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CASE REPORT

Antivirulent-bacterial action of Saudi Nigella sativa L Seeds-oil through Corona-pandemic

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Abstract

Background: Nigella sativa L named black cumin or black seed, known as "Habbat El Baraka" is grown in Arab desert, and Asia. Nigella sativa L oil extract is used to treat infectious diseases caused by virulent bacteria. The aim was to evaluate the effects of Saudi Nigella sativa L seeds oil extract against virulent bacteria through Corona pandemic.

Materials and Methods: Preparation of Saudi Nigella sativa L seeds oil, and virulent bacteria, then did experience steps. After that were determined turbidity, biomass wet and dry weight.

Results: The results showed the turbidity were higher with all concentrations for Gram-negative than Gram-positive virulent bacteria. The highest turbidity was with Klebsiella pneumoniae, Salmonella typhi, also Pseudomonas aeruginosa. The less turbidity was in Escherichia coli. The biomass wet weight was higher with all concentrations for Gram-negative than Gram-positive virulent bacteria. The highest biomass wet weight was in Klebsiella pneumoniae, Salmonella typhi, also Pseudomonas aeruginosa. The less was to Escherichia coli. The highest biomass dry weight was on Klebsiella pneumoniae, Salmonella typhi, also Pseudomonas aeruginosa, then Escherichia coli. That indicated the more effect on virulent-bacteria were oil on concentration 20%. Considered as the Minimum Inhibitory Concentration (MIC).

Conclusion: The effective Saudi Nigella sativa L seeds oil extract concentration was 20%. The extract was more effective in contradiction of Gram-positive bacteria likened to Gram-negative virulent bacteria. Based on these results, Saudi Nigella sativa L seeds oil extract could be used as a therapeutic alternative against certain virulent bacterial pathogens. It is up to the "Pharmacy Department" to estimate the most effective dose and concentration of the extract for use in humans.

Keywords: Nigella sativa L; Virulent bacteria; Gram-negative bacteria; Gram-positive bacteria

Introduction

Nigella sativa L is an herbaceous plant, known as "Habbat El Baraka", and its grown in Arab desert. The oil treated infectious diseases caused by virulent-bacteria [1]. The seeds-oil is rich in fixed oils 32-40%, volatile oil 0.4-0.45%, and essential amino acids 8-9 types [2]. Also, alkaloids, steroids, saponins, terpenes, monoterpenes and phenolic [3]. Nigellicine, N-oxide, carvone, thymoquinone, thymol nigellicimine, and nigellicimine are present [4]. The antivirulent-bacteria activities related to fatty acids, and essential oil [5]. Physical cause variation in phytoconstituents percent leads to modification in biological act [6]. The oil treats skin inflammation, and virulent-bacterial in topical infections [7], that for chemical compounds [8-9]. The antivirulent-bacterial activities were to Escherichia coli, as well to Salmonella spp., [10], Salmonella typhi [11], and to numerous antibiotics-resistant bacteria Staphylococcus aureus [12-14]. The oil antivirulent-bacteria assist in food store; it was at 2.0% inhibited 24 virulent-bacteria [15]. Also, were on Escherichia coli, Staphylococcus spp., Klebsiella pneumoniae as well on Salmonella typhi [16]. Its acted-on Streptococcus pyogenes, Pseudomonas aeruginosa, as well Klebsiella pneumoniae. The greater was against the Gram-positive virulent-bacteria [17]. Thymo-quinone oil act on Listeria monocytogenes, Staphylococcus aureus, Pseudomonas aeruginosa, Escherichia coli, and Salmonella typhi. It was able to prevent virulent-bacterial biofilm formation [2]. The oils in KSA at 2017 showed maximum antivirulent-bacterial activity against Escherichia coli due to compounds. The components were as an alternate medicine and herbal traditional treatment [18]. At 2021, Saudi black oils had antivirulent-bacterial action for Staphylococcus aureus, as antibiotics alternate [19]. The aim was using Saudi Nigella sativa L seeds-oil as herbal treatment on virulent-bacteria due to prevention secondary infections. That was for its antivirulent-bacteria possessions. So that was to prove the person health prevention during Corona-pandemic.

