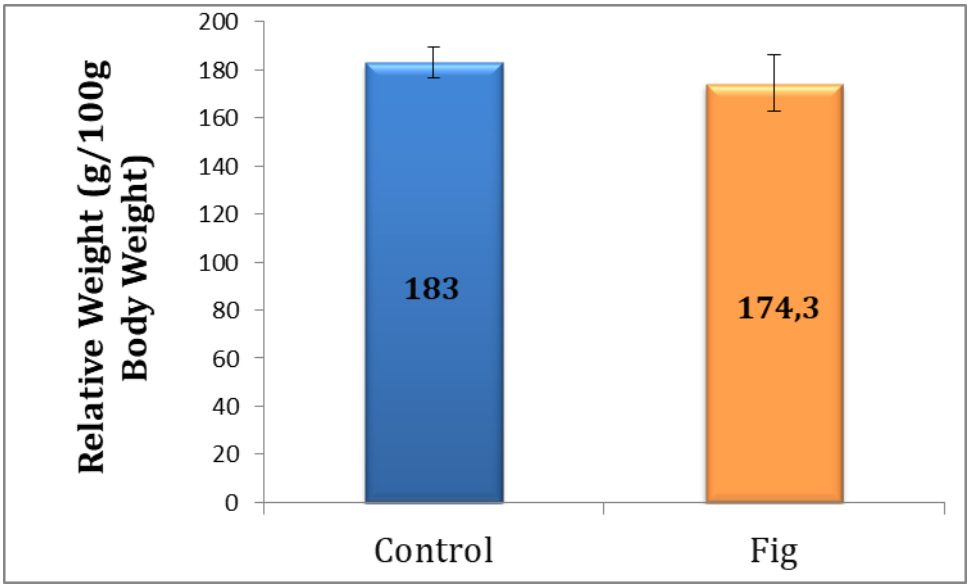


Figure 10: Effect of 10% dried figs on gain body weight[1]

[1]Values are means + SE (n=6) for each group

3.2. Effect of 10% Algerian dried fig on serum total and HDL Cholesterol:

10% dried figs (Aberkane) feeding had no significant influence on serum total and HDL cholesterol **(Fig. 11**) Despite having high soluble fibre content, eating dried figs did not reduce serum total and HDL cholesterol in the blood. A study done by **(Surendran et al, 2020**) showed that feeding Sprague Dawley rats dried fig significantly decrease total and HDL cholesterol. This paradoxical finding might due to climate change and figs species

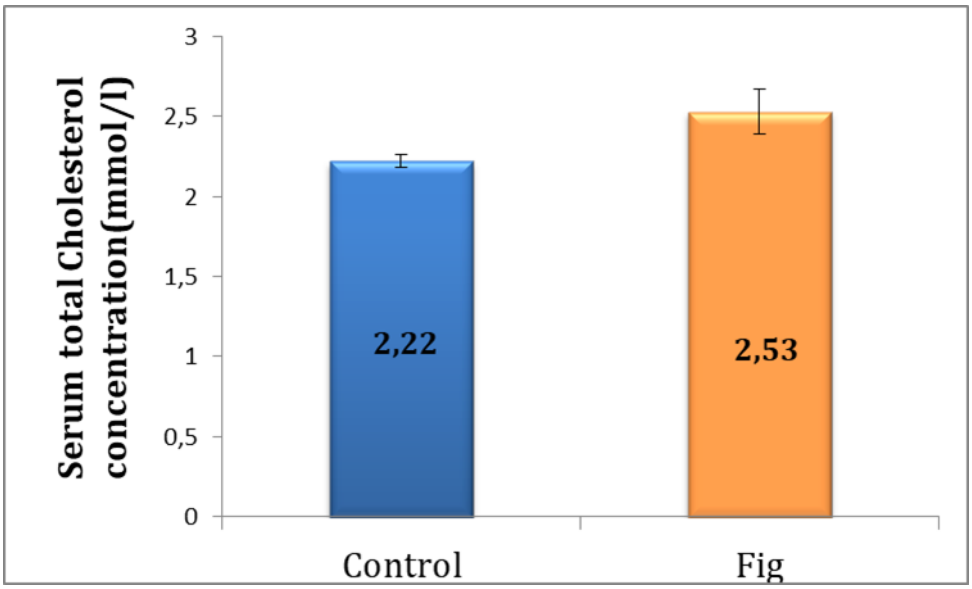


Figure 11: Effect of 10% Algerian Dried Figs on Serum total cholesterol[1]

