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Estimate the effect of Male frankincense (Boswellia *Carterii*) extracts' on the Bacteriological and chemical quality of chicken meat

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Abstract: This study's objective is to determine the influence of applying the ethanolic alcoholic extract of the male frankincense (*Boswellia carterii* plant) on extending the shelf life of raw chicken. Meat stored at 4 °C for 9 days A total of 100 g of broiler chicken meat mixed with concentrations of 100, 200, and 400 mg/ml of *Boswellia Carterii*, respectively, and 0 (control sample) was stored separately for 0 days to determine the microbiological and chemical quality of the meat. This involved performing various plate count indicators, including total bacterial count (TBC), total coliform count (TCC), TBARS levels, and pH. In all treated samples compared to the control, there were significant differences in concentration ($P<0.05$) and storage period $P<0.05$ on the third, fifth, and ninth days of refrigeration). The meat was preserved longer when mixed with frankincense extract, according to the results. The results showed better results when using the alcoholic extract of frankincense at a concentration of 400 mg/ml for 9 days at a temperature of 4 °C, where the number of microorganisms decreased significantly more than at the other concentrations used, 100 and 200 mg/ml, respectively), all of which conformed to the Iraqi standard in terms of human consumption.

Key words:- (*Boswellia Carterii*) , extract , Bacteriological analysis , chicken meat,

Introduction

The application of plant extract and herbs has increased in popularity across the worldwide. This increase reached 380 % in the United States between 1990 and 1997, since some of these plants and herbs contain beneficial components such as essential oils, phenols, aldehydes, alkaloids, and others with potential medicinal uses. Towards many diseases due to the presence of bacteria, molds, or viruses, whether in food or the human body [1], and denotes its accessibility and quality even in countries where it does not grow, as it is one of the plants species that is still largely unknown, significantly in relation of its anti-microbial effectiveness when applied in food [2]. Male frankincense is known scientifically as (*Boswellia Carterii*). Male frankincense is mostly found in Oman and Yemen, and is gathered from tree stems. It is made up of a homogeneous mixture of roughly 60% resin, 25% gum, 5% volatile oils, and a compound called olbin, bitter components are philanderin and pineine. Cortisone, found in Frankincense, is an anti-inflammatory. Research suggests that the cortisone present in frankincense is of superior quality and far more efficient than synthesized cortisone. They also think that the cortisone in frankincense doesn't have any side effects like industrial cortisone does. Many nations' traditional medicine has employed Boswellia carteri resins for the treatment of rheumatoid arthritis and other inflammatory diseases [3]. Anti-inflammatory properties of the resin have been attributed to its ability to control immune cytokine production and leukocyte infiltration. [4]. The extract of Boswellia serrata also has antibacterial and antifungal properties [5]. Furthermore, Anti-proliferative and pro-apoptotic effects in astrocytoma cell lines derived from rats Extracts of resins from Boswellia species may have anti-cancer effects, according to [6] and human leukemia cell lines. Several results show that frankincense resin contains active ingredients that modulate essential biological processes. [7] Plant extracts have generated a lot of interest because they are considered a natural product source. When utilized as therapeutic alternatives in a variety of treatments and for a variety of illnesses, they have protective properties. Furthermore, they are used as food preservatives since they have an inhibitory effect on pathogenic bacteria that cause food spoilage, as well as the use of plant extracts [8]. The focus of this research was to assess the antibacterial effect of a locally accessible male frankincense plant that could be determined. as an alternative to conventional commercial preservatives for increasing the shelf life of chicken meat in the refrigerator.

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Materials and Methods

1- Plant collection and preparation:

Male frankincense (500 g) was purchased from herbalists' stores in the local market in Al-Diwaniyah city. It was investigated by experts from the Department of Botany at the University of Al-College Qadisiyah's of Education, then ground, powdered , extracted, and subjected to the necessary tests .

