Analytical Study of Arsenic Based Herbo-Mineral Preparation Thalaka Karuppu an Indian Traditional Medicine

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Abstract: Thalaka karuppu (TK), is therapeutically used to treat various diseases like gonorrhea, epilepsy, syphilis, chronic fever, cancer, tuberculosis, asthma, psoriasis, and respiratory diseases, etc. This study was aimed to investigate the physicochemical fingerprint of commercially available arsenic based herbo-mineral preparation TK through various analytical techniques. The Uv-vis absorption peak at 288 nm corresponds to As (II). The formulation exhibits mixed nature of the arsenic compounds (AS (I), AS (II), AS (IV)). The vibrational spectroscopy peaks were observed at 802.23, 1033.77, 1404.08, 1643.24, 2368.42, 2854.45, 2923.88 and 3433.06 (cm⁻¹) has good agreement with arsenic trioxide. The peaks at fingerprint region between 302.3 and 807.31 cm⁻¹ has good agreement with arsenic trioxide. The peaks at finger print region between 697.43 and 1108.51 cm⁻¹ has good agreement with arsenic trioxide. The peaks at fingerprint region between 697.43 and 1108.51 cm⁻¹ has good agreement with arsenic trioxide. The peaks at fingerprint region between 697.43 and 1108.51 cm⁻¹ has good agreement with arsenic trioxide.

Keywords: Thalaka Karuppu, Physicochemical Property, Analytical Study, Siddha, Nanoparticles

Introduction:
Thalaka karuppu, is therapeutically used to treat various diseases like gonorrhea, epilepsy, syphilis, chronic fever, cancer, tuberculosis, asthma, psoriasis, and respiratory diseases, etc. The formulation based on arsenic are in the form of mineral arsenicals including Thalagam (orpiment, As₂S₃), Manosilai (realgar, As₄S₄), and arsenolite (contains arsenic trioxide, As₂O₃).¹

In order to evaluate the characteristic parameters (size, surface area, surface charge and crystallite shape) various analytical instruments (Uv-vis, FTIR, XRD, SEM, EDAX, and Zeta sizer) were employed in the present study. This analytical study provides concise note on various physiochemical parameters of TK.

Materials and Methods:
Metal Formulation
Thalaga Karuppu (TK) was procured from IMCOPS, Selam, Tamilnadu, India. Thalaka Karuppu, the main ingredients are purified thalagam (arsenic trisulphide), purified Sippi Chunnam (shell powder), purified elankaichal vedippu (pottassium nitrate) and Tamarindus indica. Analytical instruments (Uv-vis, FTIR, XRD, SEM, EDAX, and Zeta sizer) were employed in the present study

Results and Discussion:
The physiochemical parameters were analyzed by traditional methods as described in Siddha texts and using modern analytical techniques. The physical parameters like, color, appearance, touch, solubility was analyzed as described in Siddha texts.

The UV–visible spectroscopy is frequently used to characterize the synthesized metal and metal oxide nanoparticles. The Uv-vis absorption spectrum of the TK formulation shown in Fig. 1. The observed peak at 288 nm corresponds to As (II)².

Figure 1: The Uv visible spectrum of formulation.

The vibrational spectroscopy characterization were performed to identify the main functional groups present in the formulation. The peaks were observed at 802.23, 1033.77, 1404.08, 1643.24, 2368.42, 2854.45, 2923.88 and 3433.06 (cm⁻¹) has good agreement with arsenic trioxide.

The crystalline nature and particle characterization analysis evident that the resulting morphologies, size diameter and their dispersity (colloidal stability) significantly helps in increase the efficacy of the formulation. Further in detailed in vitro and in vivo study is warranted to know the bioavailability and binding capacity of the TK formulation.

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As2S3 compared with JCPDS data (PDF Number: 19-0084). [3]

The morphology and elemental composition were analyzed using SEM and EDAX (Fig. 2). The morphological investigation by SEM were observed irregular shaped (nearly spherical, elongated and interconnected structures (similar to rice grains)) micro/nano sized particles, which indicates that the particles of polydispersed agglomerates with diameter above 500 nm. [5]

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Figure 2: The SEM analysis of formulation.

The Zeta-potential measurements were performed to study colloidal stability of TK formulation. Colloidal stability of a drug is an important parameters to access its encapsulating efficiency with the adjuvant. This prevents the aggregation of particles in the solution because aggregates can cause serious harm to patient organism. The surface charge of the nanoparticles is an important parameter for medical applications in vivo and in vitro. The measured average diameter of the formulation was found to be 821.8 nm and width of 86.89 nm with % intensity of 100. Polydispersity index (PDI) represents the relative variance in the particle size distribution. The PDI of the formulation was 0.996. Samples with broad size distribution have PDI>0.7 [5].

Conclusion:
Through the structural and particle characterization analysis, one can conclude that the resulting morphologies, size diameter and their dispersity (colloidal stability) significantly helps in increase the efficacy of the formulation. Further in detailed in vitro and in vivo study is warranted to know the bioavailability and binding capacity of the TK formulation.

References: