# Effect of Olive and Fig Leaves Extracts on the Viability of Food Poisoning Pathogens in Beef Burger

**Heba M. Shaheen, Hosny A. Abdelrahman; Ali M. Ahmed; Soad A. Ismail**
Dept., of Food Hygiene, Faculty of Veterinary Medicine, Suez Canal University

**Abstract**

Meat products are among the leading vehicles for foodborne illnesses around the world and are responsible for millions of sickening each year. Olive and fig leaf extract can be considered as a plant antimicrobial with both antibacterial and antioxidant activities they has been shown to have antibacterial activities against foodborne pathogens such as *Staphylococcus aureus, Escherichia. coli, Salmonella spp*. In addition, they has been shown to enhance the quality and shelf-life of meat The average value of initial microbial load of Total aerobic count in examined beef burger samples (control group) was $9.9\times10^4\pm 2\times10^4$ (cfu/g).where it significantly ($p < 0.05$) decreased to $4.6\times10^3 \pm 3\times10^2$, $2.8\times10^2 \pm 9\times10$ (cfu/g) by increasing the OLE concentration to (3% and 4%) and $1.3\times10^3 \pm 4\times10^2$, $2.4\times10^2 \pm 7\times10$ (cfu/g) by increasing the fig leaves extract to (4% and 5%) respectively. The average value of initial *Bacillus cereus* count of beef burger samples (control group) was $5.4\times10^3 \pm 1\times10^3$ (cfu/g). The *Bacillus cereus* count in treated samples were significantly ($p < 0.05$) decreased to $2.1\times10^2\pm 1\times10^2$, $1.2\times10\pm <10$ (cfu/g) by increasing the OLE concentration to (3% and 4%) and $0.3\times10 \pm <10$, $0.2\times10 \pm <10$ (cfu/g) by increasing the fig leaves extract to (4% and 5%) respectively. The average value of initial *S. aureus* count of beef burger samples (control group) was $4\times10^4 \pm 2\times10^3$ (cfu/g). The *S. aureus* count in treated samples with OLE was significantly ($p < 0.05$) decreased to $2.3\times10^3 \pm 7\times10^2$, $8\times10^2 \pm 1.7\times10^2$ (cfu/g)by increasing the OLE concentration to (3% and 4%) respectively, while its count was not significantly ($p>0.05$) affected in treated samples with different concentration of fig leaves extract ($1.7\times10^4 \pm3\times10^3$, $6.7\times10^3 \pm6.7\times10^3$ (cfu/g)) for 4% and 5%concentrationsrespectively.the initial load of *E. coli* in untreated samples (control group) was 80%. The incidence of *E. coli* in treated samples with OLE was significantly decreased to 15% and 5% by increasing the OLE concentration to (3% and 4%) respectively. while it was not affected by different concentrations of fig leaves extract where its incidence was 80% and 70% in treated samples with 4% and 5% fig leaves extract respectively

## 1- Introduction

One of the means in which foodborne pathogens can be controlled is through the use of food preservatives, which can be classified as synthetic chemical and natural antimicrobial compounds. Compared to synthetic food preservatives, plant antimicrobials attract more attention since they are generally recognized as safe, and may benefit to human health **(Seow*et al*., 2014).** Moreover, plant antimicrobials may also add flavor foods. Most of consumers are aware about the side effects and hazards of this chemical additives which added to meat products **(Bin *et al*., 2007).** Therefore the food manufacturer tried to use natural substances of plant origin that have antimicrobial and seasonings properties instead of using chemical preservatives.

Olive and fig trees are believed to be one of the oldest cultivated plants in Egypt which is considered one of the major producers of olive and fig worldwide. Olive trees can be found in several areas in Egypt North Sinai, the Alexandria-Cairo road, Siwa and Fayoum while more than 50% of the total fig area is located along the north western coast of Alexandria as well as Sinai Governorates. Plant parts and extracts of these trees have traditionally been used in many

application especially their leaves which are believed to have a preservative and medicinal properties.

The antimicrobial activities of olive leaves and fig leaves are due to their contents of phenolic components which have more inhibitory effect against Gram-positive and Gram-negative bacteria **(Liu *et al.*, 2017).** Olive and fig leaf extract can be considered a plant antimicrobial with both antimicrobial and antioxidant activities **(Soltana *et al.*, 2016))** they has been shown to have antimicrobial activities against foodborne pathogens such as *Staphylococcus aureus, E. coli, Salmonella spp*. In addition, they has been shown to enhance the quality and shelf-life of meat products **(Maghsoudlou *et al.*, 2017).** Therefore this study was carried out for assessment of the antimicrobial activities of olive and fig leaves extract against the isolated bacterial group in beef burger with different concentrations of plant extract and its effect on sensory and bacteriological quality.

## 2- Materials and Methods

### 2.1 Collection of plant materials

Fresh green olive (*Oleaeuropaea L*.) and fig (*Ficuscarica*) leaves were collected from north Sinai and the farm of Faculty of Agriculture, Suez Canal University, Egypt respectively.

