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Bioactivity of Natural Compounds Extracted from *Scenedesmus obliquus* toward Some Pathogenic Bacteria

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Abstract:

An assortment of dynamic constituents has been extracted from different types of algae. The expanded utilization of anti-microbials and chemotherapeutics for illness treatment prompts issues of rising of medication safe structures and sway antagonistic impacts on the biological system. Algae address biomolecules with a wide range of impacts valuable in various biotechnological fields. During this study, various concentrates of the green algae *S. obliquus* were tried as antibacterial toward three pathogenic bacteria (*Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aurues*), utilizing BG11 media *Scenedesmus obliquus* was secluded from freshwater (Albahr elsaeidiu - Mit Yazid - Al-Qadabah) in Kafr El-Sheik governorate. Three solvents (Ethanol, Methanol and Acetone) were utilized for algal extractivity with concentrates of 5, 10, 20 and 40 mg/ml. The antibacterial activity of the concentrates of the algal extracts was determined by agar disc diffusion technique. Antibiotics were utilized to analyze their antibacterial potential. The MIC results were read up for the microorganisms that were vulnerable in the antimicrobial activity test. MIC value of the algal extracts was determined by broth dilution assay technique. Ethanol extract of *Scenedesmus obliquus* was recorded MICs values (2.25 and 7.12 and 9.5 mg/ml) toward *E. coli*, *P. aeruginosa* and *S. aureus*, individually. GC-MS examination showed that *S. obliquus* ethanolic extract contain numerous bioactive constituents which are considered with antibacterial impacts, for example, polyphenolic compounds, phenolic compounds, saturated and unsaturated fats, esters, ethers, amide compounds, long chain of hydrocarbons, aldehyde, alcohols and amines-containing compounds.

INTRODUCTION

Algae yield a limitless range of natural chemical compounds. One possible business use of algae inferred intensifies that has, at this point; got little consideration is in the space of drugs. Algal extracts, and their fractivityated activity or sanitized parts, have been reported to display anticoagulant, antibacterial, antiviral, and cancer prevention agents (Abd El-Hack *et al*., 2019). Testing of lipophilic and hydrophilic extracts from refined algae or water blossom content, confined for antiviral, antibiotic, resistant balancing and protein repressing activity in vitro frameworks uncovered strains with intriguing impacts. Extracts of different algae have been demonstrated to have antibacterial activity in vitro toward Gram +ve and Gram -ve bacteria. Optional metabolites impact different life forms nearby and are believed to be of evolutionary significance.

There has been a surge in awareness of algae as a potential source of novel drugs (Jeevanantham *et al*., 2019). *Scenedesmus sp*., which has a place with the family Scenedesmaceae is regularly predominant in freshwater lakes and waterways. Numerous species of this family are being utilized worldwide for different purposes because of their capacity to adjust to cruel ecological circumstances, capacity to develop quickly and simplicity of development and dealing with (Ho *et al*., 2012). *Scenedesmus sp*. has been considered a rich wellspring of new antimicrobial and anticancer materials. *S. obliquus* and *S. quandricauda* had antibacterial activity against a variety of foodborne pathogenic organisms and mycotoxigenic fungal (Najdenski *et al*., 2013). Bioactive constituents got from *Scenedesmus sp*. can be obtained straightforwardly from essential digestion, like proteins, unsaturated fats, vitamins, and pigments, or can be from secondary metabolism (polyphenols and other antioxidants), these metabolites can go about as substances guard against herbivores, rivalry for space and predation. Moreover, Bacteriostatic, bactericidal, antifungal, antiviral, and anticancer properties are attributed to these metabolites (El-Sheekh *et al*., 2020).