[1] Values are means+ SE (n=6) for each group

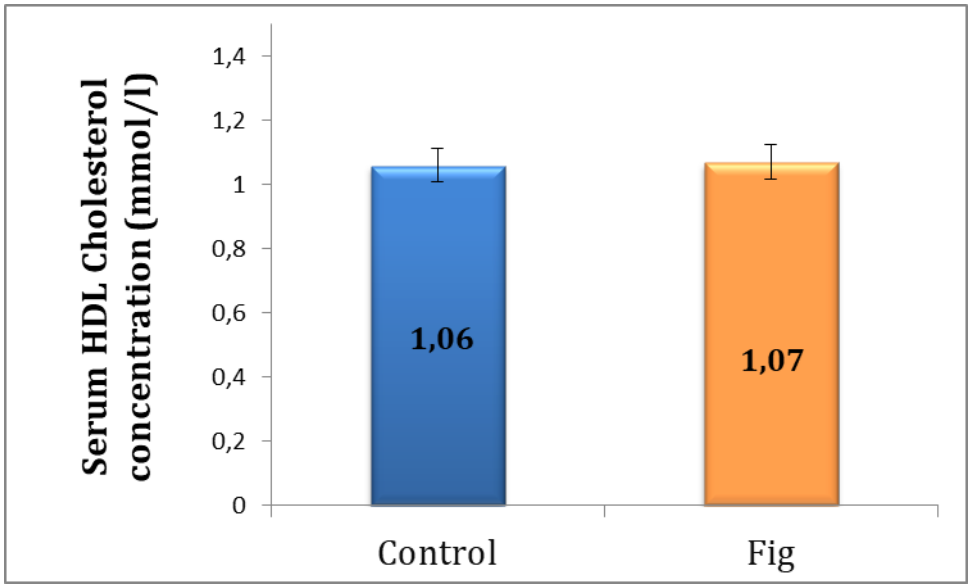


Figure 12: Effect of 10% Algerian Dried Figs on Serum HDL Cholesterol[1]

[1]Values are mean+ SE (n=6) for each group

3.3. Effect of 10% Algerian dried fig on Serum Triglyceride:

Serum triglycerides were unaffected by 10% dried figs (Aberkane) treatment (**Fig. 13**). Our results are in agreement with study done by **(Peterson., 2011**) which explains that the triglyceride concentrations did not change significantly despite the increase in sugar intake.

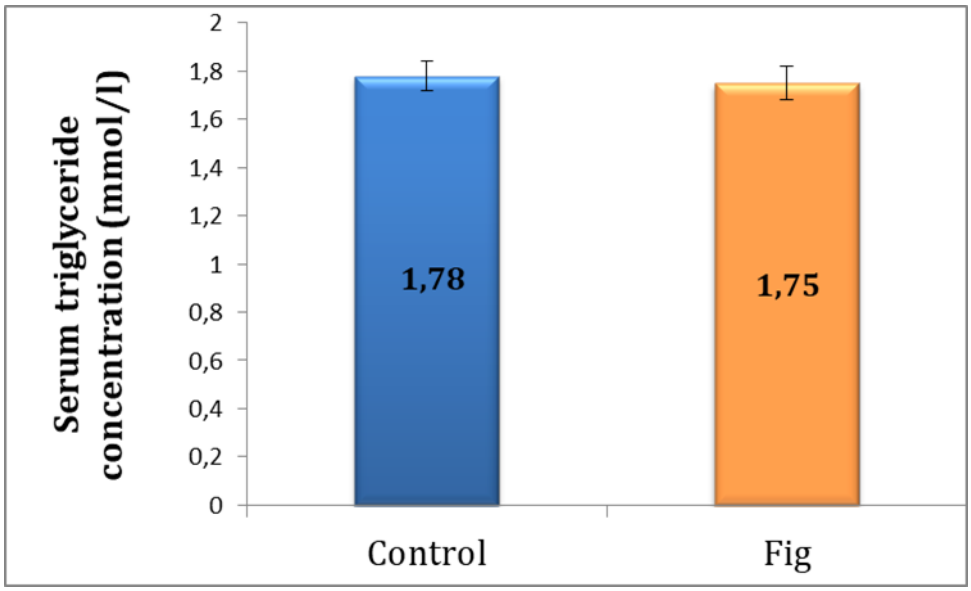


Figure 13: Effect of 10% Algerian Dried Figs on Serum triglyceride[1]

