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Antimicrobial Activity of Fig and Olive Leaves Extracts

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ABSTRACT

Recently plant extracts have been used to prevent food spoilage and poisoning diseases. In this study, fig (*Ficus carica*) and olive (*Olea europaea*) leaves were extracted by water, hot water and methanol. Antimicrobial activities of fig and olive leave extracts were evaluated. Mixture of methanolic extracts of fig and olive leave were the most effective extract and resulted in antimicrobial activities against some strains of food borne pathogenic bacteria and spoilage fungi isolated from kariesh cheese and yoghurt drink. Fig and olive leave extracts which proved to be potentially effective can be used as natural alternative preventives to control food poisoning diseases and preserve food stuff avoiding health hazards in the applications of chemically antimicrobial agents.

Keywords: Food spoilage, natural antimicrobial, pathogenic bacteria, leaves extracts

INTRODUCTION

According to the Holy Qura'n (Surah 95. At-Teen) "By the fig and the olive, By mount Sinai, By this city of security (Al-Hilali and Khan, 1996). In holy Quran the fig has been mentioned only once while the olive seven times (six times explicitly and one time implicitly) (Marwat *et al*., 2011).

The pharmacological properties of fig and olive are probably due to the presence of plant secondary metabolites, which contains several bioactive compounds (Pereira *et al*., 2007). Polyphenols (Vlahov, 1992), flavonoids (Vlahov, 1992; Du Toit *et al*., 2001), tannins, organic acids, coumarins, vitamin E and carotenoids have the potency to inhibit the oxidative mechanisms that lead to degenerative diseases (Silva *et al*., 2004; Soobrattee *et al*., 2005). *Ficus carica* and *Olea europaea* have strong antioxidant potency to scavenge free radical at an optimal phenolic and flavonoid concentration (Ayoub *et al*., 2019).

Phenolics in *Olea europaea* leaves are major contributors to the antioxidant and antimicrobial effects of olive leaves (Debib and Boukhatem, 2017). Olive leaf extract present activities against some of both gram positive and gram negative bacterial strains (Lee and Lee, 2010; Erdohan and Turhan, 2011; Keskın *et al*., 2012; Aliabadi *et al*., 2012; Bisignano *et al*., 2014; Abbasvali *et al*., 2015).

The ethanolic extract of fig leaves exhibited strong activity against tested bacteria (*Staphylococcus aureus*, *Salmonella typhi*) and fungi (*Fusarium oxysporum)* whereas. *Klebsiella pneumonae* and *E. coli* seemed to be resistant to for ethanolic leaf extract which showed (Rashid and Mahdi, 2014).

Fig (*Ficus carica*) and olive (*Olea europaea*) leaves are considered to be a cheap raw material which can be used as a useful source of high added-value products (phenolic) (Sahin and Bilgin, 2018). Fig and olive leaves are easily available natural material of low cost, share possibly a similar wealth of health benefiting bioactive phytochemicals (Fatemi *et al*., 2007; Goulas *et al*., 2009). The presence of a high number of phenolic compounds in olive leaves such as hydroxytyrosol, rutin, verbascoside, luteolin-7-glucoside, oleuropein, oleuropein aglycone, ligstroside were investigated by several studies (Ryan *et al*., 2001), and other compounds such as quinic acid (Taamalli *et al*., 2012).

Oleuropein is the most abundant phenolic compound in olive cultivars (Benavente-García *et al*., 2000), which is easily extracted as part of the phenolic fraction of olive fruits, leaves, and seeds, however, it has not been reported in virgin olive oils (Ryan *et al*., 2001; Silva *et al*., 2006).

The aim of this investigation was to evaluate the effects of fig, olive leave extracts and mixture of them as antimicrobial effect against isolated microorganisms from dairy products

MATERIALS AND METHODS

Plant material

Fig leaves (*Ficus carica*) and olive leaves (*Olea europaea*) were collected from private farm, Ahmed Orabi Association, Kaliobeya, Egypt. Dairy product samples (Kariesh cheese and yoghurt drink) were obtained from the local market and selected as sources to isolate the pathogenic bacteria and spoilage fungi.