The capability of *Scenedesmus sp*. in biotechnological applications ranges from nitrogen obsession, creation of bioactive and drug compounds, wellbeing in food varieties and hydroponics takes care of (Sahin, 2019). *Scenedesmus sp*. is among the microalgae species which has high effectiveness to eliminate supplements from the wastewater and produce biomass with supplement values, for example, protein, lipid, unsaturated fats and other fundamental enhancements that can further develop fish development, wellbeing and related applications (Alishah *et al*., 2019). The altered treatment of irresistible illnesses by the utilization of medications has specific constraints because of changing examples of obstruction in microbes and the incidental effects they delivered. These impediments interest in improved pharmacokinetic properties, which require proceeding with research for new antimicrobial builds for the advancement of medications (Jeevanatham *et al*., 2019). Accordingly, an improved screening strategy for the location of antibacterial activity and trend setting innovation is important to help in advancing the investigations around here.

The constant exploration for a new antibacterial specialist from algae is viewed as a choice to beat the development of multi-drug opposition organic entities and the higher gamble of irresistible diseases brought about by these life forms. The goal of the current study was to consider the antibacterial activity of algal extracts in contrast to three pathogenic bacteria and identify the most dynamic constituents of the algal extract.

MATERIALS AND METHODS

Microalgal culture

Scenedesmus obliquus was isolated from freshwater samples collected from (Albahr elsaeidiu - Mit Yazid - Al-Qadabah) in Kafr El-Sheik governorate, Egypt. The isolated pure strain was developed in BG11 medium under a light power of 500 Lux (Ilavarasi *et al*., 2011).

Source of microorganisms

Escherichia coli, Pseudomonas aeruginosa and Staphylococcus aureus were obtained from Botany and Microbiology department, Faculty of Science, Menoufia University, Shebein El-Kom, Egypt.

Preparation of algal extracts

Microalgae biomass were centrifuged at 5000 rpm for 10 min and the pellets were collected, weighed, and dried before being utilized for extractivity by antimicrobial specialists. Each algal pellet (0.5 g) was added independently in ethanol, methanol and acetone in a mortar pestle and kept for 24 hours at 4°C until fully extracted. After centrifugation at 10000 rpm for 10 minutes, the supernatant was collected (El-Sheekh *et al*., 2018). The dissolvable extracts were concentrated under pressure at 40°C. Dry extract was taken and dissolved in various solvents to get the last concentrate of 40 mg/ml, and afterwards the extract was kept at 4°C until used for bioassays (Abubakar and Haque, 2020).

Determination of the antibacterial activity of the algal extracts

Antibacterial activity of the concentrates (5, 10, 20 and 40 mg/ml) of each algal extract (ethanol, methanol and acetone) were determined by the paper plate measure strategy (Pridham *et al*., 1956). The supplement Agar media was ready. The media was sterilized by autoclave at 121°C for 15 minutes at 15 lbs pressure and was utilized for the test microorganisms. After sanitization, the media was poured onto the sterile Petri plates, and afterwards, the plates were permitted to cool and left to harden. Subsequently, 100 µl of bacterial suspension were immunized onto the Petri plates. Then, at that point, the filter paper circles (6 mm) were soaked with 50 µl of the algal culture crude extracts, took into consideration air dried and put on the media. The plates were hatched at 37 °C for a time of 24 hrs. Toward the finish of the incubation period the zone of inhibition around the paper circle (6 mm) was measured in millimeter (mm). Seven antibiotics were utilized as a control for obtaining comparative results. They were (Ampicillin, Amoxicillin, Cefadroxil, Doxycycline, Cefoxitin, Ofloxacin and Vancomycin).

