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Study The Effect of Frankincense as Anti-inflammatory.

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Abstract

Inflammation is the reaction of the body's defense system to the introduction of a foreign agent (bacterium, bacteria, virus, foreign body), or injury to whatever in the body's tissues rheumatoid, diabetes, heart disease, and autism. This study aimed to evaluate the effect of frankincense in different concentrations on adult male albino rats on anti-inflammatory hind paw. Thirty white male albino rats were divided into 6 groups (5 rats each) weighing 220 ± 5 g. The first and second groups fed on standard diet the third, fourth, fifth and sixth groups fed standard diet containing 5, 10, 15 and 20% frankincense powder respectively. After 30 days rats second to sixth groups were injected by 0.1 ml/kg formalin bw to caused hind paw edema inflammation, after 28 days from injection of formalin and ingesting diet supplemented with 5, 10, 15 and 20% frankincense the results when compared the negative control with rats diet 5, 10, 15 and 20% frankincense medicated that supplementation led to the improvement of hind paw edema and blood lipids level compared with positive control in groups. Also no significant difference in ESR and BW between groups fed on different concentration of frankincense.

Keywords: inflammation, hind paw, frankincense.

Introduction

Inflammation is part of the non-specific immune response that occurs in reaction to any type of bodily injury. The inflammatory response is a defense mechanism that evolved in higher organisms to protect them from infection and injury. Its purpose is to localize and eliminate the injurious agent and to remove damaged tissue components so that the body can begin to heal (Ferrero-Miliani et al., 2007).

The signs of inflammation are heat, pain, redness, swelling, and loss of function. Too little inflammation could lead to progressive tissue destruction by the harmful stimulus (e.g. bacteria) and compromise the survival of the organism. In contrast, chronic inflammation may lead to a host of diseases, such as hay fever, periodontitis, atherosclerosis, rheumatoid arthritis, and even cancer (**Abbas and Lichtman, 2009**).

There are various components to an inflammatory reaction that can contribute to the associated symptoms and tissue injury. Edema, leukocyte infiltration, and granuloma formation represent such components of inflammation. Though, it is a defense mechanism. Edema is the abnormal accumulation of fluid in certain tissues within the body. The accumulation of fluid may be under the skin - usually in dependent areas such as the legs (peripheral edema, or ankle edema), or it may accumulate in the lungs (pulmonary edema). which can cause severe pain. Applications such as in food, flavor, cosmetic, hygienic and insecticidal areas Obtain frankincense through by slashing the bark and letting the exuded resin bleed out and harden. The hardened streaks from resin are called tears. Several species and varieties of frankincense trees each produce a slightly different type of resin (**Ali, 2016**).

Inflammatory response is a defense mechanism that evolved in higher organisms to protect them from infection and injury. Its purpose is to localize with eliminate the injurious agent and to remove damaged tissue components so that the body can begin to heal. The response consists of changes in blood flow, an increase in permeability of blood vessels, and the migration of fluid, proteins, and white blood cells from the circulation to the site of tissue damage (**Ferrero-Miliani et al., 2007**).

According to WHO, 0.3-1% of the world population inflammatory is affected from and among them females are three times more prone to the disease as compared to males inflammatory, and systemic autoimmune disease (**WHO, 2016**).

Inflammation has a role in a host of common and often deadly diseases, including Alzheimer's, arthritis, cancer, diabetes, heart disease, and possibly even depression. inflammation Cause the following symptoms redness, Swelling, Heat, Pain and Loss of function (**Gialal and Devaraj 2018**).

Frankincense is one of the most widely used food ingredients and a doubt the world's two most important resins is about 25.

Frankincense contains about 5-9% essential oil, 65-85% alcohol-soluble resin, and the remaining 21-22% is water soluble gum (**Abdel-Tawab et al., 2017**).

Frankincense is considered medicine to cure inflammatory diseases, showed anti-inflammatory effectiveness with as blood purifier,

diuretic and a substance which improves complexion. It also alleviates leprosy, ulcer, fistula, diarrhea, fever, chronic skin diseases, hemorrhage and rheumatism(Ali, 2016).

Therefore, the aim of this study was determination the effect of frankincense as inflammation.