2- Preparation of of extract According to the procedure [9], 200 ml of 95% ethanol were used to dissolve 100 g of plant powder (male frankincense extract) at a 2:1 ratio. Before being put in a vibratory incubator at 28°C for 24 hours, the liquid was well stirred using a mixer. The filtrate was collected, concentrated at 40 °C in a rotary evaporator, and then distributed out on to large-surface-area plates. The residual extract was then dried in an electric oven set to 40°C. To make different frankincense extract concertation: It was made by diluting 0.2 g, 0.4 g, and 0.8 g of powdered frankincense extract in 2 ml of solvent to obtain concentrations of (100, 200, and 400) mg / ml

3- Collecting and preparing meat samples:

A total of 100 broiler raw breast meat samples (each 100 g) were purchased from a local market or sent to the research lab in ice boxes. Fresh meat samples were divided into 3 groups, each dipping separately in three different concentrations of extract in accordance with (10) and a control group that received no treatment. for 1 hour the meat sample was Dipping at room temperature (25°C). and then for 2 minutes the sample meat drained before being packaged in polyethylene bags, labeled, and refrigerated at 4 °C to measured microbiological parameters Total Bacterial Counts (TBC), TBARS levels, and PH during r 0, 3, 5, and 9 days of storage.in refrigerator .

4- Bacteriological analysis :

The chicken meat samples were processed for bacteriological examination in accordance with (11) by homogenizing 225 ml of BPW were mixed with 25 g of each sample. Each sample's total bacterial count was calculated by executing decimal serial dilutions (10-1 to 10-6) in sterile conditions.peptone water, which was then put onto nutritional agar plates and incubated at 45°C for 24 hours. Three triplicates were made for each dilution. While serially diluting each beef sample (10-1 to 10-6) in sterile peptone water, 0.1 enabled for the total quantity of coliforms to be calculated. Each dilution is placed on a plate of violet red bile agar and incubated for 48 hours. The average number of bacterial Measurement

4- pH value

After homogenizing ten grams of broiler chicken breast meat with ninety ml of distilled water for 15 seconds, the pH of the homogenates was determined immediately using a pH meter (a digital pH meter) (PHS-4A, Jingke, China). The electrode was calibrated in buffers at room temperature.

5- Measurement of TBARS .

According to (13) Malonic aldehyde was measured as an indicator of lipid oxidation level using the technique. In brief, 5 grams of meat samples were homogenized in 15 ml of distilled water, and the reaction was carried out by using a 1 ml aliquot. One ml of sample aliquot was heated for 15 minutes at 90°C with two ml of 20 mM 2-trichloroacetic acid (dissolved in 15% thiobarbituric acid). The material was centrifuged at 2,000g for 10 minutes. after previously chilling with cold water and the concentration of TBARS was estimated in mg of malondialdehyde (MDA) per gram of meat. absorbance measurements were done at 532 nm using a VIS Spectrophotometer (Biochrom Ltd.)

Result and discussion

Table 1. Total bacterial count in treated breast chicken meat.

Storage Days	TBC value				*p* value
	Control	100 mg/ml	200 mg/ml	400 mg/ml	

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Day0	126×10^3 Aa	114×10^3 Aa	107×10^3 Aa	96×10^3 Aa	Concentration= <0.05
Day3	173×10^4 Ab	158×10^4 Ab	150×10^4 Aa	122×10^4 Ab	Time= <0.05
Day5	202×10^5 Ac	181×10^4 Bb	141×10^4 Ba	157×10^4 Bb	Interaction Sum of squares= $1213x10^{12}$
Day9	293×10^5 Ad	230×10^5 Bc	200×10^5 Cb	171×10^4 Db	(LSD, F=15.8)

At row level: Different lowercase letters mean significant (p<0.05) difference.
At column level: Different uppercase letters mean significant (p<0.05) difference.