[1]Values are mean+ SE (n=6) for each group

3.4. Effect of 10% Algerian Dried Figs on Liver Weight

Relative liver weight was unaffected by dietary treatment (P <0.05, **Fig. 14**). Fibers are known for their effect in improving the liver and reducing the pathological damage associated with it and therefore cannot provoke liver diseases that can ultimately lead to a decrease in liver weight **(Zhu et al, 2023)**. Therefore, the unchanged liver weight obtained in our results might due to high content of fibers in dried figs.

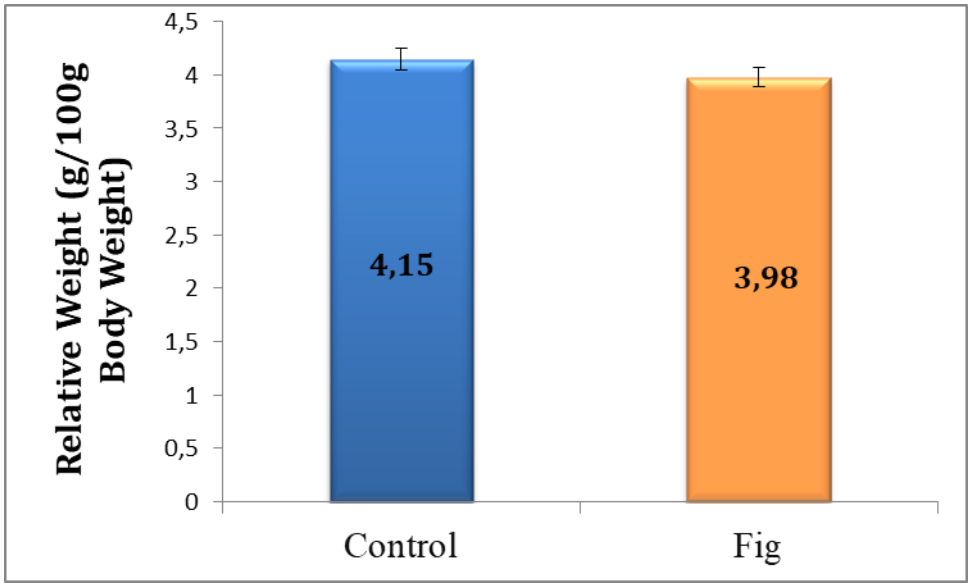


Figure 14: Effect of 10% Algerian Dried Fig on Liver Weight[1]

[1]Values are mean+ SE (n=6) for each group

3.5. Effect of 10% Algerian dried fig on Serum Glucose

Feeding rats 10 % dried figs (Aberkane) caused a significant decrease in serum glucose **(Fig. 15).** Our results are in agreement with a study done by (**Purnamasari et al, 2023).** The presence of polyphenols and flavonoids in figs contributes to its ability to influence glucose levels, since the flavonoid have been shown to impact the transport of both glucose and vitamin C. It has also been reported that fig contain a good amount of furocoumarins and phycocin as potential blood sugar lowering agents which could be responsible for its effect on insulin sensitivity. **(Liang et al, 2009) and Qin et al, 2010).** Previous studies have shown that some highly viscous soluble fibers, such as guar gum, psyllium, have a significant effect on lowering blood glucose or glycaemic index (GI), and the effect is positively correlated with viscosity. The underlying mechanism was thought to be the water-holding ability of viscous fibers, which can form a gel matrix and this gel matrix thickens the small intestinal contents, slows down the small intestinal transit time, and reduces the contact of nutrients with digestive enzymes, thereby reducing blood glucose levels **(Lu et al, 2023)**