Material And Methods

Materials:

frankincense is purchased from local market in Shibin El- kom, Casein, corn oil, vitaminsmixture and minerals, were obtained from Morgan Co. Cairo, Egypt. Chemical kits used in this study (TG, HDL-c, LDL-c, VLDL-c, ESR) were purchased from Al-Gomhoria Company for Chemical, Medical and Instruments, Cairo, Egypt.

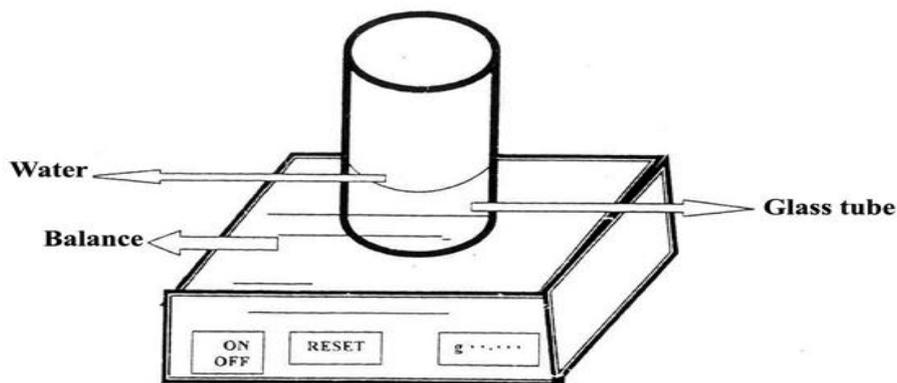
Preparation of frankincense

The frankincense was obtained at dried form and then milled to obtain powder form and stored in freezer until used

Experimental design 220 ±2g

Thirty white males werealbino rats obtained from research Institute ophthalmology Medical analysis department and experimental was applied in laboratory of the faculty of Home Economics, Menoufia University.Rats were kept in cages wire. The diet was introduction in special feed cups to avoid scattering of feed also water was provided to the rats by glass tube through the wire case.The animals were housed individually in well aerated cages under hygienic laboratory condition and fed standard diet according to AIN-93 guidelines (Reeves et al., 1993) for 7 days as an adaptation period

Determination of hind paw volume



For measuring edema used, a glass open-top cylinder with an internal diameter of 2 cm and height of 5 cm was attached to the center

of a 10-cm diameter petri dish. Four centimeters of the cylinder was filled with water, and the cylinder. The petri dish was placed on a digital balance with a suitable sensitivity. Next immersing the animal paw in to the water to a predetermined depth, a weight was appeared on the balance. The Paw volume was measure by mean of a volume displacement method using a water after 0,2,4,8, hour and after 4,8 12,14,19,21,24,28day according to **fereidonia et.al (1999)**.

Rats were fasted overnight (12 hours) with anesthetized and diethyl ether. Blood samples were divided into portion part1 then collected into a dry clean centrifuge glass tube. Serum was separated by centrifugation at 3000 r.p.m for 10 minutes at room temperature. Serum was carefully aspirated and Put it into clean quiet fit plastic tubes and kept frozen at (-20°C) until analysis. Part 2 were collected in tube contain ethylene di amine tetra acetic acid (EDTA) to estimate ESR.

Analytical method

Erythrocyte Sedimentation Rate (ESR).

Erythrocyte S-Rate was determination according to the method **Bogdaycioglu et al., (2014)**.

Serum cholestrol:

The determination of low-density lipoprotein cholesterol (LDLc) and very low-density lipoprotein cholesterol (VLDLc) were carried out according to the methods of **Leeand Nieman (1996)** as follows: VLDLc = TG/ 5, LDLc = Total cholesterol - (HDLc + VLDLc).

Histopathological examination

Small specimens of the hind paw of a rat were taken from each rat group, fixed in neutral buffered formalin, dehydrated in ascending concentration of ethanol (70, 80 and 90%), cleared in zylene and embedded in paraffin. Sections of 4–6 µm thickness were prepared and stained with hematoxylin and eosin according to **(Carleton's, 1976)**.

Statistical Analysis

The results recorded as mean ± SD and were subjected to an analysis of variance (ANOVA) for a completely randomized design using a statistical analysis system **SPSS (2000)**. Duncan's multiple range tests were used to determine the differences among means at the level of 95%.