### 2.2. Preparation of the plant extract

The leaves were cleaned from extraneous matter and properly washed then dried in hot air-oven for 24 hrs at 40$^{o}$C. The dried leaves were ground in a blender to form powder. Thereafter, 100g of the powder of each plant were macerated in 1000 ml absolute ethanol and allowed to extract for 48 h **(Dub and Dugani, 2013).** The resultant (dark green-brown mixture) was filtered and the filtrate was concentrated in a rotary evaporator under reduced pressure. The extraction yield % of the alcoholic extract of olive and fig leaves were 14% and 11% respectively. The dried extract residue was reconstituted in sterile propylene glycol to give final concentration of 3%, 4% for olive leaves extract and 4%, 5% for fig leaves extract.

### 2.3. Determination of antimicrobial activity of the prepared extract

The antibacterial activity of the extract was measured by disc diffusion test using Mueller–Hinton agar previously inoculated with 1 mL of 18 h old of bacterial suspension ($10^6$ CFU/mL) **(Changwe*et al.*, 2008)**. Sterilized paper discs (6 mm) were impregnated with 20 µL of different concentrations of extracts and placed onto the Mueller–Hinton agar plates. The plates were incubated at $4^0$C for 2hrs to allow diffusion of the active compounds in the medium **(Tagg and Mcgiven, 1971)**. Negative controls were prepared using the same solvent employed to dissolve the plant extract. Gentamicin discs (10 µg, Oxoid, UK) were used as control and positive controls. Incubation of plates was performed at 37$^{o}$Cfor 24hrs. Inhibition zones in mm (without disc paper diameter) around discs were measured. The antibacterial activity was expressed as the diameter of inhibition zones produced by the extract against test microorganisms. The experiment was repeated in triplicate and the mean of diameter of the inhibition zones was calculated.

### 2.4. Beef patties preparation / experimental design:

Beef patties preparation was carried out in agreement with Egyptian standard specification for burger **(ES 1688/2005)** as where it was formulated with 65% minced meat, 20% fat, 5% soybean, 0.3% black pepper,1.8% salt and 10% cool iced water to achieve the good manufacturing practices for beef burger.

Twenty kilograms of freshly beef chuck 24 hours postmortem was purchased from local butcher shop at Ismailia market-Egypt and directly transported to the laboratory in an ice box to be minced in electrical mincer (5mm). Fresh beef fat was immediately purchased from a local slaughterhouse after slaughtering and carcass preparation; washed and kept frozen at -18$^0$C for the next day. Before processing of the burger, the beef fat was immediately minced using electrical mincer at 3mm diameter.

Frozen minced beef was transferred to a paddle mixer, where common salt, black pepper and cold water were added and thoroughly mixed for five minutes and divided into five portions. First portion was used as control, while the other portions were mixed with the prepared concentrations of olive and fig leaves extract (3%, 4% for OLE and 4%, 5% for fig leaves extract). The obtained pastes were formed into 50g beef burger using cardboard meat box, packed in foam plates and stored at refrigerator shelf at 4ºC. 20 samples for each treatment were examined for sensory and microbiological quality evaluation.

**2.5. Bacteriological evaluation**:

Samples homogenate and serial decimal dilutions were prepared following the recommendation of **APHA (2001)**. The serial dilutions of each sample were examined for evaluation the effect of the added extracts on:

1- Determination of Total Aerobic Count. **ISO(2003b)**
2- Determination of *B. cereus* count. **ISO(2004a)**
3- Determination of *S. aurues* count. **ISO(1999a)**
4- Detection of *E. coli*. **ICMSF(1996)**

**2.6-Statistical analysis**

Data analysis was performed by using SPSS statistical software program **(SPSS for Windows version 16, Spss Inc., USA).** Data were expressed as mean ± standard error (SE). One-way analysis of variance (ANOVA) with Duncan post-hoc multiple comparisons test. Any significant differences ($P<0.05$) were analyzed by the multiple comparisons procedure of LSD (least significant difference), using a level of significance of alpha = 0.05.

## 3- Results and Discussion

The antibacterial effect of different concentrate on of olive and fig leaves extracts was evaluated against the isolated bacterial group in beef burger in addition to evaluating its effect on sensory and bacteriological quality.

Olive and fig leaves extract can be considered a plant antimicrobial with both antimicrobial and antioxidant activities. They has been shown to have antimicrobial activities against foodborne pathogens such as Staphylococcus aureus, *E. coli*, Salmonella spp. In addition, they have been shown to enhance the quality and shelf-life of meat products.