Determination of the algal extracts' minimal inhibitory concentration (MIC)

The MIC of the extracts that exhibited considerable activity was determined by dilution technique (Irith *et al*., 2008). The algal extracts were diluted into different concentrations that went somewhere in the range of 0.225 and 40 mg/ml in sterile supplement stock in test tubes. Each tube was inoculated with (0.1 ml) of each bacterial strain containing $2x10^6$ CFU/ml. The tubes were incubated at 37° C for 24hr. The control tubes with sterile stock without algal extracts. Not entirely settled as the least concentration of the extracts allowed no apparent development (no turbidity) when compared with control tubes**.**

Identification of the most effective compounds of the algal extract

The GC-MS analysis was utilized to decide the substance synthesis of antibacterial components of algal extracts in the Scientific Research Center and Measurements at Tanta University (Instrument Perkin Elmer model: clarus 580/560S). The procurement boundaries were Oven: Initial temp 50°C for 4 min, incline 8°C/min to 180°C, hold 5 min, slope 10°C/min to 280°C, hold 2 min, Inj=280°C, Volume=1 µL, Split=20:1, Carrier Gas=He, Solvent Delay=5.00 min, Transfer Temp=280°C,Source Temp=200°C, Scan: 50 to 600 Da, Column (Elite-5MS, 30 m 0.25 mmID 0.25 um df). The relative region was straightforwardly acquired from all out particle current (TIC). The compounds were recognized by correlation of their mass with the credible guidelines. The substance contents of the segmented removals were distinguished by contrasting the GC-MS pinnacles and maintenance seasons of guidelines. The level of every part was assessed as the proportion of the pinnacle region to the absolute chromatographic. Provisional distinguishing proof of the mixtures was performed in view of the examination of their

overall maintenance time and mass spectra to those of the library information of the GC/MS framework. The evaluation of the multitude of recognized parts was examined utilizing a percent relative peak area (Marrez *et al*., 2017).

Statistical Analysis

All data results were obtained from three replicates. Information entered and investigated utilizing Microsoft Excel programming. The resulted data was arranged and analyzed by a statistical software package (SPSS). Results were introduced as mean ± standard deviation (Chia *et al*., 2013).

RESULTS

Antibacterial activity of *Scenedesmus obliquus* ethanolic extract.

The antibacterial activity of various concentrations of ethanolic extract of *S. obliquus* toward three pathogenic bacteria. Concentration (40mg/ml) with inhibition zones 17.157, 14.362 and 11.318 mm, concentration (20mg/ml) with inhibition zones 14.235, 10.312 and 9.115 mm, concentration (10mg/ml) with inhibition zones 10.116, 8.236 and 7.310 mm on *E. coli*, *P. aeruginosa* and *S. aureus*, respectively. Concentration (5mg/ml) with inhibition zone 8.124 mm toward *E. coli* and with no inhibition effect toward *P. aeruginosa* and *S. aureus* as shown in table (1).

Antibacterial activity of *Scenedesmus obliquus* methanolic extract

The antibacterial activity of various groupings of methanolic extracts of *S. obliquus* toward a few pathogenic bacteria. Concentration (40mg/ml) with inhibition zones 12.264, 13.129 and 7.268 mm toward *E. coli*, *P. aeruginosa* and *S. aureus* individually. Concentration (20mg/ml) with inhibition zones 10.135, 11.337 mm, concentration (10mg/ml) with inhibition zones 8.126, 9.216 mm, concentration (5mg/ml) with inhibition zones 7.138, 7.331 mm toward *E. coli*, *P. aeruginosa* separately and with no effect toward *S. aureus* as shown in table (2).

Table 1. Inhibition zone (mm) of various concentrates of ethanolic extracts of *S. obliquus* toward the three pathogenic bacteria.

Bacteria / Conc. of Algal extract	*E. coli*	*P. aeruginosa*	*S.aureus*
40mg/ml	17.157±0.189	14.362±0.076	11.318 ±0.158
20mg/ml	14.235±0.026	10.312 ±0.128	9.115±0.219
10mg/ml	10.116±0.019	8.236±0.261	7.310±0.411
5mg/ml	8.124±0.011	Negative	Negative

Each value is mean± SD (n=3)

Table 2. Inhibition zone (mm) of various concentrates of methanolic extracts of *S. obliquus* toward the three pathogenic bacteria.

