FTIR characterization of sulphated polysaccharide extracted from brown seaweed (*Polycladia indica*)

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In recent years, seaweeds have drawn world-wide attention due to their use in many industrial and pharmacological applications. Seaweeds are known to produce a variety of bioactive components having varied structures and interesting biological activities (Kim and Bae, 2010; Kong *et al.*, 2009; Shibata *et al.*, 2008). Brown seaweed belongs to a very large group, Phaeophycae and contain fucoxanthine, a greenish brown pigment which gives them their name (Mestechkina and Shcherbukhin, 2010; Reddy and Urban, 2009). Brown seaweeds produces a range of compounds including secondary metabolites such as alkaloids, terpenoids, and phenolics, many of which are economically important and having specific biological activities (You-Jin Jeon *et al.*, 2011). Over the past few decades, bioactive sulphated polysaccharides isolated from brown seaweeds have attracted attention in the field of biochemistry and pharmacology. Functional polysaccharides such as fucans and alginic acid derivatives produced by brown seaweeds are known to exhibit different biological properties including anticoagulant, anti-inflammatory, antiviral, and antitumoral activities (Boisson-Vidal *et al.*, 1995; Costa *et al.*, 2010; Lee *et al.*, 2008).

The characterization of sulphated polysaccharide extracted from a brown seaweed (Fig. 1), using FTIR spectroscopy (Fig. 2), revealed

Fig.1. Sulphated polysaccharide extracted from *Polycladia indica*

a broad band at around 3440 cm^{-1} assigned to the OH and H_2O stretching vibrations. The bands around 2854 -2925 cm^{-1} indicates the CH stretching in pyranoid ring and C-6 groups of fucose and galactose units. The peak around 1710-1665 cm^{-1} is assigned for C=O stretching. The transmission spectra near 1707 cm^{-1} vibration revealed the presence of some O-acetyl groups in crude fucoidian. Band between 1650-1580 cm^{-1} is specific to amide group, which is mainly due to

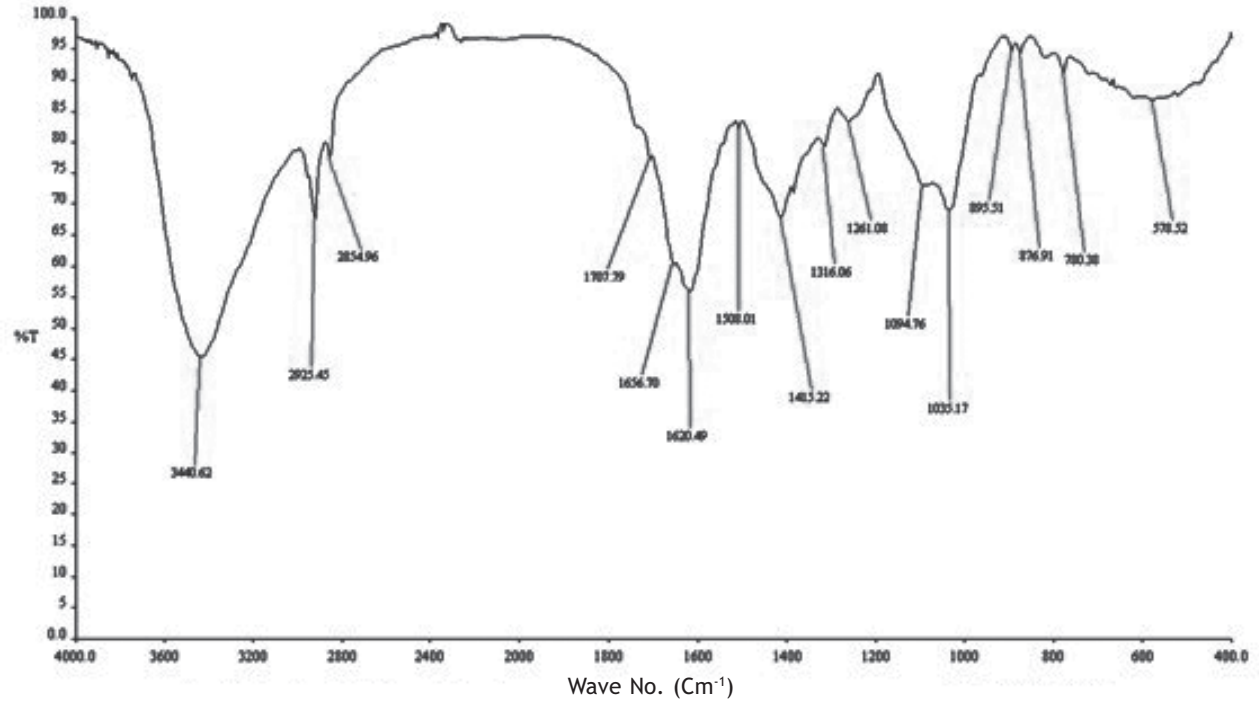

Fig. 2. FTIR Spectra of sulphated polysaccharide extracted from brown seaweed *Polycladia indica*

C=O stretching vibrations of peptide bond or due to the carboxyl functionality affected by adjoining substitutions. The peak near 1620 cm^{-1} is coherent with the presence of uronic acids. The fingerprint region reveal the presence of S=O stretching vibration of ester sulphate group near 1261 cm^{-1} and Peak at 1094 and 780 cm^{-1} confirms the presence of glucuronic and manuronic acid respectively. The extracted polysaccharide contains a peak near 1035 cm^{-1} revealing the presence of D-glucose unit also.

The overall study revealed that the polysaccharide extracted from seaweed *Polycladia indica* has a typical fucoidian structure which contains sulphate group, uronic acid, D-galactose, glucronic and manuronic acid. The presence of different functionality especially O-acetyl group qualifies the polysaccharide as an efficient immuno-stimulant.

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