Materials and Methods

Preparation of Experience Items: Saudi Nigella sativa L Seeds-oil was purchased from the "Approved Al-Atara Market Stores", as use conventional medicine, was much than 98%. The oil was diluted by Ethanol 99.9% to (5, 10, 15 and 20%) [20]. The identified virulence-bacteria were brought from the "Bacterial Laboratory". They were Staphylococcus aureus, Streptococcus pyogenes, as well Streptococcus pneumoniae, Listeria monocytogenes, Escherichia coli, also Klebsiella pneumoniae, as well Salmonella typhi, and Pseudomonas aeruginosa. They were cultured on Mueller Hinton Agar (Lab M Ltd., UK), then were grown in Peptone Water (Oxoid, Basingstoke, UK), for suspension matched the 0.5 McFarland to ($1.5X10^8$ CFU / mL) [21].

Experience Steps: Five ml of virulent-bacterial suspension was added, then one ml of Saudi Nigella sativa L seeds-oil diluted. Then were incubated overnight at 37°C [22]. The first test tubes were determined turbidity by "McFarland Standard" [23]. The second test tubes culture was centrifuged to pellets and were weight [24]. The third test tubes cells were centrifuged to pellets. Then the were dried and were weight [24].

Data Analysis: The results were preserved (IBM, Armonk, NY, USA) [25].

Results and Discussions

Turbidity: After overnight incubation at 37°C, the highest turbidity was with Klebsiella pneumoniae, Salmonella typhi, as well Pseudomonas aeruginosa. The less turbidity was in Escherichia coli. This indicated the effectiveness on the Gram-positive were more than on the Gram-negative (Table 1). That indicated the more effect on virulent-bacteria were oil on concentration 20%. Considered as the Minimum Inhibitory Concentration (MIC). The oil chemical compounds had antivirulent-bacterial drugs [8-9], to Escherichia coli, as well Salmonella spp., [10], and Salmonella typhi [11]. Also, to multiple antibiotics-resistant bacteria Staphylococcus aureus [12-14]. It had on Escherichia coli, Staphylococcus spp., Klebsiella pneumoniae and Salmonella typhi [2, 16]. Pseudomonas aeruginosa [17]. The oils in KSA at 2017 antivirulent-bacterial activity was against Escherichia coli [18]. At 2021, Saudi black oils had acted-on Staphylococcus aureus, [19].

Virulent bacteria	Nigella sativa L seeds oil concentration after overnight incubation at 37°C			
	5%	10%	15%	20%
Staphylococcus aureus	0.9±0.1	0.8±0.2	0.7±0.1	0.6±0.2
Streptococcus pyogenes	0.9±0.1	0.8±0.2	0.7±0.1	0.6±0.2
Streptococcus pneumoniae	0.9±0.2	0.8±0.2	0.7±0.1	0.6±0.2
Listeria monocytogenes	0.9±0.1	0.8±0.2	0.7±0.1	0.6±0.2
Escherichia coli	0.9±0.1	0.9±0.1	0.8±0.2	0.7±0.1
Klebsiella pneumoniae	0.9±0.1	0.9±0.1	0.9±0.1	0.8±0.2
Salmonella typhi	0.9±0.1	0.9±0.1	0.9±0.1	0.8±0.2
Pseudomonas aeruginosa	0.9±0.2	0.9±0.2	0.9±0.1	0.8±0.2

Table 1: Turbidity signal of virulent bacteria after overnight incubation at 37°C

Biomass wet weight: After overnight incubation at 37°C, the biomass wet weight was higher for Gram-negative than Gram-positive virulent-bacteria. The highest was in Klebsiella pneumoniae, Salmonella typhi, also Pseudomonas aeruginosa. The Gram-positive were more effected than the Gram-negative (Table 2). That indicated the more effect on virulent-bacteria were oil on concentration 20%. Considered as the Minimum Inhibitory Concentration (MIC). The oil had antivirulent-bacterial drugs [8-9], was to Escherichia coli, as well Salmonella spp., [10], and Salmonella typhi [11], also to multiple antibiotics-resistant bacteria Staphylococcus aureus [12-14]. It had antivirulent-bacterial effects on Escherichia coli, also Staphylococcus spp., Klebsiella pneumoniae and Salmonella typhi [16]. As well, to Streptococcus pyogenes, Pseudomonas aeruginosa, and Klebsiella pneumoniae, the greater against the Gram-positive virulent-bacteria [17]. As well on Listeria monocytogenes, Staphylococcus aureus, Pseudomonas aeruginosa, Escherichia coli, and Salmonella typhi. It was able to prevent virulent-bacterial biofilm arrangement [2]. The oils in KSA at 2017 showed activity against Escherichia coli an alternate medicine and herbal traditional treatment [18]. At 2021, Saudi black cumin oils had antivirulent-bacterial activity on Staphylococcus aureus, alternate to antibiotics for infections care [19].