**3.1. Total aerobic count:**

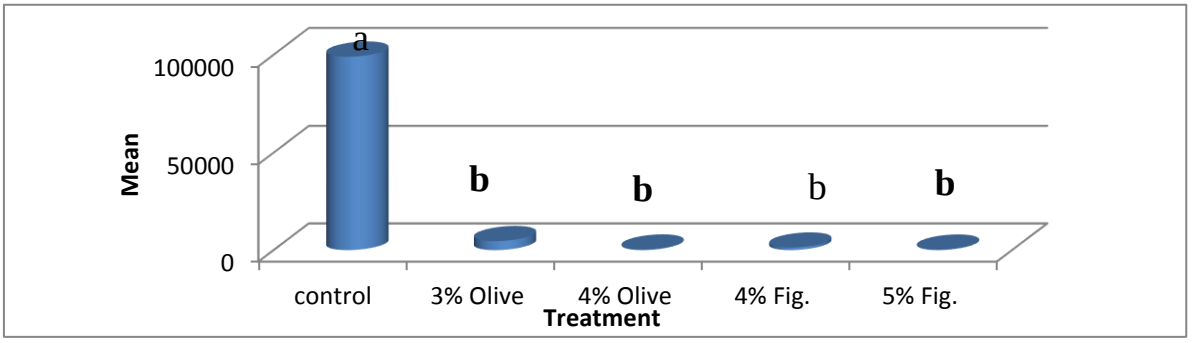

**Figure (1):** Statistical analytical results for the effect of olive and fig leaves extract on Total Aerobic Count (CFU/g) in beef burger (n=20) ,Columns have different letters are significantly different ($p<0.05$).

Results obtained in fig (1) show the effect of olive and fig leaves extract on total aerobic count (cfu/g) in beef burger where its count was ranged from $4\times10^4$ to $2\times10^5$, $3\times10$ to $3\times10^4$, $5\times10$ to$1\times10^3$, $1.3\times10^2$ to $5\times10^3$ and $6\times10$ to $8\times10^2$ (cfu/g) for control group, 3% olive, 4% olive, 4% fig and 5% fig leaves extract treatments respectively. The average value of initial microbial load of beef burger samples (control group) was $9.9\times10^4 \pm 2\times10^4$ (cfu/g). The TACs in treated samples were significantly ($p < 0.05$) decreased to $4.6\times10^3 \pm 3\times10^2$, $2.8\times10^2 \pm 9\times10$ (cfu/g) by increasing the OLE concentration to (3% and 4%) and $1.3\times10^3 \pm 4\times10^2$, $2.4\times10^2 \pm 7\times10$ (cfu/g) by increasing the fig leaves extract to (4% and 5%) respectively.

Moreover there was a non-significant difference in TACs for treated groups ($p>0.05$) while results obtained in figure (2) show the reduction percent of total aerobic count (cfu/g) in treated beef burger with olive and fig leaves extract where the highest reduction percent (99.7%) was achieved by 4% OLE and 5% fig leaves extract followed by 4% fig leaves (98.8%) extract then 3% OLE (95%).

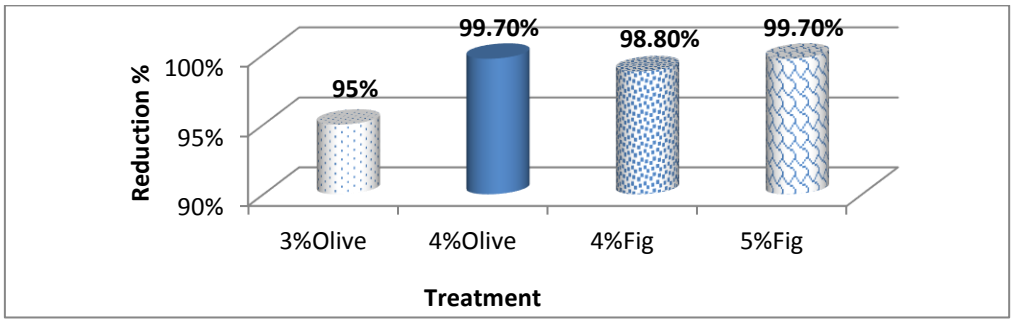


**Fig. (2):** Reduction percent of Total Aerobic Count (CFU/g) in treated beef burger with olive and fig leaves extract.

Nearly similar results was obtained by **Aytul*et al.* (2008), Aytul (2010), Aliabadi, *et al.* (2012) Ahmed *et al.* (2014), Kiraz*et al.* (2016), Moawad*et al.* (2017) and Nirwana*et al.* (2018)**

### 3.2. *Bacilluscereus* count:

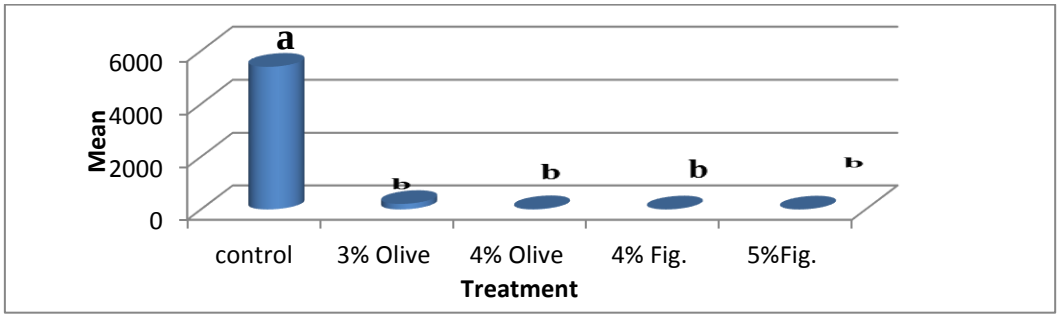


**Figure (3):** Statistical analytical results for the effect of olive and Fig leaves extract on *Bacillus cereus* (CFU/g) in beef burger (n=20). Columns have different letters are significantly different ($p<0.05$).