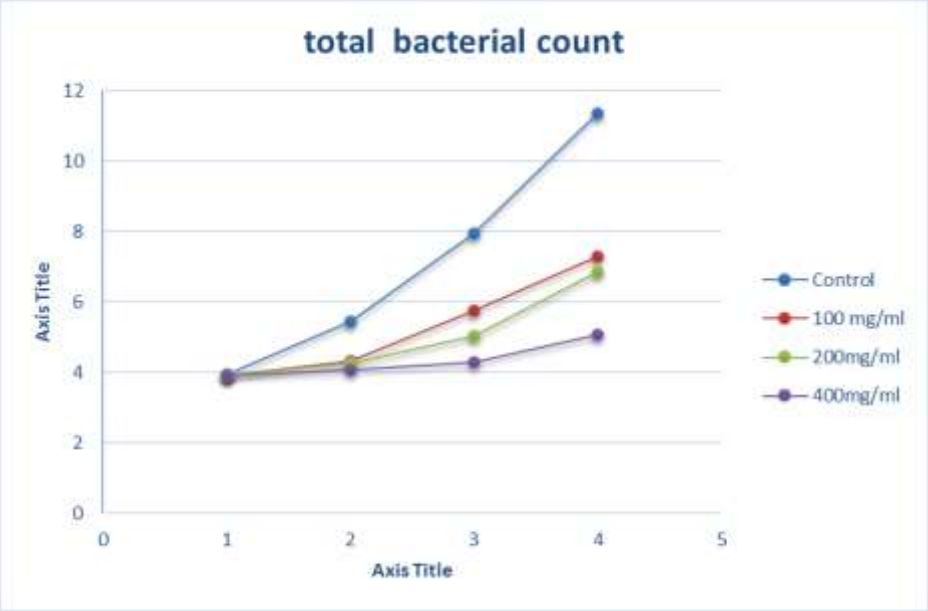

Table 2. Total coliform count in breast treated chicken meat.

Storage day	TCC value				p value
	Control	100 mg/ml G	200 mg/ml	400 mg/ml	
Day0	70×10^3 Aa	54×10^2 Aa	46×10^2 Aa	47×10^2 Aa	Concentration: <0.05
Day3	102×10^4 Ab	87×10^2 Ba	63×10^2 Ba	51×10^2 Ba	Time: <0.05
Day5	137×10^5 Ac	126×10^4 Bb	90×10^4 Bb	65×10^4 Ba	Interaction Sum of squares= $5463x10^{11}$
Day9	196×10^5 Ad	159×10^4 Bb	127×10^4 Bb	94×10^4 Bb	(LSD, F=19.1)

At row level: Different lowercase letters mean significant (p<0.05) difference.
At column level: Different uppercase letters mean significant (p<0.05) difference.

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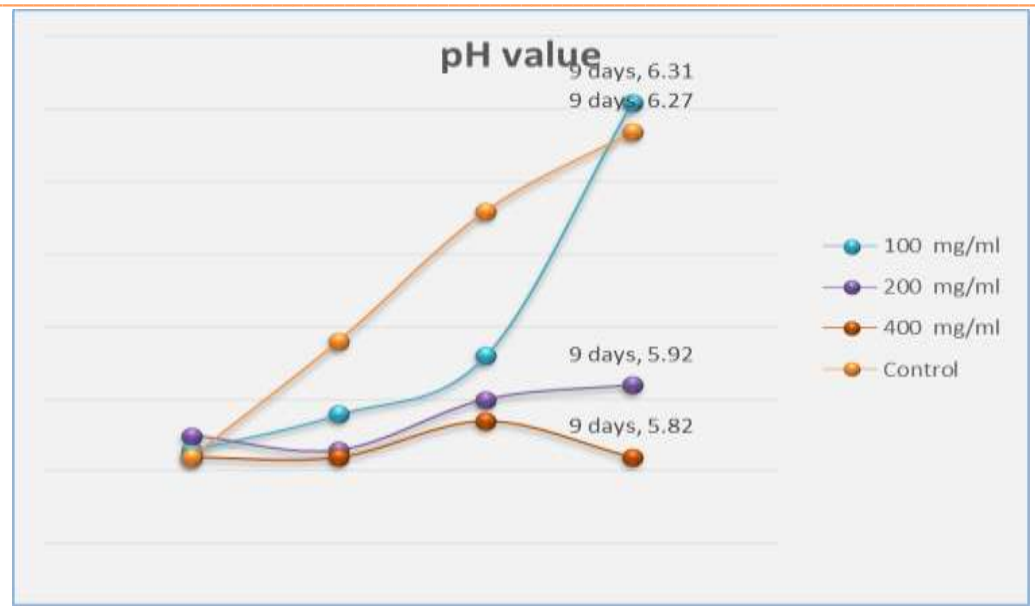

Table 3. TBARS levels in treated breast chicken meat.