Bacteria / Conc. of Algal extract	*E. coli*	*P. aeruginosa*	*S. aureus*
40mg/ml	12.264±0.84	13.129±0.67	7.268±0.83
20mg/ml	10.135±0.039	11.337 ±0.162	Negative
10mg/ml	8.126±0.047	9.216±0.251	Negative
5mg/ml	7.138±0.051	7.331±0.418	Negative

Each value is mean± SD (n=3)

Antibacterial activity of *Scenedesmus obliquus* acetone extract

The antibacterial activity of various groupings of acetone extracts of *S. obliquus* toward pathogenic bacteria. Concentration (40mg/ml) with inhibition zones 18.178, 15.241 and 7.118 mm toward *E. coli*, *P. aeruginosa* and *S. aureus* individually. Concentration (20mg/ml) with inhibition zones 15.248, 13.290 mm, concentration (10mg/ml) with hindrance zones 12.162, 10.136 mm, concentration (5mg/ml) with inhibition zones 10.158, 9.229 mm toward *E. coli*, *P. aeruginosa* individually and with no effect toward *S. aureus* as shown in table (3).

Table 3. Inhibition zone (mm) of different concentrates of acetone extracts of *S. obliquus* toward three pathogenic bacteria.

Bacteria / Conc. of Algal extract	*E. coli*	*P. aeruginosa*	*S. aureus*
40mg/ml	18.178±0.192	15.241±0.317	7.118±0.094
20mg/ml	15.248±0.334	13.290 ±0.212	Negative
10mg/ml	12.162±0.071	10.136±0.194	Negative
5mg/ml	10.158±0.092	9.229±0.218	Negative

Each value is mean± SD (n=3)

Antibacterial activity of some antibiotics toward the three tested bacteria.

Ampicillin (10µg) with inhibition zones (- ve, - ve and 7.366 mm), Amoxicillin (25µg) with inhibition zones (19.125, - ve and 21.218 mm), Cefadroxil (30µg) with inhibition zones (- ve, - ve and 10.174 mm), Doxycycline (30µg) with inhibition zones (15.218, 9.110 and 19.228 mm), Cefoxitin (30µg) with inhibition zones (9.192, - ve and 11.215 mm), Ofloxacin (5µg) with inhibition zones (16.415, 6.115 and 13.346) and Vancomycin (30µg)mm. with inhibition zones (- ve, - ve and 11.186) toward *E. coli*, *P. aeruginosa* and *Staph. aureus*, respectively and separately as shown in table (4).

Table 4. Inhibition zone of some antibiotics toward the three tested bacteria.

Antibiotics	Inhibition zone (mm)		
	E. coli	*P. aeruginosa*	*S. aureus*
Ampicillin (10 µg)	Negative	Negative	7.366±0.311
Amoxicillin(25 µg)	19.125±0.325	Negative	21.218±0.258
Cefadroxil(30 µg)	Negative	Negative	10.174±0.183
Doxycycline(30 µg)	15.218±0.217	9.110±0.076	19.228±0.219
Cefoxitin(30 µg)	9.192±0.186	Negative	11.215±0.191
Ofloxacin(5 µg)	16.415±0.364	6.115±0.078	13.346±0.289
Vancomycin(30 µg)	Negative	Negative	11.186±0.224

Each value is mean± SD (n=3)

Minimum inhibitory concentration (MIC) of *Scenedesmus obliquus* extracts

Ethanol extracts with MICs values (2.25, 7.12 and 9.5mg/ml), methanol extracts with MICs values (3.0, 2.25 and 40.0mg/ml), Acetone extracts with MICs values (0.71, 1.26 and 30.0mg/ml) toward *E. coli*, *Pseudomonas aeruginosa* and *Staph. aureus* individually as shown in figure (1).