Isolation and identification of microorganisms

Isolation of the pathogenic and spoilage bacteria such as, *Staphylococcus aureus, Escherichia coli, Entrococcus feacalis, Bacillus cereus* or *Bacillus subtilis* and spoilage fungi such as *Aspergillus niger, Aspergillus flavus* or *Aspergillus candidus* have been carried out with the cultivation on different selective culture media. One gram of kariesh cheese or yoghurt drink sample was aseptically transferred into a 9 ml physiological solution. 0.1 milliliter aliquots of the serially-diluted samples were introduced into culture plates and spread on the selective

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agar mediums. The inoculated culture media have been incubated for 48 h at 37°C for bacteria and 28°C for fungi(Laslo and Gyorgy, 2018; Samuel *et al*., 2016).

The following selective culture media were used during the isolation of the microorganisms, Eosin methyl blue agar medium for *E. coli*, ChromoBioR Cereus Base for *B. cereus*, *Staphylococcus* selective agar medium (DifcoTM) for *S. eureus*, Nutrient agar for *B. subtilis* and *En. faecalis*, and acidified PDA medium for isolating fungi. These isolates were stored at 4°C in the refrigerator as stock cultures for identification.Technique of the BIOMÉRIEUX VITEK® 2 system of Pincus (2005) and methods of James and Natalie (2001)were adopted for identification of the unknown isolated bacteria and fungi, respectively.

Preparation of plant leaves powder

Fig and olive leaves were washed under tap water to remove impurities such as dust then in distilled water, and kept between folds of filter paper to remove excess of water from external surface. Leaves dried in an air dry oven at 40°C for 18 h then ground to fine powder using an electrical mill (Morsy and Abdel-Aziz, 2014). Ten gram of milled leaves samples was extracted using the method described by Ademe *et al*., 2014; Kamal *et al.*, (2014).

Determination of the antibacterial activity

The disc diffusion technique was used as screening method to determine the antimicrobial activity of tested extracts against bacterial strains according to kaur *et al*. (2010). Sterilized filter paper discs (6mm) were dipped in 10 µl of different concentrations (10, 20 and 30 mg/ml) of methanol, water and hot water extracts. The medium without any plant extract in Petri plates served as negative control and medium with ciprofloxacin served as positive control. The dipped discs were put in the plates which were contained 0.1 ml bacterial inoculums and the plates were incubated at 37°C for (*B. subtilis*, *S. aureus*, *E. coli* and *En. Feacalis*) and at 30°C for *B. cereus*. All strains incubated for 24h. The diameter of the zone of inhibition around each of the discs (disc diameter included) was taken as measured of the antimicrobial activity. All tests were performed in triplicates.

Determination of the antifungal activity

Antifungal activities of the examined different concentrations of the tested fig and olive leave extracts to give final concentrations of 0.5, 1.0 and 1.5 % were poured on PDA medium in sterilized Petri-dishes (Chaudhuri and Sen, 1982). PDA medium free from extracts was served as negative control and medium with 1.5% Gentamycin served as positive control. The plates were incubated at 28°C. Colony diameter was measured when controls showed full plate growth (9 cm). Mycelial growth inhibition was calculated according to Singh and Tripathi (1999) as indicated in the following equation:

$$\textbf{inhibition}\ \% = \frac{\mathbf{dc - dt}}{\mathbf{dc}} \times \mathbf{100}$$

Where, dc = average diameter of fungal colony in control and dt= average diameter of fungal colony in treatment.

Scanning Electron Microscope

Scanning Electron Microscope for tested *Aspergillus niger*treated with differenrt extracts was determined in Electron Microscope unit, Faculty of Medicine, Tanta University by using the JEOL JSM- 5200 LV scanning Microscope, made in Japan.