Storage day s	TBARS value				*p* value
	Control	100 mg/ml	200 mg/ml	400 mg/ml	
Day0	0.26 Aa	0.23 Aa	0.21 Aa	0.20 Aa	Concentration: <0.05
Day3	0.40 Aa	0.24 Ab	0.23 Ab	0.22 Ab	Storage days: <0.05
Day5	0.77 Aa	0.29 Bb	0.26 Bb	0.23 Bb	Interaction Sum of squares= 1.7
Day9	1.5 Aa	0.34 Bb	0.30 Bb	0.26 Bb	(LSD, F=14.5)

At row level: Different lowercase letters mean significant (p<0.05) difference.
At column level: Different uppercase letters mean significant (p<0.05) difference.
LSD: Least significant difference.

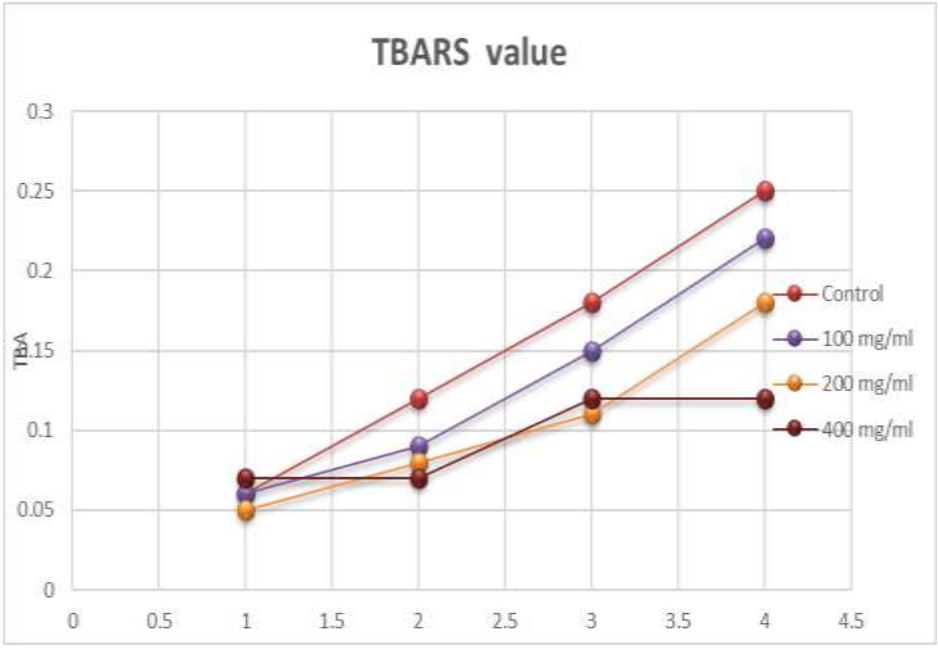

Table 4. pH levels in treated chicken meat.

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Storage days	pH value				*p* value
	Control	100 mg/ml	200 mg/ml	400 mg/ml	
Day0	5.77 Aa	5.75 Bb	5.81 Bb	5.80 Bb	Concentration: <0.05
Day3	5.94 Aa	5.83 Bb	5.84 Bb	5.82 Bb	Time: <0.05
Day5	6.16 Ab	5.91 Bb	5.87 Bb	5.81 Cb	Interaction Sum of squares= 0.4
Day9	6.27 Ac	6.13 Bb	5.91 Cb	5.81 Db	(LSD, F=16.2)

At row level: Different lowercase letters mean significant (p<0.05) difference.
At column level: Different uppercase letters mean significant (p<0.05) difference.