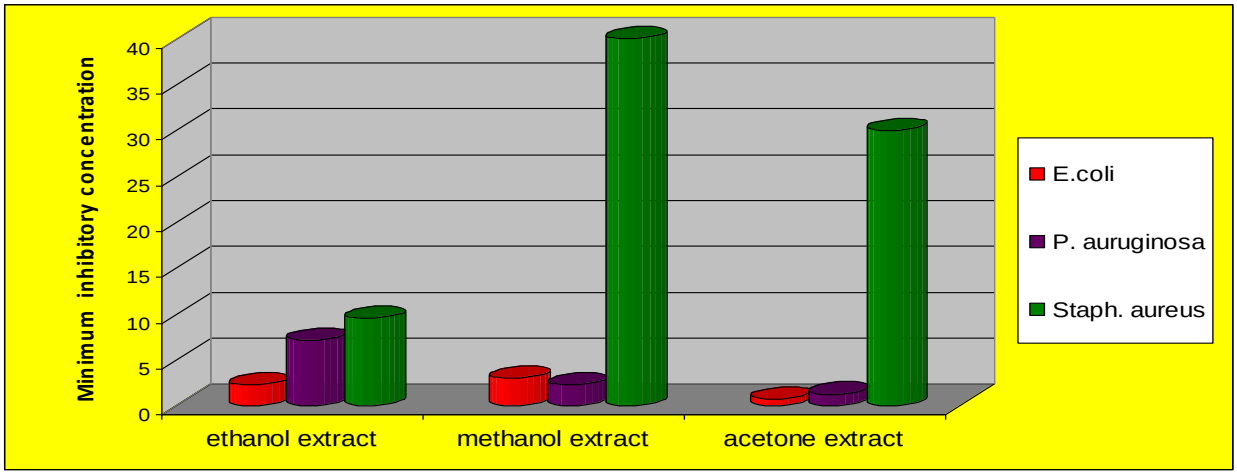

Fig. 1. MIC (mg/ml) of S. obliquus extracts toward three pathogenic bacteria.

GC-MS chromatography

Investigation showed that *S. obliquus* ethanolic extract contains numerous bioactive compounds which are considered with antibacterial impacts, for example, polyphenolic compounds, phenolic compounds, saturated and unsaturated fats, esters, ethers, amide-containing compounds, long chain of hydrocarbons, aldehyde, alcohols, fats and amine compounds. The outcomes relating to fraction and Mass Spectra of recognized compounds are listed in table (5) and figure (2).

Table 5. Composition of ethanolic extract of *S. obliquus* as evaluated by GC-MS chromatography.

No	Compounds	R.time	Area%	Norm%
1	2-[2-[2-[2-[2-[2-[2-(2-Methoxyethoxy)ethoxy]ethoxy] ethoxy]ethoxy]ethoxy]ethoxy-trimethylsilane	32.224	10.161	100.00
2	Octadecanoic acid, ethyl ester	30.649	7.470	73.51
3	2-[2-[2-[2-[2-[2-[2-[2-(2-Methoxyethoxy)ethoxy]ethoxy]ethoxy] ethoxy]ethoxy]ethoxy]ethoxy-trimethylsilane	32.144	6.569	64.64
4	Hexaethylene glycol dimethyl ether	29.108	6.465	63.63
5	Hexadecanoic acid, ethyl ester	27.713	5.172	50.90
6	1,2-Hexanediol, 2-methyl	23.281	4.799	47.23
7	(1S,14S)-Bicyclo[12.10.0]-3,6,9,12,15,18,21,24-Octaoxatetracosane	34.590	2.607	25.65
8	1,4,7,10,13,16,19-Heptaoxa-2-cycloheneicosanone	28.913	2.441	24.02
9	1-Monolinoleoylglycerol trimethylsilyl ether	36.656	1.896	18.66
10	9,12-Octadecadienoyl chloride, (Z,Z)	30.299	1.735	17.08
11	Phytol	29.553	1.407	13.85
12	1,2-Benzenedicarboxylic acid, diisooctyl ester	34.025	1.310	12.89
13	1-Hexadecanol, 2-methyl-	35.331	0.705	6.94
14	Cyclotetrasiloxane, octamethyl-	8.440	0.648	6.38
15	Heptanoic acid, 2-amino-7-chloro-2-methyl-, (R)-	11.181	0.628	6.18
16	Hydroxylamine, methyl-(1-phenylethyl)-	6.974	0.492	4.84
17	9,12,15-Octadecatrienoic acid, 2-[(trimethylsilyl)oxy]-1 [[(trimethylsilyl)oxy]methyl]ethyl ester, (Z,Z,Z)-	34.756	0.480	4.72