Results obtained in fig (3) show the effect of olive and fig leaves extract on total *Bacillus cereus* count (cfu/g) in beef burger where its count was ranged from <10to $2\times10^4$, <10 to $1\times10^3$,

<10 to1×10$^2$, <10 to 2×10 and <10to 1×10(cfu/g) for control group, 3% olive, 4% olive, 4% fig and 5% fig leaves extract treatments respectively. The average value of initial *Bacillus cereus* count of beef burger samples (control group) was 5.4×10$^3$ ± 1×10$^3$ (cfu/g). The *Bacillus cereus* count in treated samples were significantly (p < 0.05) decreased to 2.1×10$^2$± 1×10$^2$, 1.2×10± <10 (cfu/g) by increasing the OLE concentration to (3% and 4%) and 0.3×10 ± <10, 0.2×10 ± <10 (cfu/g) by increasing the fig leaves extract to (4% and 5%) respectively.

Moreover there was a non-significant difference in *Bacillus cereus* count for treated groups (p>0.05) while results obtained in figure (4) show the reduction percent of *B. cereus* count (cfu/g) in treated beef burger with olive and fig leaves extract where the highest reduction percent (99.96%) was achieved by 5% fig leaves extract followed by 4% fig leaves extract (99.94%) then 4% OLE (99.7%) while the lowest reduction percent (96%) was obtained by 3% OLE.

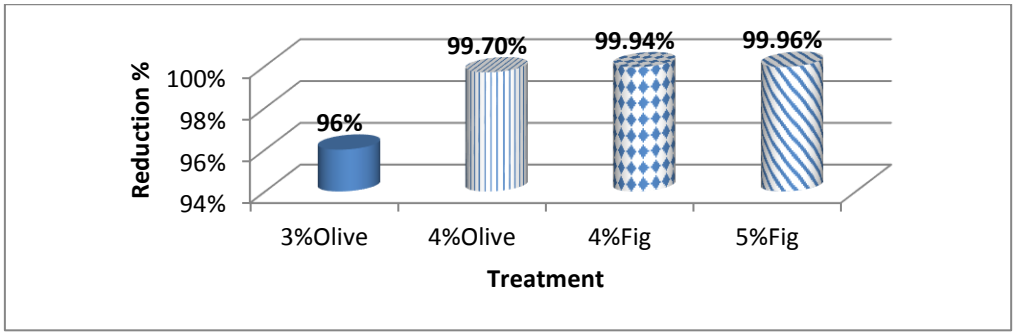


**Fig. (4):** Reduction percent of *Bacillus cereus* (CFU/g) in treated beef burger with olive and fig leaves extract

Nearly similar results was obtained by **Owen *et al*., (2003), Pereira *et al*., (2007),Keskin*et al*., (2012),Gökmen*et al*., (2014)** who found that OLE displayed the best activity against *B. cereus* while lower results was obtained by **Ahmed *et al*. (2013)** who found thatmethanolic extract of *F. carica*leaves exhibited the minimum antibacterial effect against *B. cereus* compared with other tested bacteria.

### 3.3. *Staphylococcus aureus* count:

Results obtained in fig. (5) showed theeffect of olive and fig. leaves extract on total*S. aureus*count (cfu/g) in beef burger where its count was ranged from 2×10$^3$ to 17×10$^4$, 1×10$^2$ to 7×10$^3$, 7×10 to 2×10$^3$, 5×10$^3$ to 3×10$^4$and 1.3×10$^3$ to 1.3×10$^4$ (cfu/g) for control group, 3% olive, 4% olive, 4% fig and 5% fig leaves extract treatments respectively. The average value of initial *S. aureus*count of beef burger samples (control group) was 4×10$^4$ ± 2×10$^3$ (cfu/g).