Virulent bacteria	Nigella sativa L seeds oil concentration after overnight incubation at 37°C			
	5%	10%	15%	20%
Staphylococcus aureus	1.0±0.3	0.7±0.1	0.4±0.2	0.2±0.2
Streptococcus pyogenes	1.0±0.2	0.6±0.2	0.4±0.2	0.2±0.1
Streptococcus pneumoniae	1.0±0.1	0.7±0.2	0.5±0.2	0.2±0.3
Listeria monocytogenes	1.1±0.1	0.7±0.2	0.5±0.1	0.2±0.3
Escherichia coli	1.1±0.1	1.1±0.1	0.8±0.2	0.5±0.3
Klebsiella pneumoniae	1.6±0.2	1.6±0.2	1.6±0.1	1.3±0.2
Salmonella typhi	1.6±0.3	1.5±0.2	1.4±0.1	1.2±0.1
Pseudomonas aeruginosa	1.6±0.4	1.5±0.3	1.5±0.2	1.3±0.1

Table 2: Biomass wet weight by gram of virulent bacteria after overnight incubation at 37°C

Biomass dry weight: After overnight incubation at 37°C, the highest biomass dry weight was on Klebsiella pneumoniae, Salmonella typhi, also Pseudomonas aeruginosa, then Escherichia coli. The effects were less on Gram-negative virulent-bacteria. That showed all concentration provided the most biomass dry weight effect, that was less owing to the oil effect on all virulent-bacteria (Table 3). That indicated the more effect on virulent-bacteria were oil on concentration 20%. Considered as the Minimum Inhibitory Concentration (MIC). The oil had antivirulent-bacterial drugs [8-9], to Escherichia coli, as well Salmonella spp., [10], and Salmonella typhi [11], and Staphylococcus aureus [12-14]. It had antivirulent-bacterial effects on Escherichia coli, Staphylococcus spp., Klebsiella pneumoniae and Salmonella typhi [16-17]. Thymoquinone oil content displayed act on virulent-bacteria [2]. The oils in KSA at 2017 showed maximum antivirulent-bacterial activity against Escherichia coli [18]. At 2021, Saudi black cumin oils had antivirulent-bacterial action on Staphylococcus aureus [19].

Virulent bacteria	Nigella sativa L seeds oil concentration after overnight incubation at 37°C			
	5%	10%	15%	20%
Staphylococcus aureus	0.6±0.1	0.4±0.2	0.2±0.2	0.1±0.2
Streptococcus pyogenes	0.6±0.2	0.4±0.1	0.3±0.1	0.1±0.1
Streptococcus pneumoniae	0.6±0.2	0.5±0.2	0.3±0.2	0.1±0.1
Listeria monocytogenes	0.7±0.1	0.5±0.1	0.3±0.1	0.1±0.1
Escherichia coli	0.7±0.2	0.7±0.1	0.5±0.1	0.3±0.1
Klebsiella pneumoniae	1.0±0.1	1.0±0.1	0.9±0.2	0.8±0.2
Salmonella typhi	0.9±0.2	0. 9±0.1	0.9±0.1	0.7±0.2
Pseudomonas aeruginosa	1.0±0.2	0.9±0.2	0.9±0.2	0.8±0.2

Table 3: Biomass dry weight by gram of virulent bacteria after overnight incubation at 37°C

Conclusions

The results were found the effective of Saudi *Nigella sativa L* seeds-oil concentrations were 20%. It continued the effects on the Gram-positive additional than Gram-negative virulent-bacteria through Corona-pandemic.

Recommendations

It was optional the Saudi *Nigella sativa L* seeds-oil usage as a therapeutic alternative for virulent-bacteria. It is up to the "Pharmacy Department" to estimate the quantity and concentration for human using doses.

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