Results And Discussion:

Table (1): showed the frankincense on body weight gain of negative and inflamed groups. Rats are shown inflamed groups recorded lower than the negative control there was significant difference ($P \leq 0.05$) among positive and inflamed groups feeding on different concentration of frankincense powder in body weight gain (BWG) no significant difference was observed in BWG between inflamed rats feed on different concentration frankincense. Also feeding rats on diets replaced with

different concentration frankincense caused decreasing in BWG This loss weight may be attributed to the high amount of resin and a mixture of volatile oil, (**Jane et al., 2007**).

Table: (2) showed the effect of frankincense on erythrocyte sedimentation rate of negative and inflamed groups. Rats in the inflamed groups recorded the highest than the negative control there was significant difference ($P \leq 0.05$) among positive and inflamed groups feeding on different concentration of frankincense powder in erythrocyte sedimentation rate (ESR) no significant difference. Also as observed in ESR between inflamed rats fed on different concentration frankincense caused decreasing in ESR the result agrees with (**Saha et al; 2018**).

Table(3): showed the effect of frankincense on hind paw weight of negative and inflamed groups. Injection rats with formalin caused edema which is resulted of inflammatory. However, supplementation rats diets with frankincense at doses 5, 10, 15 and 20% were frankincense found to have significant ($P \leq 0.05$) anti-inflammatory activity compared with positive control groups. Also feeding rats on diets replaced with different concentration frankincense caused decreasing in hind paw, the result was agree with **Houghton, (1989)**.

Similar study, paw edema in rats is one of the most suitable test procedures to screen the acute inflammation which was in the first day after injection and its event. Among the various phytoconstituents frankincense has beneficial effects in the inflammatory conditions and that the anti-inflammatory activity is a common property of many plants, anti-inflammatory and antitumor activity the anti-inflammatory from frankincense effects of resin and a mixture of volatile oil have been attributed to various mechanisms including inhibition of lipoxygenase and cyclooxygenase activities **Melina, (2011)**.

Table (4): Effect of frankincense on lipids profile of experimental rats is shown that inflamed rats had the highest than the negative control ($P \leq 0.05$) values of TC, TG, LDL and VLDL while HDL had opposite trend, among positive and inflamed groups feeding on different concentration of frankincense powder, positive control was the highest there was significant difference ($P \leq 0.05$) this result agrees with (**Mohammad, 2018**) (**Zutsi, 2019**).

Histopathological investigation

Fig (1): showed the effect of frankincense on histological of rats hind of negative control and inflamed.

Microscopically, examined sections from rats in group negative control revealed normal two articular cartilages separated by normal joint space with normal synovial membrane. On the other hand, examined sections of rats positive control showing massive inflammatory exudate infiltrated in the joint space. However, improved picture was noticed in sections from group frankincense 5%, as examined sections revealed narrow joint space group frankincense 10% pannus formation with marked improved picture was noticed in rats from group frankincense 15%, examined sections revealed no histopathological alterations group frankincense 20% .

Table (1): Effect of frankincense on body weight gain of negative and positive groups

Variables	Negative control	Inflamed groups				
		positive control	Frankincense 5%	Frankincense 10%	Frankincense 15%	Frankincense 20%
BWG (g)	17.5 ^a ±5.05	14.0 ^b ±1.6	-15.77 ^c ±1.8	-16.67 ^c ±1.06	-16.82 ^c ±1.3	-17.32 ^c ±0.83

Values are expressed as means ± SD; means in the same row with different letter are significantly different (P < 0.05). BWG; body weight gain.

Table: (2) Effect of frankincense on erythrocyte sedimentation rate of negative and positive groups

Variables	Negative control	Inflamed groups				
		positive control	Frankincense 5%	Frankincense 10%	Frankincense 15%	Frankincense 20%
ESR (g/60day)	5.8 ^b ±0.54	22.4 ^a ±7.5	8.4 ^b ±0.54	6.8 ^b ±.83	7.8 ^b ±.83	7.8 ^b ±.83

Values are expressed as means ± SD; means in the same row with different letter are significantly different (P < 0.05) ESR; erythrocyte sedimentation rate.

