

STUDYING THE EFFECT OF USING OLIVE OIL AGAINST MICROBES THAT CAUSE SKIN INFECTIONS

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Received 9/ 5/ 2023, Accepted 22/ 6/ 2023, Published 30/ 6/ 2024

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ABSTRACT

Modern nutritional sciences look at the fruits of olives and Olive oil as essential products for human life due to the richness of its fruits in basic compounds such as oil, proteins, carbohydrates, mineral salts and some other vitamins, which Iraqi tables are almost devoid of as a consumable material, either in the form of green or black olives or their oil, hence the idea This study aimed at evaluating some types of commercial olive oil samples extracted from olive fruits as a biomaterial against some types of microorganisms represented by Gram-negative *Pseudomonas aeruginosa* (*Pseu aeruginosa*) and *Staphylococcus aureus* (*Staph aureus*) as Gram-positive. Characterized at the level ($P \leq 0.01$) for the concentrations of the oil extract (25, 50 and 100)% used in the study on both types of target bacteria in the study, and thus the possibility of using this extract, which has proven its inhibitory effectiveness as an antidote against some types of gram-positive and gram-negative bacteria.

Keywords: Olive oil, Baghdad's local markets, skin infection.

دراسة تأثير استعمال زيت الزيتون ضد الميكروبات المسببة للالتهابات الجلدية

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الخلاصة

تنظر علوم التغذية الحديثة الى ثمار الزيتون وزيت الزيتون على انها منتجات ضرورية لحياة الانسان نظرا لغنى ثمارها بمركبات اساسية كالزيت والبروتينات والكاربوهيدرات والاملاح المعدنية وبعض الفيتامينات الاخرى والتي لاتكاد تخلو موائد العراق منها كمادة استهلاكية اما على شكل زيتون اخضر او اسود او زيتيه. ومن هنا جاءت فكرة هذه الدراسة التي هدفت الى تقييم بعض انواع عينات زيت الزيتون التجارية المستخلصة من ثمار الزيتون كمادة حيوية مضادة لبعض انواع الاحياء المجهرية المتمثلة في بكتريا (*Pseudomonas aeruginosa* (*Pseu aeruginosa*) سالبة لصبغة كرام وبكتريا (*Staphylococcus aureus* (*Staph aureus*) كموجبة لصبغة كرام. اظهرت نتائج الدراسة وجود فروق معنوية على مستوى ($P \leq 0.01$) لتراكيز مستخلص الزيت (25, 50 و 100)% المستعملة بالدراسة على كلتا نوعي البكتريا المستهدفة في الدراسة، وبالتالي امكانية استعمال هذا المستخلص الذي اثبتت فعاليته التثبيطية كمادة مضادة تجاه بعض انواع البكتريا الموجبة والسالبة لصبغة كرام.

الكلمات المفتاحية: زيت الزيتون ، أسواق بغداد المحلية ، التهابات جلدية.



INTRODUCTION

The Olive plant *Olea europaea* belongs to the family *Oleaceae*, and is a perennial olive plant, evergreen is characterized by a huge stem and longitudinal lanceolate leaves, 5.7 cm long, with opposite edges sharply tapering, silvery-green in light, the flowers are greasy-white and the fruits are stoned, its length is about 1 cm, green in color at the beginning of summer, but it turns black at the beginning of summer maturity (**Rotondi et al., 2004; Ray et al., 2019**). Due to its nutritional and medicinal benefits, the olive tree and the oil it yields hold a prominent standing among fruit trees. It can be found in places with a variety of climates, including humid & arid regions (**Gorzynik-Debicka et al., 2018**). Olive oil is the fruit juices oil, which itself is separated from the other constituents of the producing olive fruit using extraction method (**Abdelhafez et al., 2017**). Olives are distinguished by the fact that they contain oils, which in turn consist of multiple components such as compounds volatile aromatics, phenolic compounds, and triglycerides of all kinds, mono, di, and tri. It also contains fatty acids, vitamins such as E and D, phospholipids, saponins and others (**Cicerale et al., 2012**) and (**Di Bene et al., 2012**). The natural olive oil extract inhibits some types of bacteria that cause skin inflammation, in addition to inhibiting the growth of some bacteria on culture medium such as *Pseu aeruginosa*, olive fruit oil works To reduce high blood pressure, olive oil have effectiveness Protective against blood clots, as it is important in the analysis of fats and reduces platelet aggregation. It also has an anti-cancer and anti-inflammatory effect (**Hohmann et al., 2015; Gabriel et al., 2019**). Numerous research studies have investigated the chemical and physical qualities, antioxidant substances of olive oil. Olive oil contains the following chemicals, together with their ratios: palmitic, palmitoleic, margaric, margarolic, stearic, linoleic, linolenic, and henric. (**Rubio et al., 2014; Alvarez-Laderas et al., 2020**). The objective of this research was to assess the efficacy of Olive oil as a treatment ingredient in preventing bacterial infections of the skin.