Statistical analysis

Analysis of Variance was carried out according to Gomez and Gomez (1984). Treatment means were compared by Duncan's (1955). The significance levels were 0.05 and 0.01 only. All statistical analysis was performed using analysis of variance technique by means of MSTAT computer program (Bricker, 1991).

RESULTS AND DISCUSSION

Antimicrobial activity of fig and olive leave extracts

A bioactive principle isolated from plant appears to be one of an alternative for control of plant and human pathogens being resistant to antibiotics. Since nearly all of the identified components from plants active against microorganisms are aromatic or saturated organic compounds, they are most often obtained through initial ethanol or methanol extraction (Cowan, 1999). It has been documented that biological active components such as tannins, saponins and alkaloids are plants metabolites well known for antimicrobial activity (Akinyemi *et al*., 2005).

Antibacterial activity of fig and olive leave extracts against isolated bacteria

The antibacterial activity of fig leave extracts was examined by the disc diffusion technique as shown in Table 1. Data revealed that fig leave water extract (FLWE) and fig leave methanol extract (FLME) at different concentrations resulted in an inhibition effect on the growth of all of the examined isolated bacteria species. Fig leave hot water extract (FLHWE) was of no effect on all isolated bacteria, with the exception of *S. aureus* and *E. coli* at high concentration 30 mg/ml. Slight activity effect of the hot water extract against isolated bacterial strains was detected, which came in agreement with Koduru *et al*. (2006) and Aiyegoro *et al*. (2008), who found that water extracts of plant generally showed little or no antibacterial activities. *Staphylococcus aureus* and *E. coli* were the most sensitive to the FLWE and FLME (Table 1)

Inhibition zones reached to 25 and 22 mm at 30 mg/ml FLME for *S. aureus* and *E. coli*, respectively. Generally, FLME resulted in strong antibacterial activity for all isolated bacteria. Joseph and Raj (2011) and Mi-Ran *et al*. (2009) observed a strong antibacterial activity of *Fiucs carica* extract leaves against oral bacteria. Ross and Kasum (2002); Vaya and Saeed (2006) and Mi-Ran *et al*. (2009) found that, the phytochemical of fig leaves extracts contained some phenolic compounds, which have pharmacological properties, namely flavonoids (like rutin, quercetin, and luteolin), phenolic acids (like ferrulic acid) furanocoumarins (like psoralen and bergapten) and also phytosterols (like taraxasterol).

Olive leave extracts were tested for antibacterial activity against five isolated bacteria Table 1. Olive leave hot water extract (OLHWE) exerts no effect on all isolated bacteria, with the exception of *S. aureus* and *E. coli* at concentration 30 mg/ml. OLME, on the other hand, exerted strong antibacterial activity among the tested extracts. The diameters of inhibition zones of *S. aereus* are the largest, followed by *E. coli*. There are no significant differences between diameter inhibition zone of *B. cereus and B. subtilis* at all concentration of olive leave methanol extract (OLME). Diameters of inhibition zones for *S.*

aereus ranged between 23 and 32 mm for OLME at 10 and 30 mg/ml, respectively, meanwhile, ranged between 22 and 30 mm in *E. coli* at the same extract. High concentration of olive leave water extract (OLWE) showed higher bacterial activity for *S. aureus* and *E. coli* than other isolated bacteria. It has been reported that the olive leaf extract has an antimicrobial activity because of its high phenolic content (Aytul, 2010).

Table 1. Anti-bacterial activity of fig and olive leave extracts against isolated bacteria

