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Preliminary screening of Green alga *Chlorella vulgaris* for Secondary Metabolites

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ABSTRACT
Algae are rich in secondary metabolites with diverse bioactive properties, which make them an excellent source for novel natural products. This study aimed to conduct a preliminary screening of green alga *Chlorella vulgaris* for the presence of secondary metabolites, including phenols flavonoids, alkaloids**,** glycosides, steroids, saponins, and terpenoids. Extract was prepared from alga *Chlorella vulgaris* and preliminary screening was carried out for the analysis of presence or absence of secondary metabolites. The alga revealed the presence of various secondary metabolites such as phenols, flavonoids, alkaloids, terpenoids and steroids. However alga showed the absence of glycosides and saponins.
Keywords : *Chlorella Vulgaris*, Preliminary Screening, Secondary Metabolites.

INTRODUCTION
Algae, an ancient group of photosynthetic organisms, have gathered increasing interest in recent years due to their rich content of bioactive secondary metabolites. These metabolites, which are produced by algae as part of their metabolic processes but are not essential for growth, are a valuable source of novel chemical compounds with therapeutic, industrial, and agricultural potential. Secondary metabolites from algae include compounds such as polyphenols, flavonoids, terpenoids, alkaloids, carotenoids, and lipids, many of which exhibit significant biological activities, including antioxidant, antimicrobial, anticancer, and anti-inflammatory properties. Marine and freshwater algae species represent an untapped resource for discovering new bioactive compounds. Natural products are considered to have compounds showing curative properties for many ailments and are considered as good source for drug extraction (Richmond and Hu, 2013).

Hence the present study aimed to conduct a preliminary screening of green alga *Chlorella vulgaris* for the presence or absence of secondary metabolites, including phenols flavonoids, alkaloids, glycosides, steroids, saponins, and terpenoids.

MATERIALS AND METHODS
Prelimiary screening of was done by crude successive soxhlet extracts of *chlorella vulgaris* viz., aqueous, chloroform, ethanol and petroleum ether extracts were used for quantitative screening of various secondary metabolites such as phenols flavonoids and alkaloids, glycosides, steroids, saponins, and terpenoids

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RESULTS

The results of the preliminary screening indicated that, *chlorella vulgaris* showed the presence of various secondary metabolites such as phenols, flavonoids, alkaloids, terpenoids and steroids. However alga exhibited the absence of glycosides and saponins (Table 1).

Phenols: Petroleum ether extract of *C. vulgaris* responded positively to phenol test where as aqueous, chloroform and ethanol extracts responded negatively to Elagic acid test and phenol test.

Flavonoids: Ethanol extract of *C. vulgaris* responded positively to shinoda test where as the extract of aqueous, chloroform and petroleum ether responded negatively to shinoda, lead acetate and NaOH tests

Alkaloids: *C. vulgaris* extracts of chloroform and petroleum ether responded positively for the presence of alkaloids in Mayer's test. Similarly petroleum ether extracts responded positively for Wagner's test. But the extracts of aqueous, chloroform, ethanol and petroleum ether showed negative results for Dragendroffs test.

Glycosides: *C. vulgaris* showed negative result for Keller Killianis, concentrated H_2SO_4 and Molisch tests.

Steroids: Etanol extract of *C. vulgaris* responded positively for Liebermann Burchard test whereas negative results for aqueous, chloroform and petroleum ether in salkowski and Liebermann Burchard tests.

Saponins: *C. vulgaris* when tested for the presence of saponins depicted negative results to foam test.

Terpenoids: Petroleum ether extract of *C. vulgaris* revealed positive result for both Liebermann Burchard and salkowiski tests. Whereas it exhibited negative results for other extracts.

DISCUSSION

The alga revealed the presence of various secondary metabolites such as phenols, flavonoids, alkaloids, terpenoids and steroids. However alga showed the absence of glycosides and saponins. The results demonstrate that alga has significant sources of bioactive compounds. These findings align with previous research that highlights the pharmacological potential of algae in the development of novel natural products. Previous reports stated that, Seaweed extracts are measured to be a rich source of phenolic compounds (Heo et al., 2005). Huang et al., (2008) made an observation that Phenolic compounds are one of the best antioxidants in brown algae. According to Song et al., Flavonoids, as antioxidants may keep the dynamic impedance of pancreatic beta cell because of the function due to oxidative stress and may, along these lines decrease the incidence of type 2 diabetes (Song et al., 2005). It was stated that Natural products are considered to have compounds showing curative properties for many ailments and are considered as good source for drug extraction (Richmond and Hu, 2013).

CONCLUSION

The results exhibited that, *chlorella vulgaris* showed the presence of various secondary metabolites such as phenols, flavonoids, alkaloids, terpenoids and steroids. However alga exhibited the absence of glycosides and saponins This study provides a preliminary overview of the secondary metabolites present in alga *Chlorella vulgaris*. Alga represents a valuable and sustainable source of bioactive compounds that could have applications in pharmaceuticals, food industries, and agriculture.

Table – 1: Preliminary screening for Secondary Metabolites from *Chlorella vulgaris*

Sl. No	Description of the test	Aqueous	Chloroform	Ethanol	Petroleum ether
I	**Test for Phenols**				
01	Eladic acid test	-	-	-	-
02	Phenol test	-	-	+	-
II	**Test for Flavonoids**				
01	Shinoda Test	-	-	+	+
02	Lead acetate test	-	-	-	-
03	NaOH test	-	-	-	-
III	**Test for Alkaloids**				
01	Mayers test	-	+	-	+
02	Dragendroffs test	-	-	-	-
03	Wagenrs test	-	+	-	+
IV	**Test for Glycosides**				
01	Keller Killian test	-	-	-	-
02	Con.H_2SO_4 test	-	-	-	-
03	Molicsh test	-	-	-	-
V	**Test for Steroids**				
01	Liberman burchard test	-	+	-	-
02	Salkowiski test	-	-	-	-
VI	**Test for Saponins**				
01	Foam test	-	-	-	-
VII	**Test for Terpenoids**				
01	Salkowiski test	-	-	-	+
02	Liberman burchard test	-	-	-	+

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