MATERIAL AND METHIODS

Sample collection

A total of Ten Olive oil samples from different brands were randomly collected from Baghdad's local markets, samples are given in (**Table, 1**).

Table 1: Olive oil samples used in this study

Code	Trade mark	Country	Expiration date
O1	Rafael salgadors	Spain	2022/9/22-2024/8/22
O2	KDD	Kuwait	2022/4/1-2023/10/1
O3	Mazola	Lebanon	2022/1/26-2024/1/25
O4	Al-motawasset	Syria	2022/6/8-2024/6/7
O5	Fourati	Tunis	2022/7/2-2024/7/1
O6	Afia	Turkey	2022/2/12-2024/2/11
O7	Zer	Turkey	2022/9/14-2024/9/13
O8	Aljabal teebea	Lebanon	2021/2/15-2023/2/14
O9	Fil	IRAQ	2022/2/24-2024/1/23
O10	Hemani	Pakistan	2021/1/-2023/12

Microorganisms and Culture Conditions

Two bacterial isolates were obtained, one positive for Gram-positive staining, including *Staph aureus* and the other negative for Gram-positive including *Pseu aeruginosa*. They were obtained from the laboratories of the College of Science / University of Baghdad as

isolates that cause skin infections. They were used in order to qualitatively detect the inhibitory effectiveness of Olive oil extract. These two isolates were active on the medium. Luria Broth (LB) for 18 h at 37°C (Rubio *et al.*, 2014).

Determination of the Antibacterial Susceptibility

The Well diffusion method was used to detect the inhibitory activity of Olive oil extracts, as 0.1 ml of pathogenic bacterial isolates activated with an approximate number of inoculum 1.5×10^8 cells / mL were spread on sterile N.A solid agar media cast in sterilized Petri dishes using L- shape, holes were made on the surfaces of the cultured media with a cork borer, and specific amounts of 50 microliters of different concentrations of extracts were placed, including (25, 50 and 100)%, in duplicate for each concentration, in addition to the positive control treatment free of the extract. The plates were incubated at a temperature of 37°C for 24 h for pathogenic bacterial isolates and at a temperature of 28°C for 48 h for yeast. The diameter of the inhibition zone was measured around each hole using a graduated ruler (Fратиanni *et al.*, 2016; Alvarez-Laderas *et al.*, 2020).

STATISTICAL ANALYSIS

The Statistical Analysis System- SAS (2018) program was used to detect the effect of difference factors in study parameters. Least significant difference –LSD test (Analysis of Variation-ANOVA) was used to significant compare between means in this study.

RESULT AND DISCUSION

The antibacterial ability of Olive oil was evaluated at concentrations (25, 50,100) % against some types of gram-positive and gram-negative bacteria, proved its inhibitory effectiveness against the bacteria as shown in (Tables 2).

Table (2): Diameters of inhibition zones (mm) for the growth of bacteria treated with different concentrations of olive oil (25, 50,100) %.

Code	Organism						LSD value
	<i>Staph aureus</i>			<i>Pseu aeruginosa</i>			
	25%	50%	100%	25%	50%	100%	
O1	14	18	25	-	11	13	5.61 *
O2	10	12	14	-	9	10	4.95 *
O3	11	10	12	8	11	10	3.79 *
O4	10	16	22	7	9	13	5.66 *
O5	11	13	19	-	14	16	5.02 *
O6	13	19	21	11	14	16	4.78 *
O7	15	18	23	-	9	11	6.13 *
O8	13	19	28	10	16	22	5.75 *
O9	15	17	26	12	11	15	6.37 *
O10	11	14	17	-	7	14	4.82 *
LSD value	4.39 *	5.22 *	5.84 *	3.92 *	4.28 *	4.5 1 *	----