Leave extracts	Concentration mg/ml	Inhibition zone of isolated bacteria, mm				
		S. aureus	*E. coli*	*En. feacalis*	*B.cereus*	*B.subtilis*
		Fig leave extracts				
FLWE	10	12.0^{Ba}	10.0^{Cb}	7.0^{Cc}	6.0^{Bc}	7.0^{Bc}
	20	13.0^{Ba}	12.0^{Ba}	8.0^{Bb}	7.0^{Ab}	7.5^{Bb}
	30	18.0^{Aa}	17.0^{Aa}	9.0^{Ab}	7.5^{Ab}	8.5^{Ab}
FLWHE	10	6.0^{Ba}	6.0^{Aa}	6.0^{Aa}	6.0^{Aa}	6.0^{Aa}
	20	6.0^{Ba}	6.0^{Aa}	6.0^{Aa}	6.0^{Aa}	6.0^{Aa}
	30	8.0^{Aa}	7.0^{Ab}	6.0^{Ac}	6.0^{Ac}	6.0^{Ac}
FLME	10	16.0^{Ca}	12.0^{Cb}	8.0^{Cc}	7.5^{Cc}	8.0^{Cc}
	20	19.0^{Ba}	17.0^{Bb}	9.0^{Bc}	8.5^{Bc}	9.0^{Bc}
	30	25.0^{Aa}	22.0^{Ab}	13.0^{Ac}	9.5^{Ad}	10.0^{Ad}
		Olive leave extracts				
OLWE	10	9.0^{Ca}	8.0^{Cb}	8.0^{Cb}	7.5^{Ab}	8.0^{Bb}
	20	10.0^{Bb}	15.0^{Ba}	9.0^{Bc}	8.0^{Acd}	8.5^{Bd}
	30	18.0^{Ab}	21.0^{Aa}	11.0^{Ac}	8.5^{Ae}	9.5^{Ad}
OLWHE	10	6.0^{Ba}	6.0^{Ba}	6.0^{Aa}	6.0^{Aa}	6.0^{Aa}
	20	6.0^{Ba}	6.0^{Ba}	6.0^{Aa}	6.0^{Aa}	6.0^{Aa}
	30	9.0^{Aa}	8.0^{Ab}	6.0^{Ac}	6.0^{Ac}	6.0^{Ac}
OLME	10	23.0^{Ca}	22.0^{Cb}	10.0^{Cc}	9.0^{Bd}	9.0^{Cd}
	20	30.0^{Ba}	29.0^{Bb}	11.0^{Bc}	9.5^{Bd}	10.0^{Bd}
	30	32.0^{Aa}	30.0^{Ab}	14.0^{Ac}	10.5^{Ad}	11.0^{Ad}

Diameter of filter paper disc = 6 mm, In a row, means having the same superscript small letters are not significantly different at 5% level for isolated bacteria strain, In a column, means having the same superscript capital letters are not significantly different at 5% level for concentration levels of each treatment separately.

Antifungal activity of fig and olive leave extracts against isolated fungi

Fungi represent an increasing problem as spoilage organisms in food products, as in-house surface contaminants and as important lethal human pathogens. In food manufacturing, fungal spoilage of products causes severe economic losses and potential health hazards because of the possible production of different mycotoxins (Brul and Klis, 1999).

Mycelial growth inhibition for isolated fungi was presented in Table 2.

Table 2. Antifungal activity of fig and olive leave extracts against isolated fungi

Leave extracts	Concentration, %	Mycelial growth inhibition, %		
		Asp. niger	*Asp.flavus*	*Asp.candidus*
		Fig leave extracts		
FLWE	0.5	0.0^{Ca}	0.0^{Ca}	0.0^{Ca}
	1.0	22.25^{Ba}	17.77^{Bb}	21.00^{Ba}
	1.5	25.04^{Aa}	20.00^{Ac}	23.22^{Ab}
FLHWE	0.5	0.0	0.0	0.0
	1.0	0.0	0.0	0.0
	1.5	0.0	0.0	0.0
FLME	0.5	0.0^{Ca}	0.0^{Ca}	0.0^{Ca}
	1.0	25.00^{Ba}	22.22^{Bb}	25.00^{Ba}
	1.5	33.33^{Aa}	24.44^{Ac}	26.66^{Ab}
		Olive leave extracts		
OLWE	0.5	0.0^{Ca}	0.0^{Ca}	0.0^{Ca}
	1.0	15.12^{Bc}	20.00^{Bb}	21.50^{Ba}
	1.5	20.51^{Ac}	22.35^{Ab}	24.65^{Aa}
OLHWE	0.5	0.0	0.0	0.0
	1.0	0.0	0.0	0.0
	1.5	0.0	0.0	0.0
OLME	0.5	35.89^{Ca}	22.78^{Cc}	24.70^{Cb}
	1.0	41.02^{Ba}	24.93^{Bc}	26.52^{Bb}
	1.5	43.58^{Aa}	26.21^{Ac}	28.88^{Ab}

