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ANTIMICROBIAL EFFECT OF GRAPE SEED OIL, OLIVE OIL, AND SESAME OIL ON FOOD POISONING BACTERIA ISOLATED FROM RAW MEAT

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Abstract

The study designed to explore the Antimicrobial effect of the Grape Seed oil, olive oil and Sesame oil against *E. coli, E. coli O157, Salmonella, Pseudomonas, Klebsiella, Campylobacter* and *Yersinia enteriocolitica* isolated from Raw meat samples collected from local butchers market in Baghdad. Microorganisms were planted on Muller Hinton agar. The oils were applied using a steers replicator, then incubated at (37˚C) for 24 hours. The antibacterial activities were determined by measuring the inhibition zone diameter in mm. The result showed that biggest inhibition zones were seen with Sesame oil on all bacteria isolate followed by Grape Seed oil then olive oil.
Keyword : Grape Seed oil, olive oil, garlic.

Introduction

Food borne bacteria had constantly been as a most important cause of serious humans diseases. In the last years many pharmaceutical companies produced new antibacterial drugs, but, the appearance of bacterial strains with multiple resistances will struggle these drugs. Furthermore, the wide use of immune-suppressing drugs with a rise in bacterial infections become a global concern. (Levy and Marshall, 2004). So, develop natural sources of new effective and potential antimicrobial agents had been a demand (Adwan *et al*., 2008). Plants from ancient times consider as medicinal compound major source and play a vital role in the man health maintenance (Longobardi *et al*., 2012), plant origin antimicrobials have many therapeutic potential to cure many infectious diseases without causing aside effect (Mohamed, 2011). Olive (*Olea europaeapeople*) used for a wide range as therapeutic and culinary purposes throughout history (Nakbi *et al*., 2010) Olive oil, in particular extra virgin olive oils (EVOO) with a high content in certain phenolic compounds, can inhibit the growth of pathogenic bacteria (Cicerale *et al*., 2012) This antimicrobial activity being higher than many reported foods such as tea, coffee, wine and others (Filmena *et al*., 2019). The polyphenols of graps seeds have been recognized for their beneficial role in man health, It is shown to display bioactivities apart from its antioxidant activity includes anti-inflammatory, anti-bacterial, anticancer, antiviral, anti-aging and anti-diabetic (Juliano *et al*., 2016). Sesame oil used in Chinese medicine to prevent aging and increase energy (Namiki, 2007). The consumption of sesame shows to increase hepatic mitochondrial and peroxisomal oxidation of the fatty acid also, enhance vitamin E activity and augment plasma gamma-tocopherol (Shahidi *et al*.,2006), Sesame seed have many bioactive component like vital minerals, polyunsaturated fatty acids tocopherols, phytosterols and exceptional class of phenylpropanoid (Darshika *et al*.,2015).

Material and Method

Sample collection

Eighty samples of the raw meat butchers market in Baghdad sent to the microbiology laboratory for culturing isolation and identification of *E. coli, E coli O157, Salmonella, Pseudomonas, Klebsiella, Campylobacter* and Y*ersinia enteriocolitica*.

25 gram of each meat sample was inoculated into (225) ml of peptone broth and incubated at (37°C) for (18–24) hours. After incubation, about 100µl of the inoculated peptone broth were sub-cultured onto plates of blood agar, Nutrient agar, MacConkey agar, Eosin methylene blue (EMB), Sorbitol- Macconcy agar with cefixime tellurite, Salmonella Shigella Agar (S.S) agar and CIN agar. Biochemical is (SIM) Sulfur, Indole, Motility, Triple Sugar Iron (TSI), Simmon Citrate (SC), Urease and Methyl Red - Voges Proskauer (MR/VP). Special latex for *E.Coli* (O157). Pure culture of bacterial isolates were identified and confirmed diagnosis by morphological features and biochemical tests according to (Quinn *et al*., 2010)

Olive oil: The fresh olive collected from local market, washed with distilled water in order to remove dust and clay, dried then squeezed to extract its oil with the commercial oil extraction device.

Grape Seed oil: The fresh red grape seed collected from local of red grape juice shop, washed with distilled water in order to remove dust and clay, dried then squeezed to extract its oil with the commercial oil extraction device.

Sesame oil: The fresh sesame collected from local market. Washed with distilled water and dried then squeezed to extract its oil with the commercial oil extraction device.

Control: Normal saline% 0.95Nacl

Result

The result showed that (72/80) meat samples contaminated with *E.coli* (90%) fallowed by pseudomonas (19/80) sample (23.75%) campylobacter (17/80) sample (21.25 %), *E.coli O157* (10/80) sample (12.5%), *Yersinia enterocolitica* (9/80) sample (11.25) salmonella (8/80) sample (10%), *Klebsell*a (6/80) Sample (7.5%) , and *Proteus*(4/80) sample (5. %) respectively. most samples expressed mixed bacterial isolates and some showed pure single bacterial colonies Table 1.