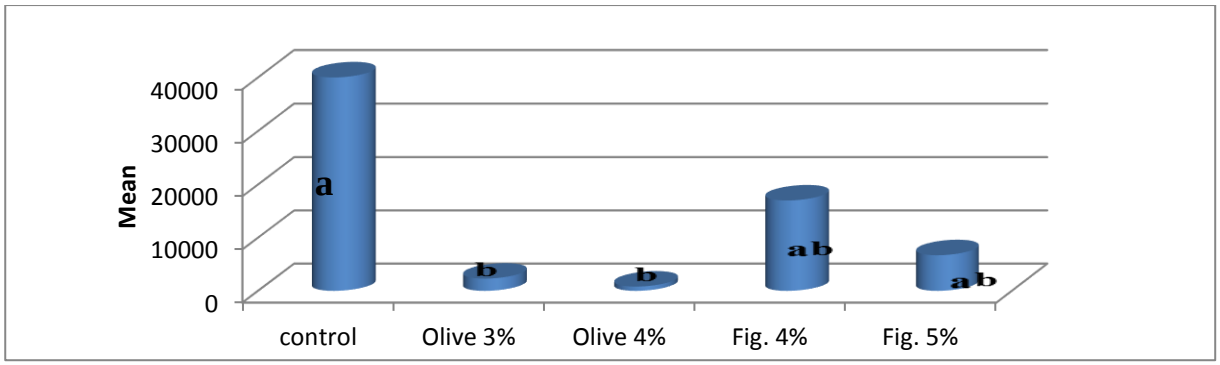


**Fig.(5):** Statistical analytical results for the effect of olive and fig leaves extract on *Staphylococcus aureus* (CFU/g) in beef burger (n=20).Columns have different letters are significantly different (p<0.05).

The *S. aureus* count in treated samples with OLE was significantly ($p < 0.05$) decreased to $2.3\times10^3 \pm 7\times10^2$, $8\times10^2 \pm 1.7\times10^2$ (cfu/g)by increasing the OLE concentration to (3% and 4%) respectively, while its count was not significantly ($p>0.05$) affected in treated samples with different concentration of fig leaves extract ($1.7\times10^4 \pm3\times10^3$, $6.7\times10^3 \pm6.7\times10^3$ (cfu/g)) for 4% and 5%concentrationsrespectively.

Moreover there was a non-significant difference in *S. aureus* count for treated groups ($p>0.05$) while results obtained in figure (6) show the reduction percent of *S. aureus* count (cfu/g) in treated beef burger with olive and fig leaves extract where the highest reduction percent (98%) was achieved by 4% OLE followed by 3% OLE (94%) then 5% fig leaves extract (83%) while the lowest reduction percent (57.5%) was obtained by 4% fig leaves extract.

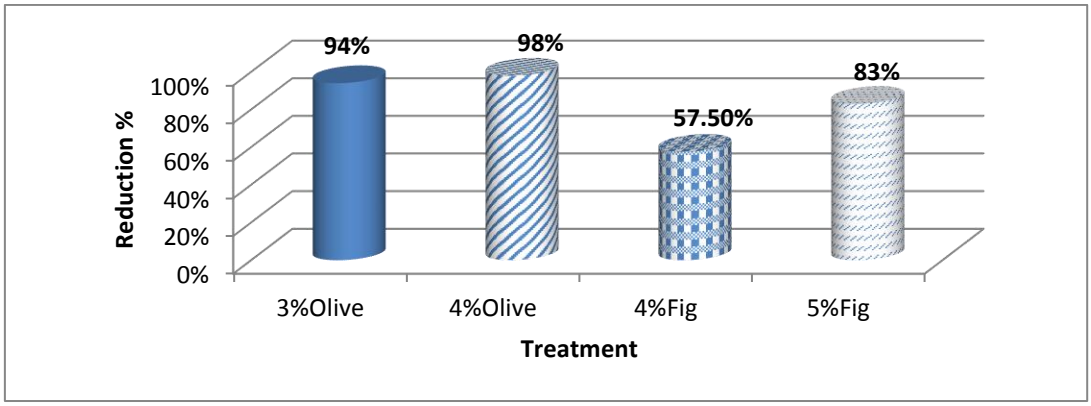


**Fig. (6):** Reduction percent of *Staphylococcus aureus* (CFU/g) in treated beef burger with olive and fig leaves extract

The obtained results was nearly similar to those obtained by **Owen *et al.*, (2003), Pereira *et al.*, (2007) and Gökmen *et al.*,(2014)** who found that OLE has a strong antibacterial effect against *S. aureus* while it disagree with**Jeong*et al.*, (2009), Al Askari*et al.*, (2013) and Rashid and Mahdi (2014)**who found that fig leaves extract has an inhibitory effect against *s. aureus*

**3.4. Detection of *E. coli*:**

Results in figure (7) show the effect of olive and fig leaves extract on *E. coli* (CFU/g) in beef burger, where the initial load of *E. coli* in untreated samples (control group) was 80%.