** (P≤0.01).

As shown in Table 1, the olive oil extracts of O1, O4, O6, O7, O8, O9 significant differences at the level (P≤0.01) in its higher inhibitory activity against *Staph aureus*, while the

brands O2, O3, O5 and O10 showed the least inhibition against the same bacteria, while the O8 model showed a significant difference at the level of ($P \leq 0.01$). the highest in inhibition against *Pseu aeruginosa*, while the least inhibition was observed for the O2 brand. O3 against the same bacteria. This result was agreement with **Manuel et al., (2019)**, he found The different concentration for inhibit the growth of the pathogenic bacteria strains was active for all the olive oil extracts against *S. aureus* This confirms that polyphenols present in the olive oil have a general capacity to inhibit the growth of pathogenic or unwanted microorganisms. A lot in vitro research studies have demonstrated that certain olive oil polyphenols may inhibit the growth of many kinds of bacteria, including those that cause some skin infections and digestive problems as well as cancer-causing bacteria like *Helicobacter pylori* and other types of peptic ulcers (**Lazzez et al., 2008; Rubio et al., 2014; Manuel Silvana et al., 2019**). This result was agreement with **Fratianni et al., (2019)**, who found the *Pseu aeruginosa*, a well-known pathogen equivalent to *E. coli*, was also able to be inhibited by several extra virgin olive oil extracts. Since it could form biofilms, which raises its resistance to conventional medicine. 4.9 g of the olive oil extract were generally extremely successful at preventing the growth of all bacterial strains, with an inhibition zone not less than 10.67 *Staph aureus*. Overall, inhibitory zones generated by 4.9 g of the polyphenol extract was superior to 17 mm, when evaluated against *Staphylococcus aureus*. Olive oil extracts in the amount of 4.9 g created zones which were not more than 12.67 mm, which was less effective, that a microorganism's vulnerability or susceptibility to a certain drug or natural extract might not only be linked to its species or genus but, in certain circumstances, to its strain as well, this result was disagreement with (**Ombra et al., 2016 ; Cerulli et al., 2017; Karygianni et al., 2019**).

CONCLUSION

The results of the study showed that the commercial olive oil extracts with different concentrations were different in their inhibitory activity against some types of Gram-positive and Gram-negative bacteria that cause skin infections, which indicates the possibility of using extracts of this oil against infection with other types of bacteria that cause skin infections.

REFERENCES

1. Ray, N.B.; Hilsabeck, K.D.; Karagiannis, T.C.; McCord, D.E.(2019). Bioactive Olive Oil Polyphenols in the Promotion of Health. In *The Role of Functional Food Security in Global Health*; Singh, R.B., Watson, R.R., Takahashi, T., Eds.; Elsevier: Amsterdam, The Netherlands, pp. 623–637.
2. Gorzynik- Debicka, M.; Przychodzen, P.; Cappello, F.; Kuban-Jankowska, A.; Marino Gammazza, A.; Knap, N.; Wozniak, M.; Gorska- Ponikowska, M. (2018). Potential health benefits of olive oil and plant polyphenols. *Int. J. Mol. Sci.* 19, 686.
3. Abdelhafez, H. M., Al-Tounsy, M. M., & Omran, D. A. (2017). The possible therapeutic effect of ethanolic olive leaves extract or bone marrow mesenchymal stem cells on the kidney of gammairradiated adult male rats. *Stem Cell*, 8(1): 60-81.
4. Di Bene, C., Pellegrino, E., Debolini, M., Silvestri, N., & Bonari, E. (2012). Short-and long-term effects of olive mill wastewater land spreading on soil chemical and biological properties. *Soil Biology & Biochemistry*, 56, 21-30. doi:10.1016/j.soilbio.2012.02.019
5. Hohmann, C. D. ; Cramer, H. ; Michalsen, A.; Kessler, C.; Steckhan, N. ; Choi, K. and Dobos, G.(2015). Effects of high phenolic olive oil on cardiovascular risk factors: A systematic review and meta-analysis, *Phytomedicine*, 22, 631–640