Discussion

Broiler chicken meat is one of the most traditional food in the world. The acceptability of this product depends on sensory and nutritional preferences, as well as economic aspects. the results of the total bacterial count in breast treated chicken meat are shown in tables 1 and 2 . At zero time, were observed in all groups. When compared to the other groups, samples treated with 400 mg/ml had the lowest value of TBC counts during the refrigeration period. The counts were 96×10^3 CFU/g and the total coliform counts were 47×10^2 in zero day to 94×10^4 On the 9th day there was a significant reduction in bacterial count between concentration < 0.05 and period of storage : <0.05 at the 3rd , 5 th and 9 th days of refrigeration in all treated sample respectively. The total bacterial count and total coliform counts were decreased by time and in compared with control (sample without treated) . The reduction total bacterial count were 158×10^4, 150×10^4 and 122×10^4 log CFU/g in and total coliform counts 126×10^4 , 90×10^4 and 65×10^4 at the 9th day of refrigeration, respectively (Table 1 and 2). Because it decreased the microbial load, the concentration used was 400 mg/ml, which produced the best microbe inhibition results. Herbs and spices have been studied for their natural antibacterial properties. (15). The antibacterial property of (*Boswellia Carterii)* indicated and similar to the finding studies(16) and (17) the reason for the decrease in microorganisms of chicken meat may be due to the inclusion of the frankincense plant. It includes several chemicals with antimicrobial action that form complexes with the cell wall and soluble proteins in the microbial cell body and damage the microbial cell membrane (18) .

The level of TBARS in chicken meat is regarded to be a reliable indicator of lipid oxidation. (19). The achievement of (*Boswellia Carterii*) extracts in the reduction of TBARS in the current study is remarkable. Values of TBARS of raw chicken meat were determined in Table 3) during the 9-d storage period. On the 9th day, the malondialdehyde value for treated raw chicken with 100, 200, and 400 mg/ml of extract decreased from 1.5 to 0.34, 0.30, and 0.26 mg/g. There was also a significant decrease in malondialdehyde value for treated raw chicken on the 3rd and 5th days. Values for untreated chicken were increased and ranged from 0.26, 0.40 , 0.77 and 1.5 mg of malondialdehyde/g during 3,5, and 9 days, respectively. The TBARS value increased slowly within the. The present study's results were in accordance with previous reports. (20) TBARS levels were found to be significantly lower in chicken meat. This implies that, in contrast to the control sample, which decreases TBARS by reducing microbial lipases, the ethanolic extract of Boswellia Carterii had the observed effect on TBARS reduction. The current results demonstrated that the Boswellia Carterii-treated group produced much fewer TBARS, suggesting that these antioxidants prevented lipid oxidation during storage. Natural antioxidants derived from extract produced a stable final product and modified free radical chains.**(21)**

The rate of oxidation, bacteriological shelf life, and drip loss are all affected by changes in meat pH from the initial value, and vice versa. Meat pH is an important element for determining quality during refrigeration storage**.**. During days of storage their were significant increase in chicken meat pH in control samples with in Concentration: <0.05 and Storage days: <0.05 as shown in table (4) the value were recorded 5.77 at zero day to 5.94 , 6.16 , and 6.27 during 3,5, and 9 days, while there e was a significant decrease in PH value 6.13 , 5.91, and 5.81 for the treatment 100,200 and 400 mg/ml respectively at 9th day may be the This is an explanation for bacteria and enzymes destroying proteins and releasing alkaline compounds

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like biogenic amines. he antimicrobial action of eugenol extract inhibits the development and proliferation of meat spoilage bacteria that use basic nitrogen compounds, resulting in a lower pH of chicken meat dipped in extract. (22) achieved comparable control group results; however, there was a significant decrease in all treatment groups, and this decline in meat pH was comparable to (23). On the ninth day, pH in the control group dramatically increased, possibly due to bacteria's utilization of amino acids, with ammonia accumulation as an end product of amino acid degradation, resulting in an increase in pH. (24).

Conclusion

The extract of *Boswellia Carterii* exhibited the ability to preserve chicken meat during refrigerated storage. Natural antioxidants added to chicken meat considerably enhanced the chemical characteristics and bacteriological quality when compared to the untreated control. The *Boswellia Carterii,* may reduce fat oxidation, improve quality, and increase shelf life. Anthor experiments may be needed to test this theory and compare it to standard antioxidants so that these new products can be made.

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