Fig. 1: *Salmonella* and *E. coli* on MacConkey agar

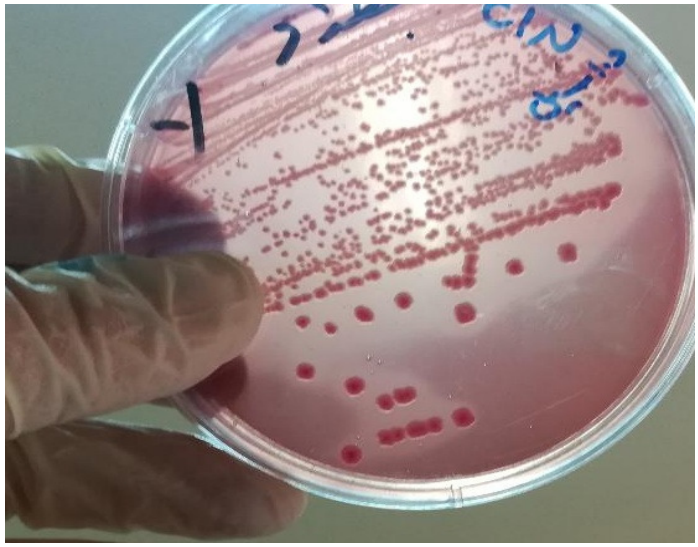

Fig. 2 *Yersinia enterocolitica* on CIN agar

The result showed growth inhibition with all oils on all isolated bacteria, but the highest with sesame oil Table 2

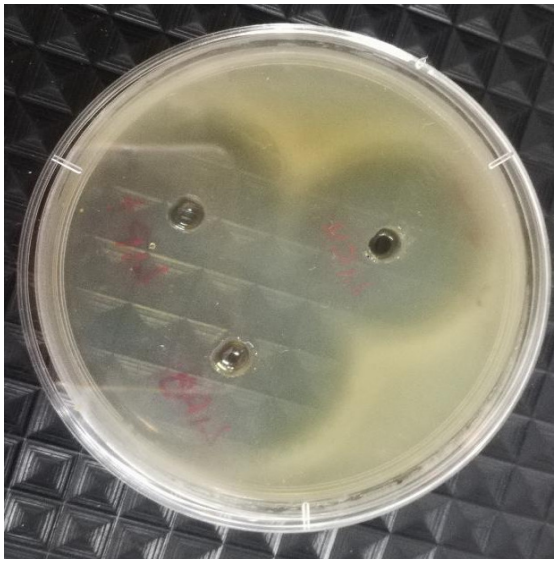

Fig. 3 : Inhibition zone by using sesame oil, red grape seed oil and olive oil on Mueller Hinton agar

Table 1 : Percentage of isolated bacteria from red meat sample

Isolated bacteria	Meat sample	No. of isolate	Recovery %
E. Coli	80	72	90%
Pseudomonas	80	19	32.75%
Campylobacter	80	17	21.25%
E .Coli O157	80	10	12.5%
Y. enterocolitica	80	9	11.25%
Salmonella	80	8	10%
Klebsella	80	6	7.5%
Proteus	80	4	5%

Table 2 : Zone of inhibition of Olive oil Grape Seed oil and Olive oil with garlic fresh garlic juice for different pathogenic bacteria using well diffusion method

Bacteria	Inhibition zone diameter in mm			
	Control	Olive oil	Grape Seed oil	Sesame oil
E. Coli	0	20	26	30
Pseudomonas	0	18	24	27
Campylobacter	0	15	21	26
E .Coli O157	0	17	21	23
Y. enterocolitica	0	19	20	22
Salmonella	0	17	20	25
Klebsella	0	15	21	24
Proteus	0	18	19	22

Discussion

Since 1940s, the revolution of medical treatment, specially, that deal with bacterial infections have been considerably reduced the morbidity and mortality from microbial disease (Karaosmanoglu *et al.,* 2010). Regrettably, this development has been accompanied by the emergence of drug-resistant organisms. Which entails serious constraints on the available options for the medical treatment of many bacterial infections (Bent & Young, 2010).

The present study has demonstrated that sesame oil effectively inhibited the growth of all the bacterial pathogens tested, followed by grape seed oil then olive oil, these result is related to others obtained from other studies like (Heidari *et al*., 2016) who find that the sesame seed extract showed considerable antibacterial activity against different pathogenic bacterial species, and the high phenolic content particularly lignans on sesame oil is causing their antibacterial effect (Ail *et al*., 2018)

Red grape seed have antioxidant and antimicrobial activities. Which is due to the biologically active phenolic flavonoid compounds that act by suppressing bacterial virulence factors including neutralization of bacterial toxin, inhibition of biofilm formation and reduction of host ligands adhesion, (Akerele, 2015). Also the non-flavonoid compounds predominantly, Gallic acid have antibacterial activity against Gram- and Gram+ bacteria, more powerful than Gentamicin and streptomycin antibacterial activity (Manal *et al*., 2017).

Phenolic compounds, mineral contents and the antioxidant effect obtained from the olive fruits play imported role as antibiotic effect against many pathogenic bacteria (Cioffi *et al*., 2010; Ayhan 2016).

Conclusion

This study recommended that natural olive oil, red grape seed oil and sesame oil can be used as potentials antibacterial agents for a variety of Gram-negative organisms that cause food poisoning , Further detailed studies are required to evaluate the possibility of the use of these oils as an antibacterial agent alone or in grouping with conventional antibacterial.

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