Table(3):Effect of frankincense on hind paw weight (g)of negative and positive groups

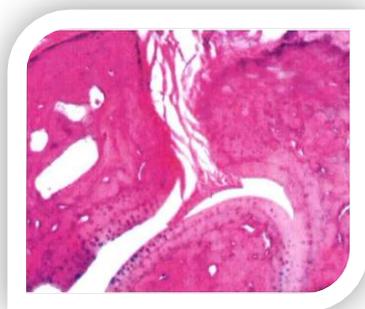
Variables	Negative control	Inflamed groups				
		Positive control	Frankincense 5%	Frankincense 10%	Frankincense 15%	Frankincense 20%
E.T (0h)	0.48 ^c ±0.08	.68 ^b ±0.08	0.7 ^a ±0.07	0.68 ^b ±0.1	0.6 ^b ±0.03	0.6 ^b ±0.02
E.T (2h)	0.48 ^d ±0.08	1.4 ^a ±.24	0.84 ^b ±.15	0.7 ^{bc} ±.07	0.66 ^c ±.05	0.62 ^{cd} ±.04
E.T (4h)	0.48 ^d ±.083	1.7 ^a ±.11	1.0 ^b ±.13	0.9 ^c ±.07	0.84 ^c ±.05	0.82 ^c ±.4
E.T (8h)	0.48 ^d ±0.08	1.8 ^a ±.08	1.0 ^b ±0.14	1.0 ^b ±0.14	0.92 ^c ±0.04	0.88 ^c ±0.4
E.T (4d)	0.48 ^d ±0.08	1.8 ^a ±.08	1.1 ^b ±0.1	1.0 ^b ±0.1	0.96 ^c ±0.05	0.92 ^c ±0.04
E.T (8d)	0.48 ^d ±0.08	1.7 ^a ±.08	1.0 ^b ±0.07	0.94 ^b ±.11	0.82 ^c ±.04	0.94 ^b ±.05
E.T (12d)	0.48 ^d ±0.08	1.5 ^a ±.08	0.88 ^b ±0.07	0.88 ^b ±0.11	0.74 ^c ±0.04	0.82 ^b ±.04
E.T (14d)	0.48 ^c ±0.08	1.3 ^a ±.17	0.8 ^b ±.07	0.82 ^b ±.08	0.68 ^b ±.08	0.68 ^b ±.08
E.T (19d)	0.54 ^c ±.054	1.2 ^a ±.17	0.7 ^b ±0.07	0.72 ^b ±0.08	0.62 ^b ±.04	0.64 ^b ±.05
E.T ((21d)	0.54 ^d ±.054	.98 ^a ±.17	0.7 ^b ±.07	0.68 ^{bc} ±.08	0.60 ^c ±.04	0.64 ^{bc} ±.04
E.T (24d)	0.54 ^d ±.054	0.98 ^a ±.04	0.7 ^b ±.07	0.68 ^{bc} ±0.1	0.60 ^c ±.0	0.62 ^c ±.1
E.T (28d)	0.54 ^d ±.054	.98 ^a ±.04	0.7 ^b ±.07	0.68 ^{bc} ±.1	0.60 ^c ±.0	0.61 ^c ±.1

Values are expressed as means ± SD; means in the same row with different letter are significantly different (P < 0.05. ET: Evaluate Time.; h:hour.; d: day.

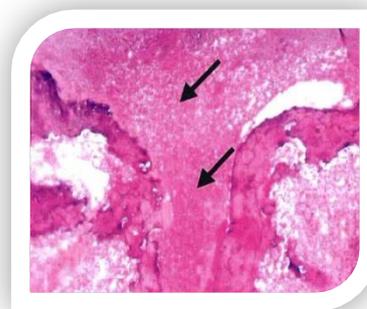
Table (4): Effect of frankincense on lipids profile of negative and positive groups