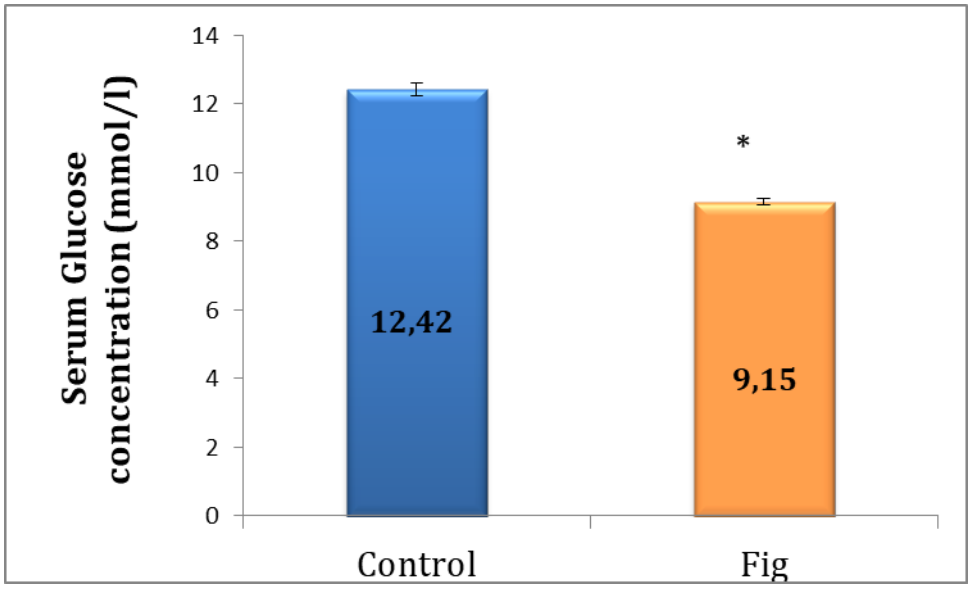


Figure 15: Effect of 10% Algerian Dried Fig on Serum Glucose[1]

[1] Values are mean + SE (n=6) foe each group

"*" Significantly different from control by student's test ($p<0.05$)

3.6. Effect of 10% Algerian dried fig on relative epedidymal and perirenal adipose tissue weight

Dietary 10% Dried figs (Aberkane) significantly caused 32% and 23% depression in epididymal adipose tissue and perirenal adipose tissue, respectively **(Fig. 16 and 17**). This response is evidence supporting the hypoglycaemic effect by 10% dried figs. We speculate that the anti-obesity effect is due to the high content of fibers in dried figs which slow absorption of macronutrients, leading to increased insulin sensitivity, reduced food intake, therefore increased satiety and energy expenditure

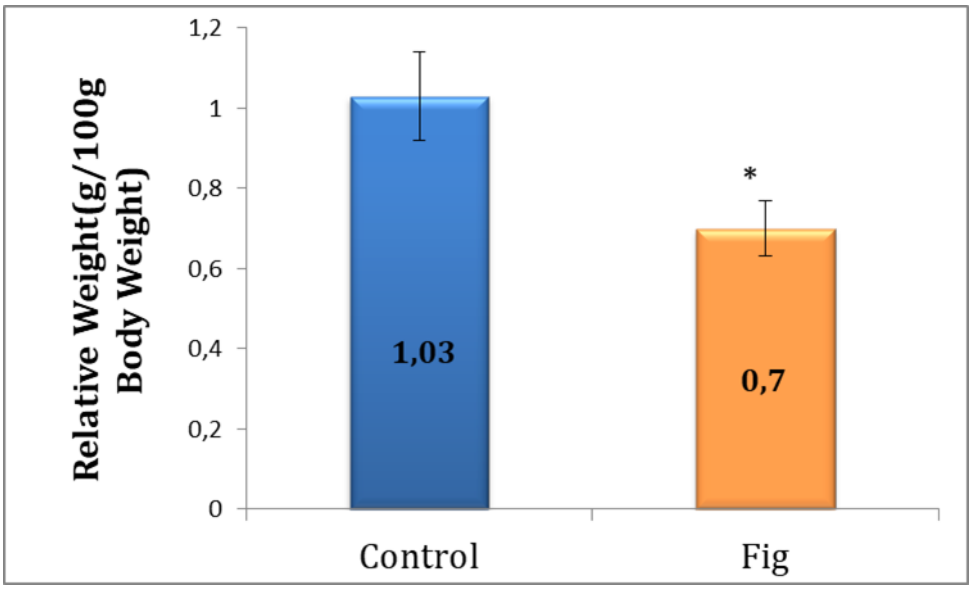


Figure 16: Effect of 10% Algerian Dried Fig on Epididymal Adipose Tissue Weight[1]