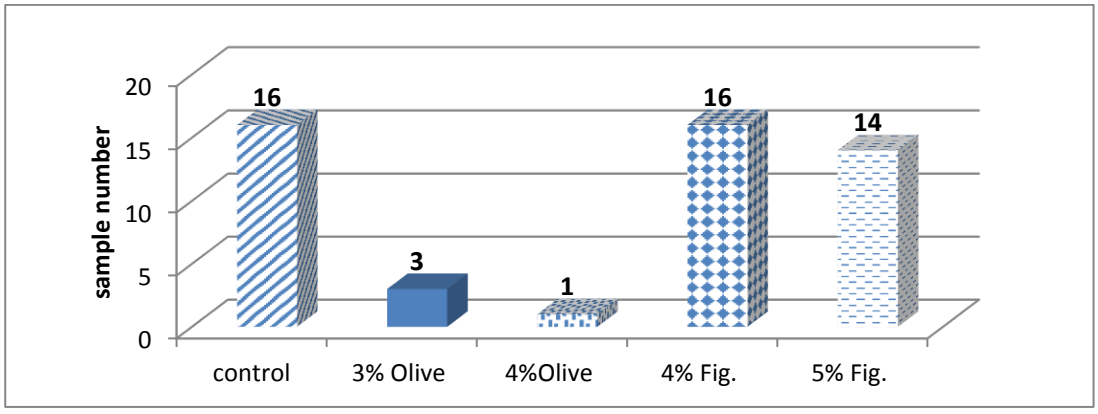


**Fig. (7):** Positive samples for presence of *E. coli* in treated beef burger samples (n=20)

The incidence of *E. coli* in treated samples with OLE was significantly decreased to 15% and 5% by increasing the OLE concentration to (3% and 4%) respectively. These results agreed with **Markin*et al.*, (2003)Gökmen*et al.*, (2014), Liu *et al.*, (2017)** while it was not affected by different concentrations of fig leaves extract where its incidence was 80% and 70% in treated samples with 4% and 5% fig leaves extract respectively. These results indicate that the activity of fig leaves extracts was more effective against Gram-positive than Gram- negative bacteria; this fact is in agreement with **Alzoreky and Nakahara (2003), Nihal*et al.*, (2007)**, **Al Askari*et al.*, (2013), Rashid and Mahdi (2014)** and**Mahmoudi*et al.*, (2016)**

The higher resistance of Gram-negative bacteria against plant extracts is credited to the presence of outer membrane lipopolysaccharides. Also these observations are likely to be the consequences of the differences in cell wall structure between Gram-positive and Gram-negative bacteria. Thus the Gram-negative outer membrane can acting as a barrier against many environmental substances, including antibiotics.

## 5- References

**Ahmad J, Khan I, Khan S and Iqbal D(2013):** Evaluation of antioxidant and antimicrobial activity of Ficuscarica leaves: an in vitro approach. J Plant PatholMicrobiol 2013; 4(1): 157-160.

**Ahmed, A.M., Rabii, N.S., Garbaj, A.M. and Abolghait, S.K. (2014):** Antibacterial effect of olive (*Oleaeuropaea L.*) leaves extract in raw peeled undeveined shrimp (Penaeussemisulcatus). International Journal of Veterinary Science and Medicine 2, 53–56.

**Al Askari, G. Kahouadji, A., Khedid, K., Ouaffak, L., MahjoubaMousaddak, M., Charof, R. and Mennane, Z. (2013):** In vitro antimicrobial activity of aqueous and ethanolic extracts of leaves of *Ficuscarica* collected from five different regions of Morocco. J. Mater. Environ. Sci. 4 (1), 33-38.

**Aliabadi, M.A., Darsanaki, R.K., Rokhi, M.L., Nourbakhh, M. and Raeisi, G. (2012) :**Antimicrobial activity of olive leaf aqueous extract Annals of Biological Research, 3:4189-4191.

**Alzoreky, N.S. and Nakahara, K. (2003):** Antibacterial activity of extracts from some edible plants commonly consumed in Asia. Int. J. Food Microbiol., 80, pp. 223-230

**APHA (American Public Health Association) (2001):** Compendium of methods for the microbiological examination of food. 4th ED., Washington D., USA.

**Aytul ,K.K. (2010):** Antimicrobial And Antioxidant Activities of Olive Leaf Extract And Its Food Applications. Athesis Submitted To The Graduate School of Engineering And Sciences Of İzmir Institute Of Technology.

**Aytul, K.K., Korel, F., Arserim-Uçar, D.K., Uysal, I. and Bayraktar,O., (2008)**: Efficacy of olive leaf extract for enhancing quality of beef cubes, the international congress of meat science and technology, south Africa.

**Bin S., Yi. ZC., John D.B. & Harold, C. (2007):** Antibacterial properties and major bioactive components of Cinnamon Stick (*Cinnamomumburmannii*): activity against food-borne pathogenic bacteria. *JAgric Food Chem.* 55:5484-5490.

**Changwei, A.O., Anpin, Li., Abdelnaser, A.E., Tran, D.X. and Shinkichi T. (2008):** Evaluation of antioxidant and antibacterial activities of Ficusmicrocarpa L. fil. extract. Food Control; 19, 940–948.

**Dub A.M. and Dugani A.M. (2013):** Antithrombotic effect of repeated doses of the ethanolic extract of local olive (*Oleaeuropaea L.*) leaves in rabbits. Libyan J Med;8: 20947.