In a row, means having the same superscript small letters are not significantly different at 5% level for isolated bacteria strain, In a column, means having the same superscript capital letters are not significantly different at 5% level for concentration levels.

Results showed that no antimicrobial effect was noticed at 0.5% FLWE or FLME for all isolated fungi. FLHWE has no anti-fungi effect at all concentrations used against all isolated fungi. Methanol extract of fig leave recorded the highest percentage mycelial growth inhibition zones 33.53% with Asp. niger at 1.5% FLME, while the lowest percentage mycelial growth inhibition (22.22 %) was recorded with Asp. flavus at 20%. On the other hand, Asp. niger had the highest sensitive for FLWE with 25.04% mycelial growth inhibition at 1.5%. While Asp. flavus reported the lowest (17.77%) growth inhibition at 1.0% FLWE (Table 2). All of the tested fungal strains characterized with various effects of antifungal sensitivity to water, hot water and methanol extracts of olive leaves as shown in Table 2. It was determined that the methanol extract showed the most prominent activity.

From presented data in Table 2, it was observed that OLWE at 10 % had no anti-fungal effect for all isolated fungi. Asp. candidus observed high percentage mycelial growth inhibition (24.65%) at 1.5 % OLWE. On the other hand, Asp. niger showed the lowest anti-fungal effect (20.51%).

OLWHE exerted no antifungal effect at all concentrations for three isolated fungi. The hot water extracts of plants contained relatively higher amounts of high-molecular weight polysaccharides and lignin-carbohydrate complexes and lower amounts of low molecular weight tannins, flavonoids, terpenes and saponins (Sakagami *et al*., 2012). The cold extracts were more effective than hot extracts for the bioactive component present in the extracts might be thermo labile which might lose its activity when extracted under heat (Nagananda and Satishchandra, 2013).

Methanol extracts of olive leave (OLME) were found of the most effective against three isolated fungi at all

concentrations. Asp. niger characterized with the highest mycelial growth inhibition at all concentration of OLME. The percentages mycelial growth inhibition of Asp. niger were 35.89, 41.02 and 43.58 % at 0.5, 1.0 and 1.5% OLME, respectively. Asp. flavus showed the lowest percentage mycelial growth inhibition at all concentrations of OLME. Generally, OLME observed high antifungal activity for isolated fungi followed by OLWE. Some phenolic compounds in olive leaf, such as oleuropein (and its derivatives), exhibit antimicrobial activities and inhibit the growth of yeasts, fungi, and molds (Khalil *et al*., 2014; Pereira *et al*., 2007; Korukluoglu *et al*., 2006).Antimicrobial activity of fig and olive leaves methanol extract mixture

Mixture of fig and olive leaves methanol extract was evaluated at different ratio against isolated bacteria compared with Ciprofloxacin 30mg/ml (Table 3). Mixtures of FLME and OLME at different levels resulted in the highest antimicrobial activity against the isolated bacteria. Diameter of inhibition zones increased in all isolated bacteria by increasing concentration of OLME in the mixture. The mixtures showed the highest effect on S. aureus and E. coli. There was a similarity between the inhibition zones of mixture leaf extract at level 1:7 (FLME:OLME) and Ciprofloxacin discs against S. aureus and E. coli (Table 3). Zone inhibition diameters of En. feacalis, B.cereus and B. subtilis were 18, 15 and 16 mm, respectively for mixture 1:7. These values were nearly to that found in Ciprofloxacin discs against the same isolated bacteria (Table 3). The obtained results came in agreement with those mentioned by Dawoud *et al*., 2013, and Shafiei *et al*., 2016).