[1]Values are mean+ SE (n=6) for each group

"*" Significantly different from control by student's test (P <0.05)

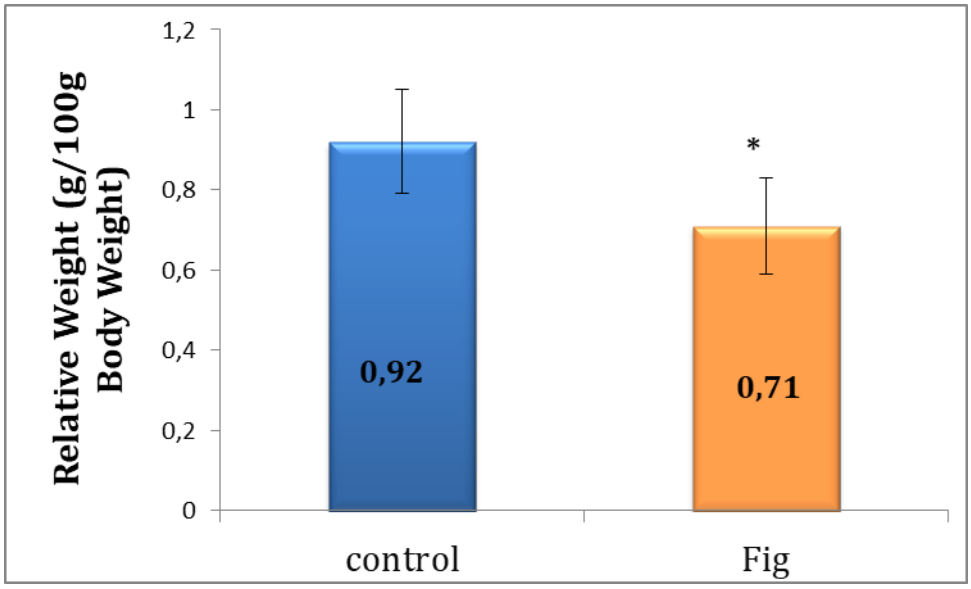


Figure 17: Effect of 10% dried fig on Perirenal Adipose Tissue Weight[1]

[1]Values are mean+ SE (n=6) for each group

"*" Significantly different from control by student's test (P <0.05)

3.7. Effect of 10% Algerian dried fig on Serum Creatinine:

Serum concentration of creatinine (indicator of renal function) was unaffected by 10% dried figs (Aberkane) treatment **(Fig. 18)**. The unaffected serum creatinine by 10% dried figs, suggesting that

the anti-obesity caused by 10% dried figs is not mediated through a mechanism involving renal dysfunction.

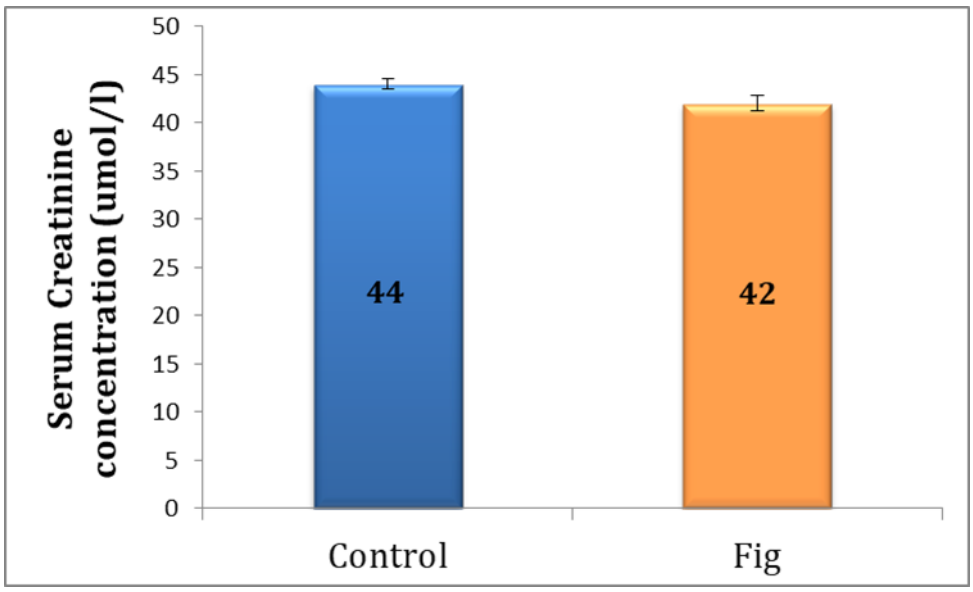


Figure 18: Effect of 10% Algerian Dried Fig on Serum Creatinine[1]