**EOS (2005):** Egyptian Organization for Standardization and Quality Control Egyptian Standards No. 1688 for frozen beef burger.

**Gökmen, M., Kara, R., Akkaya, L., Torlak, E., and Önen, A. (2014):** evaluation of antimicrobial activity in olive (oleaeuropaea) leaf extract. American Journal of Microbiology 5 (2): 37-40.

**ICMSF (International Commission on Microbiological Specifications for Foods) (1996):** Microorganisms in Foods. Intestinally pathogenic *Escherichia coli*.Blachie Academic and professional London.

**ISO (International Organization for Standardization) (2004a):** Horizontal method for the detection and enumeration of *Bacillus cereus* – colony count technique at 30 ºC.ISO 7932:2004, Geneva, Switzerland.

**ISO (InternationalOrganizationforStandardization) (1999a):** Horizontal method for the enumeration of Coagulase positive Staphylococcus (*S. aureus* and other species). Part 1: Technique using Baird-Parker Agar medium. ISO 6888-1:1999 (E), Geneva, Switzerland.

**ISO(International Organization for Standardization) (2003b):** Horizontal methods for the enumeration of micro-organisms, colony count technique at 30 o C. ISO 4833:2003 (E), Geneva, Switzerland.

**Jeong, MR., Kim, HY. and Cha, JD. (2009):** Antimicrobial Activity of Methanol Extract from *Ficuscarica*Leaves Against Oral Bacteria Journal of Bacteriology and Virology. 39(2): 97 – 102.

**Keskin, D., Ceyhan, N., Zorlu, Z. and Ugur, A. (2012):** *Phytochemical Analysis*and Antimicrobial Activity of Different Extracts of Fig Leaves (Ficus*carica L.*) from West Anatolia against some Pathogenic Microoorganisms. Journal of pure and applied microbiology, Vol. 6(3), p. 1105-1110.

**Kiraz, A., Simsek, T., Tekin, S.Z., Elmas, S., Tekin, M., Sahin, H., Altinisik, H.B. andPala, C.(2016)**: Investigation of the effects of oleuropein rich diet on rat enteric bacterial flora. BratislLek Listy;117(12):734-737.

**Liu, Y., McKeever, L.C. and Malik, N.S.A. (2017):** Assessment of the Antimicrobial Activity of Olive Leaf Extract Against Foodborne Bacterial Pathogens. Frontiers in Microbiology.www.frontiersin.org, Volume 8 ; Article 113.

**Maghsoudlou, E., Kenari, R.E. and Amiri, Z.R. (2017):** Evaluation of antioxidant activity of fig (*ficuscarica*) pulp and skin extract and its application in enhancing oxidative stability of canola oil. Journal of Food Processing and Preservation ISSN 1745-4549.

**Mahmoudi, S., Khali, M., Benkhaled, A., Benamirouche, K. and Baiti, I. (2016):** Phenolic and flavonoid contents, antioxidant and antimicrobial activities of leaf extracts from ten Algerian *Ficuscarica L.* varieties. Asian Pac J Trop Biomed; 6(3): 239–245.

**Markin, D., Duek, L. and Berdicevsky, I. (2003):** In vitro antimicrobial activity of olive leaves. Mycoses, 46, pp. 132-136.

**Moawad, R.K., Ibrahim, A.A., Abdelmaguid, N.M., Ibrahim, W.A. and Shehata, A.N. (2017):** Preventive Effect of Olive Leaves Extract in Combination with Tannic Acid on the Quality Losses of the Refrigerated Ground Beef Patties. Asian Journal of Scientific Research, 10: 215-226.

**Nihal, T.Y., Sedat, V., Ferda, S. and Gokce, P**. (2007): Effect of extraction conditions on measured total polyhenol contents and antioxidant and antibacterial activities of black tea. Molecules. 12:484–496.

**Nirwana I, Rianti D, Soekartono RH, Listyorini RD, Basuki DP (2018)**: Antibacterial activity of fig leaf (Ficuscarica Linn.) extract against Enterococcus faecalis and its cytotoxicity effects on fibroblast cells, Veterinary World, 11(3): 342-347

**Owen, R.W., R. Haubner, W. Mier, A. Giacosa and W.E. Hull (2003):** Food Chem. Taxicol., 41: 703-717.

**Pereira, A.P., Ferreiara, I.C.F.R., Marcelino, F., Valentao, P., Andrade, P.B., Seabra, R., Estevinho, L., Bento, A. and Pereira, J.A. (2007):** Phenolic compounds and antibacterial activity of olive (Oleaeuropaea L. Cv. Cobrancosa) leaves. Molecules, 12: 1153-1162

**Rashid, K.I. and Mahdi, N.M. (2014):** Antimicrobial activity of fig (*Ficuscarica*Linn.) leaf extract as compared with latex extract against selected bacteria and fungi.Journal of Babylon University/Pure and Applied Sciences/ No. (5)/ Vol. (22).