Variables	Negative control	Inflamed groups				
		positive control	Frankincense 5%	Frankincense 10%	Frankincense 15%	Frankincense 20%
CH (mg/dl)	57.0 ^e ±1.7	107.9 ^a ±1.1	81.5 ^b ±1.7	79.5 ^c ±0.5	74.0 ^d ±1.1	81 ^b ±0.57
TG (mg/dl)	53 ^d ±5	81.5 ^a ±7.5	55 ^d ±1.7	60.0 ^c ±5.7	67 ^b ±1.7	60 ^c ±6.9
HDL (mg/dl)	11.0 ^a ±0	8.8 ^c ±.05	10.5 ^{a,b} ±.57	10.2 ^b ±0.9	10.6 ^a ±.05	10.5 ^{a,b} ±.57
LDL (mg/dl)	35.8 ^d ±2.7	82.8 ^a ±1.7	60.0 ^b ±3.4	57.5 ^b ±1.0	49.8 ^c ±1.4	59.0 ^b ±1.1
VLDL (mg/dl)	10.6 ^c ±0.1	16.3 ^a ±1.5	11.0 ^c ±1.1	12 ^b ±0.34	13.5 ^b ±0.34	12 ^b ±0

Values are expressed as means ± SD; means in the same row with different letter are significantly different (P < 0.05).



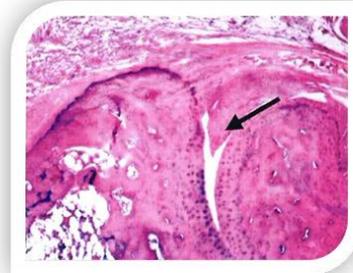
negative control



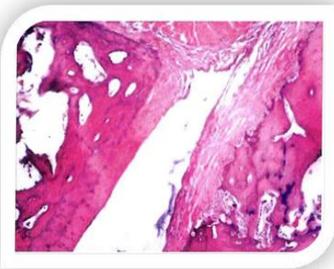
positive control



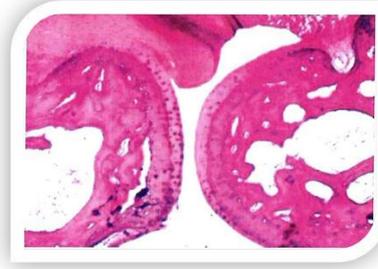
Frankincense 5%



Frankincense 10%



Frankincense 15%



Frankincense 20%

fig (1): Effect Of frankincense on histological of rats hind of negative control and inflamed

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الملخص العربى

الإلتهاب هو رد فعل الجهاز الدفاعي في الجسم على دخول عامل غريب (جرثومة ، بكتيريا، فيروس، جسم غريب) أو على إصابة أيا كانت في أنسجة الجسم وهناك خطورة شديدة من الالتهابات المزمنة تساهم فى انتشار العديد من الامراض القاتلة كالأمرض السرطانية وتصلب الشرايين والتهاب المفاصل الروماتويدى والسكري وامراض القلب وامراض الزهايمر ومرض التوحد .هدفت هذه الدراسة إلى تقييم تأثير الكندر بتركيزات مختلفة على ذكور الفئران البيضاء كمادة مضادة لالتهاب مخلب الفأر وقد استخدم الكندر بتركيزات مختلفة لذلك. وتم استخدام في الدراسة 30 من ذكور الفئران وزن 220 ± 2 جم وقد قسمت إلى ستة مجموعاتبواقع خمسة فئران لكل مجموعة كالتالىالمجموعة الاولى وفيها تغذت الفئران على العليقة الأساسية (عليقة اللكازين)، والمجموعة الثانية التيتغذت على العليقة الأساسية و تم حقنها بعد ثلاثون يوم من بداية التجربة مع باقي المجاميع التي كانت تتغذى على العليقة الاساسية مع 5،10،15، 20% كندروتم الحقن بمادة الفورمالين كمادة مسببة للالتهاب بتركيز 0.1 لكل كيلو جرام من وزن الجسم وبعد 28 كانت النتائج عندما تم مقارنة المجموعة الضابطة الموجبة مع المجموعه السالبة و تركيزات الكندر (5و10و15و20%) ادى الى تحسن الاوديما المخليبية ودهون الدم بمعنوية مرتفعة ($p \leq 0.05$) بينما لم يلحظ أي اختلاف معنوي في مستوى الوزن وسرعة الترسيب بين المجموعة الضابطة الموجبة وبين مجاميع تركيزات الكندر .