18	Tetradecanoic acid, ethyl ester	22.886	0.335	3.29
19	Cyclopentasiloxane, decamethyl	11.766	0.323	3.18
20	9,12-Octadecadienoic acid, ethyl ester	30.214	0.306	3.01
21	Phenol, 2,2'-methylenebis[6-(1,1 dimethylethyl)-4-methyl-	32.950	0.303	2.98
22	Cyclohexasiloxane, dodecamethyl-	14.857	0.290	2.86
23	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	23.891	0.282	2.77
24	Octaethylene glycol monododecyl ether	29.323	0.279	2.75
25	Heptaethylene glycol monododecyl ether	29.398	0.262	2.58
26	2-Propanone, 1,1-diethoxy-	11.066	0.258	2.54
27	(E)-9-Octadecenoic acid ethyl ester	30.379	0.252	2.48
28	i-Propyl 16-methyl-heptadecanoate	30.979	0.229	2.26
29	Propane-1,3-diol 2-nitrobenzeneboronate	8.755	0.228	2.25
30	Cyclononasiloxane, octadecamethyl-	30.764	0.220	2.17
31	Cycloheptasiloxane, tetradecamethyl	17.579	0.209	2.06
32	Octasiloxane, 1,1,3,3,5,5,7,7,9,9,11,11,13,13,15, 15-hexadecamethyl	35.546	0.205	2.02
33	Benzaldehyde, 4-(1-methylethyl)-	13.992	0.199	1.96
34	Ethyl 9-hexadecenoate	27.563	0.200	1.96
35	Cystine	10.556	0.192	1.89
36	Phthalic acid, butyl undecyl ester	24.556	0.189	1.86

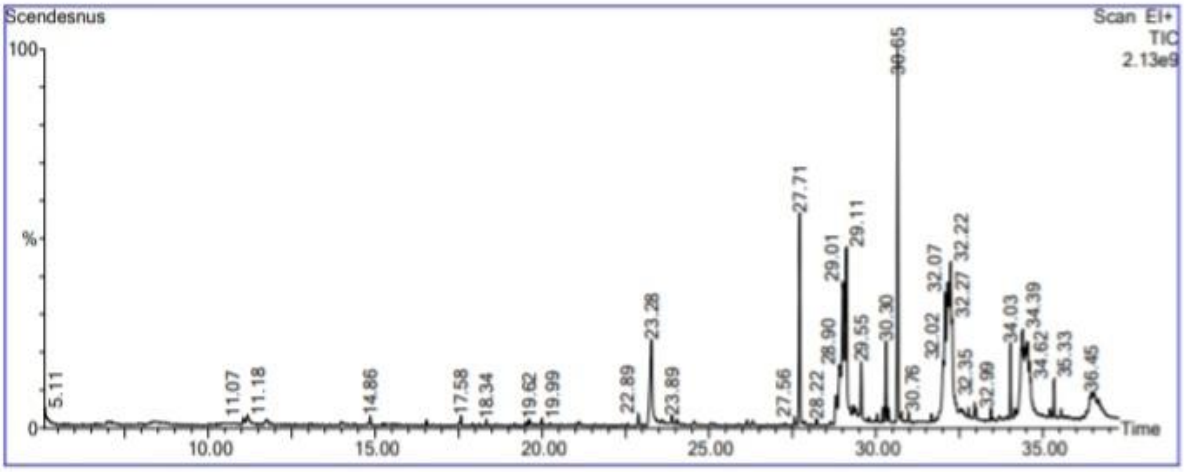

Fig. 2. Chromatogram from the GC-MS with the ethanol extract of *S. obliquus*.