Table 3. Anti-microbial activity of fig and olive leaves methanol extract mixture

FLME:OLME	Zone inhibition of bacteria, mm					Mycelial growth inhibition, %		
	S.aureus	*E. coli*	*En. feacali*	*B.cereus*	*B.subtilis*	*Asp. niger*	*Asp. flavus*	*Asp. candidus*
1:1	35.0^{D}	34.0^{E}	15.0^{E}	11.00^{E}	12.0^{E}	77.77^{e}	28.88^{e}	33.33^{e}
1:3	36.0^{CD}	35.0^{D}	16.0^{D}	12.0^{D}	13.0^{D}	80.00^{d}	31.11^{d}	35.55^{d}
1:5	37.0^{BC}	36.0^{C}	17.0^{C}	13.0^{C}	14.0^{C}	82.22^{c}	33.33^{c}	37.77^{c}
1:7	38.0^{B}	37.0^{B}	18.0^{B}	15.0^{B}	16.0^{B}	84.44^{b}	35.55^{b}	40.00^{b}
Ciprofloxacin 30mg / ml	40.0^{A}	39.0^{A}	20.0^{A}	18.0^{A}	19.0^{A}			
Gentamycin (1.5%)						86.66^{a}	37.77^{a}	42.22^{a}

FLME = Fig leave methanol extract, OLME = olive leave methanol extract, In a row, means having the same superscript (capital litter for bacteria and small litter for fungi) are not significantly different at 5% level for mixture concentration.

As shown in Table 3, all of the isolated fungi showed various degrees of antifungal sensitivity to different concentration levels of FLME : OLME. Figure 1 showed that Asp. niger are more affected by mixture methanol extract at different levels. Inhibition growth mycelial percentage of Asp. niger ranged between 84.44% for 1:7 mixture and 77.77% for 1:1 mixture, while, Gentamycin at 1.5% reported 86.66% inhibition of Asp. niger mycelial growth. On the other hand, Asp. flavus reported the lowest sensitivity and the percentage of mycelium growth inhibitory ranged between 37.77% for 1:7 mixture and 28.88% for 1:1 mixture. These results were in agreement with Kungulovski and Atanasova-Pancevska (2014)

It has also been shown that a mixture of methanolic FLME and OLME in this study has a strong anti-microbial effect (Table 3). The extraction method must be obtaining a maximum amount of interested bioactive compounds without any adverse effect on their chemical structure. The activity of natural extraction depends on the active components of the raw material, the type and polarity of extraction solvent and the extraction procedure (Kouri *et al*., 2007).

Results in Figure 1 illustrate the inhibitory activity of the mixture fig and olive leave extracts against Asp. niger. At 1:7 ratio of fig to olive leave methanol extracts mixture fungal development was inhibited 84.44% after 7 days of incubation. This ratio of mixture was found to be good fungicidal. The mixture extracts inhibited spore germination of Asp. niger at 1:7 FLME:OLME.

Results show decrease in the mycelia growth with increasing the concentration of leave extract. Combination of fig and olive leave extract had significant fungistatic activity against all isolated fungi.

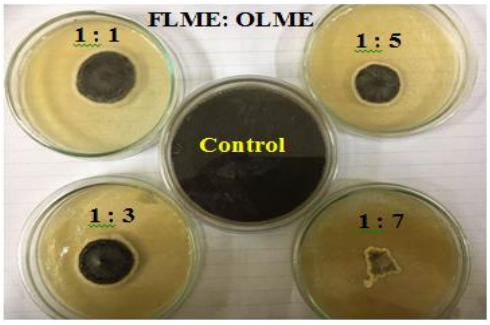
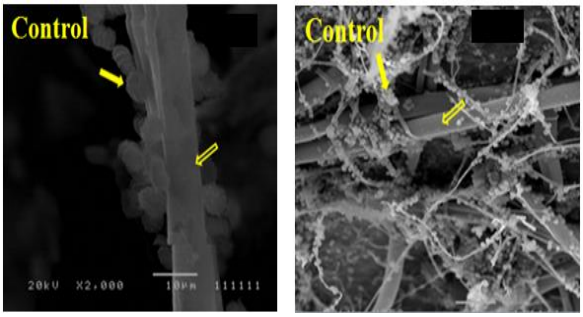