[1] Values are mean+ SE (n=6) for each group.

Conclusion and Future Perspectives

4. Conclusion and Future Perspectives

Figs fruits provide protein and fibre to body. It also contains healthy monounsaturated fat that promotes good cardiovascular health. Figs are rich in anti-oxidants that help in the elimination of free radicals which are one of the causes of cancer. The high energy density and high amount of dietary fibre in figs both are attributes to a beneficial effect on weight management. Therefore, this study provided for the first time that feeding rats 10% Algerian dried figs (Aberkane) caused not only weight loss in body fat (Epididymal and Perirenal Adipose Tissues), but also lowered serum glucose.

Obesity is well associated with diabetes **(Konakachi et al, 2017).** The high energy density and high amount of dietary fibre in figs both are attributes to a beneficial effect on weight management, because dietary fibre can produce a feeling of fullness in the stomach **(Toqaa, et al, 2022).** The adipose secreted protein namely leptin has a main biological role in regulation of obesity **(Halaas et al. 1995)**. It seems to control the energy expenditure and food intake. Increase in leptin secretion reduces food intake and elevates energy expenditure. Putting these facts in consideration, further study is needed to explain this phenomenon by measuring serum leptin, enzyme activity of carnitine palmitoyltransferase (a rate limiting enzyme for fatty acid oxidation), activities lipogenesis enzymes such as glucose 6-phosphate dehydrogenase and fatty acid synthase

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SUMMARY

The use of Algerian dried figs has been known to have various health benefits such as gastrointestinal (colic, indigestion, lack of appetite, and diarrhea), respiratory (sore throats, coughs, and bronchial issues), and cardiovascular abnormalities. Figs also utilized as an antispasmodic and anti-inflammatory medication. This study was conducted for the first time to elucidate the effect of 10% Algerian dried fig (Aberkane) on Obesity and Lipids metabolism in Rats. Male Albino Wister rats were fed a poor diet, in a two-way design, diets with or without 10% Algerian dried figs (Aberkane). After 6 weeks of consuming diets, Blood was collected by heart puncture, Serum samples were obtained by centrifugation. Abdominal adipose tissues (Epididymal and perirenal adipose tissues) and liver were immediately removed, weighed, and stored at -20°C until use.

The results showed that d Feeding rats 10 % dried figs caused a significant decrease in serum glucose, 32% and 23% reduction in epididymal adipose tissue and perirenal adipose tissue, respectively. However, the other lipid tests such as serum total cholesterol, HDL cholesterol, serum triglycerides were unaffected.

The anti-obesity effect of dried figs seems to be mediated through a mechanism involving the high content of fibers in dried figs which slow absorption of macronutrients, leading to increased insulin sensitivity, reduced food intake, therefore increased satiety and energy expenditure.

Keywords: Lipids metabolism, Glucose, Fibers, Figs

Résume

L'utilisation des figues séchées d'Algérie est connue pour avoir divers bienfaits sur la santé, notamment gastro-intestinaux (coliques, indigestion, manque d'appétit et diarrhée), respiratoires (maux de gorge, toux et problèmes bronchiques) et anomalies cardiovasculaires. Les figues sont également utilisées comme médicament antispasmodique et anti-inflammatoire. Cette étude a été menée pour la première fois pour élucider l'effet de 10 % de figue séchée d'Algérie (Aberkane) sur l'obésité et le métabolisme des lipides chez le rat. Des rats mâles Albino Wister ont été nourris avec une alimentation pauvre, selon une conception bidirectionnelle, avec ou sans 10 % de figues séchées d'Algérie (Aberkane). Après 6 semaines de régimes alimentaires, le sang a été collecté par ponction cardiaque, des échantillons de sérum ont été obtenus par centrifugation. Les tissus adipeux abdominaux (tissus adipeux épididymaires et périrénaux) et le foie ont été immédiatement prélevés, pesés et conservés à -20 ° C

Les résultats ont montré que l'alimentation des rats avec 10 % de figues séchées entraînait une diminution significative de la glycémie, une réduction de 32% et 23% du tissu adipeux épididymaire et du tissu adipeux périrénal, respectivement. Cependant, les autres tests lipidiques tels que le cholestérol total sérique, le cholestérol HDL et les triglycérides sériques n'ont pas été affectés.