DISCUSSION

The search for antimicrobial compounds from natural origin has garnered a lot of attention recently, and researchers are working hard to find natural chemicals that can replace synthetic antimicrobial. These chemicals offer a broad clinical efficacy against human pathogens like bacteria, parasites, fungus, and viruses. Numerous investigations have been conducted

using the extracts of various algae to find novel antibacterial chemicals (Hosseini *et al*., 2019). As shown in tables 1, 2 and 3 *Scenedesmus obliquus* extracts exhibit antibacterial efficacy toward all tested pathogenic bacteria *E coli*, *P aeruginosa* and *S. aureus*. *S. obliquus* extracts have moderate antibacterial activity toward *P.aeruginosa* and *E. coli*, according to Tuney et al. (2006) *Scenedesmus sp*. methanol, acetone, and ethanol extracts had medium antibacterial efficacy toward these pathogenic bacteria, while diethyl ether extract having the best results. *S. quadricauda* methanolic extract displayed antibacterial efficacy toward *E. coli, B. cereus*, and *S. aureus*, whereas ethanol, acetone, and diethyl ether extracts had antibacterial activity toward *B. cereus* and *S. aureus* (Abedin and Taha, 2008). They also discovered that *P. aeruginosa* was resistant to *S. quadricauda* extracts such as ethanolic, acetone, diethyl ether, and methanol. Extracts from microalgae and bioactive elements have found their way into pharmaceuticals, nutraceuticals, and dietary supplements. *S. aureus*, a foodborne pathogen, was discovered to be inhibited by a pigment extract from *S. obliquus*. When compared to other extracts, *Scenedesmus sp*. acetone, methanol, diethyl ether, and hexane extracts exhibited modest antibacterial efficacy toward *Pseudomonas sp*., while watery displayed unexpected antibacterial efficacy (Nair and Krishnika, 2011). Conversely, *S. obliquus* ethanolic extract had antibacterial activity toward *S. aureus*, *B. cereus*, *E. coli*, *P. aeruginosa* and *S. typhi*. The results of the current study adjust to earlier studies wherein solvent extracts of dried biomass of *S. obliquus* showed antibacterial properties when tried toward different bacterial strains. Long chain fatty acids (extricated utilizing organic solvent) from *S. obliquus* displayed antibacterial activity toward *S. aureus*, *E. coli*, *P. aeruginosa* and *Salmonella sp*. (Guedes *et al*., 2011). A similar activity was likewise seen in a study made by (Ordog *et al*., 2014) wherein ethanolic extract of a freshwater green microalga, *Scenedesmus sp*. hindered the growth of *S. aureus*, *E. coli* and *P. aeruginosa*. This result is like the current study. In this study the minimum inhibitory concentration of *S. obliquus* ethanolic extracts are with MICs values (2.25, 7.12 and 9.5mg/ml), methanol extracts with MICs values (3.0, 2.25 and 40.0mg/ml), Acetone extracts with MICs values (0.71, 1.26 and 30.0mg/ml) toward *E coli, P. aeruginosa* and *S. aureus*, individually. Desbois et al. (2009) uncovered that hexane extract and to some degree cleaned parts of *Skeletonema costatum* diatom had antibacterial activity toward *E. coli*, *P. aeruginosa*, *S. typhi*, *S. aureus* and *S. epidermidis* with MIC values in the range of 1.9 and 7.8 µg/ml. Najdenski et al. (2013) revealed that The ethanolic components of *S. obliquus* were bactericidal toward *S. aureus, B. cereus*, *E. coli, P. aeruginosa*, and *S. typhi*, with MIC ranges from 0.3 to 3 mg/ml. GC/MS evaluation of the *S. obliquus* ethanolic extract revealed various unsaturated fats, according to the present study's findings, in agreement with Álvarez et al. (2015). In the current study these extracts have bactericidal effect toward *E. coli*, *P. aeruginosa* and *S. aureus* which could be because of the great substance of bioactive polyphenolic compounds and unsaturated fats. The occurrence of amide-containing components, long chain hydrocarbons, aldehyde, alcohols, unsaturated lipids, esters, phenols, and amine compounds were discovered using GC-MS analysis of the volatile chemicals in algal extracts. As a result, the existence of these chemicals, which have recently been hypothesized to have a distinct antimicrobial effect, may be attributed to the antibacterial activities of these extracts (Okunowo *et al*., 2016). Salem et al. (2014) revealed that quercetin 7, 3, 4-trime-thoxy from *Scenedesmus sp*. methanol portions had antibacterial efficacy toward *B. subtilis, K. pneumoniae,* and *S. aureus*. Additionally, Marrez et al. (2017) detailed that antibacterial activity of quercetin 7, 3, 4-trimethoxy and octasiloxane from the *Oscillatoria brevis* diethyl ether division toward foodborne pathogens was broad. Marrez and Sultan (2016) demonstrated that the antifungal activity of butylated hydroxytoluene isolated from *M. aeruginosa* toward a variety of mycotoxigenic parasites. Demirel et al. (2011) observed that the bactericidal effect of butylated hydroxytoluene derived from the natural oils of two lichen plants, *L. obtusa* and *L. pyramidata*, was shown versus *S. aureus, E. coli*, and *C. albicans*. In actuality, Kanimozhi and Sridhar (2017) dismantled the *Grateloupia doryphora*