**Seow, Y. X., Yeo, C. R., Chung, H. L., and Yuk, H. G. (2014):** Plant essential oils as active antimicrobial agents. Crit. Rev. Food Sci. Nutr. 54, 625–644.

**Soltana H, Tekaya M, Amri Z, El-Gharbi S, Nakbi A, Harzallah A, *et al*. (2016):** Characterization of fig achenes' oil of Ficuscarica grown in Tunisia. Food Chem; 196: 1125-30.

**SPSS, (2001**): SPSS for windows, Version: 16. Copyright SPSS Inc. 1989 - 2001. All rights reserved.

**Tagg, J.R. and Mcgiven, A.R. (1971):** Assay system for bacteriocins. Applied Microbiology; 21, 943–944

**الملخص العربي**

## تأثير مستخلصات أوراق الزيتون والتين على قابلية البكتيريا المسببة للتسمم الغذائي في بيرجر اللحم

**هبة محمد شاهين وحسني عبداللطيف عبدالرحمن وعلي معوض احمد وسعاد احمد اسماعيل**
**قسم الرقابة الصحية علي الاغذية – كلية الطب البيطري – جامعة قناة السويس**

تعد منتجات اللحوم من اهم المصادر المسببه للتسمم الغذائى حول العالم. يعتبر مستخلص اوراق التين والزيتون من المواد الطبيعيه التى لها تاثير مضاد للبكتريا ومضاد للاكسده فقد اثبتت النتائج ان لهم تاثير مضاد للعديد من بكتريا التسمم الغذائى مثل بكتريا العنقود الذهبى، الاشيرشيا كولاى و الباسيلس سيرس.بينما اوضحت نتائج التقييم البكتريلوجى لعينا ت البيرجر التى تم فحصها (20عينه) ان متوسط الحمل الميكروبى الاولى للمجموعه الضابطه فى حاله الجراثيم الهوائيه كان$9.9\times10^{4}\pm2\times10^{4}$جرثومه لكل جرام والذى انخفض انخفاض معنوى الى $4.6\times10^{3}\pm3\times10^{2}$ و $2.8\times10^{2}\pm9\times10$ جرثومه لكل جرام فى عينات البيرجر المعالجه بمستخلص اوراق الزيتون مع زياده التركيز الى 3% و 4% بينما انخفض الى $1.3\times10^{3}\pm4\times10^{2}$ و $2.4\times10^{2}\pm7\times10$ جرثومه لكل جرام فى عينات البيرجر المعالجه بمستخلص اوراق التين مع زياده التركيز الى 4% و 5% على التوالى و لم يكن هناك فروق معنويه بين المجاميع المعالجه. وفى حاله الباسيلس سيريس اوضحت النتائج ان متوسط الحمل الميكروبى

الاولى للمجموعه الضابطه كان$5.4\times10^{3}\pm1\times10^{3}$جرثومه لكل جرام والذى انخفض انخفاض معنوى الى $2.1\times10^{2}\pm5\times10$ و $1.2\times10\pm<10$ جرثومه لكل جرام فى عينات البيرجر المعالجه بمستخلص اوراق الزيتون مع زياده التركيز الى 3% و 4% بينما انخفض الى $0.3\times10\pm<10$ و $0.2\times10\pm<10$جرثومه لكل جرام فى عينات البيرجر المعالجه بمستخلص اوراق التين مع زياده التركيز الى 4% و 5% على التوالى و لم يكن هناك فروق معنويه بين المجاميع المعالجه.وفى حاله بكتريا العنقود الذهبى اوضحت النتائج ان متوسط الحمل الميكروبى الاولى للمجموعه الضابطه كان$4\times10^{4}\pm2\times10^{3}$جرثومه لكل جرام والذى انخفض انخفاض معنوى الى $2.3\times10^{3}\pm7\times10^{2}$ و $8\times10^{2}\pm1.7\times10^{2}$ جرثومه لكل جرام فى عينات البيرجر المعالجه بمستخلص اوراق الزيتون مع زياده التركيز الى 3% و 4% بينما لم يكن هناك انخفاض معنوى فى متوسط الحمل الميكروبى لبكتريا العنقود الذهبى فى العينات المعالجه بمستخلص اوراق التين فكانت $1.7\times10^{4}\pm3\times10^{3}$ و $6.7\times10^{3}\pm1.3\times10^{3}$ جرثومه لكل جرام مع زياده التركيز الى 4% و 5% على التوالى. لم يكن هناك فروق معنويه بين المجاميع المعالجهكماوضحت النتائج ان نسبه تواجد الاشيريشيا كولاى فى المجموعه الضابطه كان 80% والذى انخفض انخفاض معنويا الى 15% و 5% فى العينات المعالجه بمستخلص اوراق الزيتون مع زياده التركيز الى 3% و 4% على التوالى بينما لم تتاثر بالتركيزات المختلفه لمستخلص اوراق التين فكانت نسبه تواجدها 80% و 70% فى العينات المعالجه بتركيز 4% و 5% على التوالى.