IMMUNOMODULATORY HETEROGLUCAN FROM AN EDIBLE MUSHROOM *Astraeus hygrometricus* (Pers.) Morgan AND ITS EFFICACY IN CANCER THERAPY

ABSTRACT

Out of the diverse mushrooms available only a few are investigated for various biological properties. In this study, efforts have been made to investigate the potential of one of the neglected edible mushrooms, *Astraeus hygrometricus* for bioactive molecules. Here, three different extraction procedures are followed to isolate the active glucan fractions and out of the three different extracted fractions, 2% alkali extracted fraction was found to be composed of polysaccharides only, so it was further purified by anion exchange chromatography and the resulting heteroglucan was designated as AE2 which composed primarily of five different monosaccharide units of which repeating units of glucose contributed about 70% of the composition. A structural study with IR, NMR and GC-MS studies indicate the presence of (1-3) β linked glucose units with (1-6) branched glucose as the backbone structure. It has a polydisperse molecular weight of 500-1000 kDa as determined by gel filtration chromatography. AE2 fraction stimulates mice peritoneal macrophages to produce enhanced levels of Nitric oxide (NO), TNF-α and IL-1. Induction of splenocyte proliferation as well as Th1 (IFN, IL-2 and IL-12) type of cytokine production was also observed in presence of AE2. On the other hand AE2 mediated systemic toxicity in mice model was not observed. Subsequently intraperitoneal (*i.p.*) administration of AE2 (20mg/ kg body weight) in Daltons Lymphoma (DL) bearing mice showed that the median survival time of mice was increased to 29 days as compared to 23 days in control DL bearing mice. It also skewed the cytokine profile to Th1 type with enhanced production IFN-γ in the same DL bearing mice. Studies on the mode of immune activation indicate the activation of MAPK and JNK followed by the nuclear translocation of NF-κB, and the expression of various cytokines.

All these findings of this study reveal that AE2 fraction of *Astraeus hygrometricus* is a heteroglucan of Th1 type of immunomodulatory properties and activates immune system through MAPK, JNK and NF κB pathway. This Heteroglucan exhibits tumor regression

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in mice model through immunomodulation. However, further studies are required for the development of defined therapeutic protocols by using AE2.

Keywords: *Astraeus hygrometricus*, Mushroom, Heteroglucan, Biological response modifier, Immunomodulation, antitumor, polysaccharide.

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