ethyl acetic acid derivation extract, which was thought to be high in phenolic content. They ascribed the strong cancer-prevention and bactericidal properties to the occurrence of phenolic compounds such as (pentane-dione (2,4-di-t butylphenyl) mono ester, as well as alkanes (hexadecane, octadecane, 1-[2-hexadecyloxy ethoxy] and octadecane) and fatty acid subordinates (octadecanoic acid methyl ester). The occurrence of Phthalic acid, butyl undecyl ester in the ethanolic extracts of *S. obliquus* was discovered in this study, confirming the compound's survivability toward the tested bacteria. Ethyl tridecanoate, Phytol, Gamolenic Acid, Hydroxylamine, O-methyl, Ethan and Fluoro and their subordinates, which is because of the natural and drug exercises on skin growths, which have been seen in the current study and this is affirmed by an investigation of Cox and Abu-Ghannam (2010) who concentrated on the activity of bioactive compounds extracted from *Spirulina platensis* toward pathogenic microorganisms. The recorded natural compound extracted from *Spirulina platensis* by alcoholic extract, for example, phytol (2-hexadecen-1-ol,3,7,11,15-tretramethyl) and their subsidiary neophytadiene have antimicrobial activity normally credited to long-chain unsaturated fats ($C_{10}H_{20}O$,C_{16}-C_{20}).

CONCLUSION

The solvent extracts of *Scenedesmus obliquus* showed conspicuous inhibitory activities toward some pathogenic bacteria (*E. coli, P. aeruginosa and S. aurues*). The upgraded antibacterial activity communicated in consecutive activity may be because of the way that both hydrophobic and hydrophilic bioactive mixtures were separated. Among the solvent extracts evaluated for their antibacterial movement, ethanol extracts included valuable bioactive parts. Accordingly, they might be examine to improve antipathogenic drugs in the drug manufacturing. Nonetheless, further exploration is expected to recognize the impact of each bioactive part on tried confines.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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