6. Gabriel, P.O.; Aribisala, J.O.; Oladunmoye, M.K.; Arogunjo, A.O.; Ajayi-Moses, O.B.(2019). Therapeutic effect of goya extra virgin olive oil in albino rat oro-gastrically dosed with Salmonella Typhi. *South Asian J. Res. Microbiol.* 3, 1–9.
7. Rubio, L.; Macia, A.; Castell-Auvi, A.; Pinent, M.; Blay, M.T.; Ardevol, A.; Romero, M.P.; Motilva, M.J.(2014). Effect of the co-occurring olive oil and thyme extracts on the phenolic bioaccessibility and bioavailability assessed by in vitro digestion and cell models. *Food Chem.*149, 277–284.
8. Alvarez-Laderas, I.; Ramos, T.L.; Medrano, M.;Caracuel-García,R.;Barbado,M. V.;Sánchez-Hidalgo,M.; Zamora, R.; Alarcón-de-la- Lastra,C.; Hidalgo, F. J. ; Piruat, J. I. ; Caballero-Velázquez T. and Pérez-Simón, J. A. (2020). Polyphenolic Extract (PE) from Olive Oil Exerts a Potent Immunomodulatory Effect and Prevents Graft-versus-Host Disease in a Mouse Model, *Biol. Blood Marrow Transplant.*, 26, 615–624
9. SAS. 2018. Statistical Analysis System, User's Guide. Statistical. Version 9.1th ed. SAS. Inst. Inc. Cary. N.C. USA.
10. Manuel S.,J.; Pinto-Bustillos, M.A.; Vásquez-Ponce, P.; Prodanov, M.; Martinez-Rodriguez, A.J.(2019). Olive mill wastewater as a potential source of antibacterial and anti-inflammatory compounds against the food-borne pathogen *Campylobacter*. *Inn. Food Sci. Em. Technol.* 51, 177–185.
12. Manuel Silvana, J.; Pinto-Bustillos, M.A.; Vásquez-Ponce, P.; Prodanov, M.; Martinez-Rodriguez, A.J. (2019). Olive mill wastewater as a potential source of antibacterial and anti-inflammatory compounds against the foodborne pathogen *Campylobacter*. *Inn. Food Sci. Em. Technol.* 51, 177–185.
13. Fratianni, F.; Cozzolino, R.; Martignetti, A.; Malorni, L.; d’Acierno, A.; De Feo, V.; Cruz,A.G.; Nazzaro, F.(2019). Biochemical composition and antioxidant activity of three extra virgin olive oils from the Irpinia province, Southern Italy. *Food Sci. Nutr.* 2019, in press.
- 14-Cerulli, A.; Lauro, G.; Masullo, M.; Cantone, V.; Olas, B.; Kontek, B.; Nazzaro, F.; Bifulco, G.; Piacente, S.(2017). Cyclic diarylheptanoids from *Corylus avellana* green leafy covers: determination of their absolute configurations and evaluation of their antioxidant and antimicrobial activities. *J. Nat. Prod.*, 80, 1703–1713.
15. Karygianni, L.; Cecere, M.; Argyropoulou, A.; Hellwig, E.; Skaltsounis, A.L.; Wittmer,A.; Tchorz, J.P.; Al-Ahmad,(2019).A. Compounds from *Olea europaea* and *Pistacia lentiscus* inhibit oral microbial growth. *BMC Compl. Altern. Med.* ,19-51.
- 16-Lazzez, A.;Perri, E.; Caravita, M. A.; Khlif, M.; Cossentini, M.(2008). Influence of olive maturity stage and geographical origin on some minor components in virgin olive oil of the Chemlali variety. *J. Agric. Food Chem.* 56, 982–988.
17. Rotondi, A.; Bendini, A.; Cerretani, L.; Mari, M.; Lercker, G.; Toschi, T.G. Effect of olive ripening degree on the oxidative stability and organoleptic properties of cv. Nostrana di Brisighella extra virgin olive oil. *J. Agric. Food Chem.* 2004, 52, 3649–3654.
18. Ombra, M.; d’Acierno, A.; Nazzaro, F.; Riccardi, R.; Spigno, P.; Zaccardelli, M.; Pane, C.; Maione, M.; Fratianni, F.(2016). Phenolic composition and antioxidant and antiproliferative activities of the extracts of twelve common bean (*Phaseolus vulgaris L.*) endemic ecotypes of Southern Italy before and after cooking. *Oxid. Med. Cell Longev.* (1):122-128.
- 19.Cicerale, S.; Lucas, L.J.; Keast, R.S.J.(2012). Antimicrobial, antioxidant and anti-inflammatory phenolic activities in extra virgin olive oil. *Curr. Op. Biotechn.* 23, 129–135.