L'effet anti-obésité des figues séchées semble être dû à un mécanisme impliquant la teneur élevée en fibres des figues séchées qui ralentit l'absorption des macronutriments, entraînant une sensibilité accrue à l'insuline, une réduction de l'apport alimentaire, donc une augmentation de la satiété et de la dépense énergétique.

Mots clés : Métabolisme des lipides, Glucose, Fibres, Figues

ملخص

من المعروف أن استخدام التين الجزائري المجفف له فوائد صحية مختلفة، بما في ذلك الجهاز الهضمي (المغص وعسر الهضم وقلة الشهية والإسهال)، والجهاز التنفسي (التهاب الحلق والسعال ومشاكل الشعب الهوائية) واضطرابات القلب والأوعية الدموية. يستخدم التين أيضًا كدواء مضاد للتشنج ومضاد للالتهابات. أجريت هذه الدراسة لأول مرة لتوضيح تأثير 10% من التين الجزائري المجفف (أبركان) على السمنة واستقلاب الدهون في الجرذان. تمت تغذية ذكور فئران البينو ويستر بنظام غذائي منخفض، في تصميم ثنائي الاتجاه، مع أو بدون 10٪ من التين الجزائري المجفف (أبركان). بعد 6 أسابيع من النظام الغذائي، تم جمع الدم من القلب، وتم الحصول على عينات المصل عن طريق الطرد المركزي. تم جمع الأنسجة الدهنية في البطن (الأنسجة الدهنية والبربخية) والكبد على الفور ووزنها وتخزينها عند -20 درجة مئوية .

أظهرت النتائج أن تغذية الفئران بنسبة 10% من التين المجفف أدى إلى انخفاض كبير في نسبة السكر في الدم، وانخفاض بنسبة 32% و23% في الأنسجة الدهنية فوق البربخ والأنسجة الدهنية المحيطة بالكلية على التوالي. ومع ذلك، لم تتأثر اختبارات الدهون الأخرى مثل الكوليسترول الكلي في الدم، والكوليسترول الحميد، والدهون الثلاثية في الدم .

يبدو أن التأثير المضاد للسمنة للتين المجفف يرجع إلى آلية تتضمن المحتوى العالي من الألياف في التين المجفف، مما يؤدي إلى إبطاء امتصاص العناصر الغذائية الكبيرة، مما يؤدي إلى زيادة حساسية الأنسولين، وتقليل تناول الطعام، وبالتالي زيادة الشبع وإنفاق الطاقة.

الكلمات المفتاحية: استقلاب الدهون، الجلوكوز، الألياف، التين

Done by: BOUGOFFA Ouahiba and AISSAOUI Malak

Academic year: 2023/2024

Dissertation

To Get Diploma of Master in Biochemistry

Effect of Consumption of Algerian Dried Figs on Obesity And Lipids Metabolisms in Rats

SUMMARY

The use of Algerian dried figs has been known to have various health benefits such as gastrointestinal (colic, indigestion, lack of appetite, and diarrhea), respiratory (sore throats, coughs, and bronchial issues), and cardiovascular abnormalities. Figs also utilized as an antispasmodic and anti-inflammatory medication. This study was conducted for the first time to elucidate the effect of 10% Algerian dried fig (Aberkane) on Obesity and Lipids metabolism in Rats. Male Albino Wister rats were fed a poor diet, in a two-way design, diets with or without 10% Algerian dried figs (Aberkane). After 6 weeks of consuming diets, Blood was collected by heart puncture, Serum samples were obtained by centrifugation. Abdominal adipose tissues (Epididymal and perirenal adipose tissues) and liver were immediately removed, weighed, and stored at -20°C until use.

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