Figure 1. Mycelial growth Inhibition of *Aspergillus niger* by mixture of fig and olive leave methanol extract at different levels

Scanning electron microscope of Aspergillus niger treated with mixture of fig and olive leave extract

The effects of fig and olive leave extracts on the morphology of *Asp. Niger* were examined by scanning electron microscope as shown Figures 2 and 3.



The hollow arrow pointed to conidiophore and the solid arrow pointed to spores

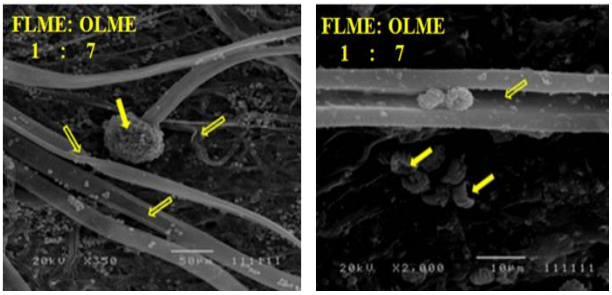
Figure 2. Scanning electron micrograph of *Asp. niger* on control PDA medium

The *Asp. niger* mycelium grown on potato dextrose agar medium as control showed the characteristic morphology with regular, lengthened, homogenous hyphae

of constant diameter with smooth external surface and rounded top (Figure 2).

Scanning electron microscopy of *Asp. niger*in figure 2 showed normal conidiophore, linear like, smooth and a stable surface decoration. Mycelium is normal thick, normal growth and large numbers of normal spores.

The presence of the fig and olive leave extracts in the culture medium led to observe alterations in the morphology of the hyphae and some alterations were noted on the cell surface (Figures 3).



The hollow arrow pointed to conidiophore and the solid arrow pointed to spores

Figure 3: Scanning electron micrograph of *Asp. niger* on PDA medium treated with mixture of fig and olive leave methanol extract at ratio 1:7

Scanning electron microscopy of *A. niger* treated with mixture of fig and olive leave methanol extract at ratio (1:7) showing hypha with rough surface, shrinkage, flat ribbon-shaped and distortion. Number and size of spores are less, distortion and shrinkage (Figure 3).

Greater damage was observed which showed flattened and empty hyphae with the presence of undulations along the hyphal borders clearly visible with cell wall disruption. Because of high antifungal activity for some fungi, easy-to-prepare and low-cost aqueous extracts might be serviceable for the food industry (Korukluoglu *et al*., 2008).

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النشاط المضاد للميكروبات لمستخلصات أوراق التين والزيتون

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حديثاً تم استخدام المستخلصات النباتية للسيطرة على التسمم الغذائى والأمراض الناتجة عن فساد الأغذية. فى هذه الدراسة تم إستخلاص كلا من أوراق التين (*Ficus carica*) والزيتون (*Olea europaea*) بالماء والماء الساخن والميثانول. وتم تقييم النشاط المضاد للميكروبات لمستخلصات أوراق التين والزيتون. ووجد أن خليط المستخلص الميثانولى لأوراق التين والزيتون هو الأكثر فاعلية حيث أظهر نشاط مضاد للميكروبات وخاصة ضد البكتريا الممرضة المتواجدة فى الغذاء وأيضاً الفطريات المفسدة له والتى تم عزلها من الجبن القريش ومشروب الزبادى. أثبتت مستخلصات ورق التين والزيتون فعاليتها لاستخدامها كمواد حافظة طبيعية للتحكم فى أمراض التسمم الغذائى وحفظ الغذاء الخام وذلك تجنبا للمخاطر الصحية الناتجة عن إستخدام المواد الكيميائية المضادة للميكروبات.