CHEMICAL AND MICROBIOLOGICAL ANALYSIS OF ARISHTA AND ASAVA WITH REFERENCE TO THE HERBAL PHARMACEUTICAL STANDARDIZATION

A DISSERTATION SUBMITTED IN FULFILMENT OF THE PhD DEGREE IN CHEMISTRY TO THE DEPARTMENT OF CHEMISTRY UNIVERSITY OF KELANIYA SRI LANKA

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ABSTRACT

Arishta and Asava have been used in Ayurveda as medicines over 3000 years to treat several disorders. This study was carried out to evaluate the chemical and microbiological standards of commercially available and laboratory prepared Arishta and Asava that are widely used in Ayurveda medicine. The study includes determination of alcohols present in Arishta and Asava other than ethanol, determination of acetaldehyde, ethyl acetate, essential metal concentrations, determination of heavy metals, identification and evaluation of bacterial quality of products and enumeration of yeast and mold counts in these products, assessment of hygienic conditions in terms of Coliforms and Salmonella contamination, evaluation of anti-bacterial stress activity of the products. Gas Chromatography and Atomic Absorption Spectrophotometry was used in the chemical analysis. Pour plate and spread plate method, selective and non-selective enrichment method, physical and biochemical characterization tests were carried out in this study to evaluate the microbiological quality of the products. Ashvagandharishta (Arishta) and Aravindasava (Asava) that are widely used and consumed in Sri Lanka were selected for the analysis.

Result revealed that the mean value of methanol in commercially available Arishta is 112.03 ± 70.13 mg/l and in Asava is 93.77 ± 63.50 mg/l. Mean values of methanol in laboratory prepared Arishta is 143 ± 28.62 mg/l and in Asava is 129.41 ± 5.22 mg/l. In Arishta, iso propyl alcohol 6.98 ± 2.59 mg/l, n propanol 12.71 ± 7.66 mg/l, isobutanol 29.03 ± 22.17 mg/l, isoemyl alcohol 109.75 ± 50.78 mg/l are the mean values and 6.06 ± 2.25 mg/l, 6.97 ± 4.48 mg/l, 22.49 ± 5.74 mg/l, 85.63 ± 12.96 mg/l are the detected level of iso propyl alcohol, n propanol, isobutanol and isoemyl alcohol in Asava respectively. In laboratory prepared Arishta, iso propyl alcohol 8.54 ± 2.53 mg/l, n propanol 12.11 ± 5.04 mg/l, isoemyl alcohol 123.01 ± 33.88 mg/l are the mean values and 6.47 ± 3.72 mg/l, 7.31 ± 5.21 mg/l, 21.87 ± 11.34 mg/l, 89.88 ± 19.25 mg/l are the detected level of iso propyl alcohol, n propanol, isobutanol and isoemyl alcohol in prepared Asava respectively. Mean values of ethyl acetate in commercially available Arishta and Asava are 60.72 ± 30.60 mg/l and 55.29 ± 13.03 mg/l respectively. However, it is 104.22 ± 67.33 mg/l in prepared Arishta and Asava.
The concentration of organic volatiles, heavy metals and essential metals of the tested *Arishta* and *Asava* revealed that the commercially available samples are within the acceptable range of chemical standard parameters that are recommended by the WHO guidelines for different types of herbal products. The tested samples of *Arishta* and *Asava* are within the internationally acceptable microbiological quality, free from *Salmonella* and *Escherichia coli*. These preparations are hygienically in good condition. The bacteria isolated and identified in *Arishta* and *Asava* is *Bacillus subtilis* which is a Gram positive, rod shaped, non-acid fast, aerobic and produce heat resistant spores.

Keywords (*Arishta, Asava, Volatiles, Heavy metal, Salmonella and Escherichia coli*)