STUDY OF THE CHEMISTRY AND TECHNOLOGY OF AYURVEDIC PREPARATIONS

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Vasakarishtaya is a fermented ayurvedic drug prepared by using the root bark extract of *A. vasica* as the main ingredient with 10 other secondary (kalka) plant ingredients. Vasakarishtaya showed significant activity on three selected in-vitro immunoassays involving human complement and polymorphonuclear leukocytes indicating that this drug may influence both the humoral and the cellular components of the human immune system.

The main ingredient of Vasakarishtaya, *A. vasica* showed moderate activity on the three immune assays. On prolonged boiling, the root bark extract of *A. vasica* showed decreased inhibition of the classical pathway of complement activation and increased inhibition of the production of chemiluminescence by activated polymorphonuclear leukocytes. Thus the standardization of the boiling time is an important factor in the quality control of this drug. Some practitioners use a combination of root bark and leaves as the main ingredient for the preparation of Vasakarishtaya. A mixture of root bark and leaves of *A. vasica* showed higher inhibitory activity in classical pathway compared to the root bark. Compared to the immune activity of the main ingredient
most of the secondary plants showed higher immunomodulatory activity. During fermentation immunomodulatory activity of Vasakarishtaya remarkably increased after addition of secondary plants.

Secondary plants play a major role in the Vasakarishtaya fermentation. W. fruticosa flowers which represent 54% of the secondary plants are responsible for important changes in the fermentation medium. It lowers the pH by releasing gallic acid into the fermentation medium. This pH drop is important to the activity of invertase enzyme. At low pH (3.5-4.5) sucrose was hydrolysed to glucose and fructose by invertase present in the W. fruticosa flowers. This accelerates the initiation of fermentation by yeasts. Irradiation experiments clearly demonstrated that the source of invertase was not microbial.

Of the secondary plants, W. fruticosa plays the major role in the fermentation.

On the other hand secondary plants increases the immunomodulatory activity of Vasakarishtaya. During fermentation, anticomplementary activity of Vasakarishtaya significantly increased after the addition of secondary plants. Secondary plants add some immune active compounds into the preparation such as gallic acid, vanillic acid and syringic acid. These phenolic acids are inhibitors of chemiluminescence production by Polymorphonuclear leukocytes induced by serum treated zymosan.

Alkaloids of A. vasica were found to be immuno active. During prolonged extraction, the alkaloid contents increased, however, 90% of vasicine, 83% of vasicinone and 76% of
vascinolone were extracted at the end of the first day. During fermentation the vasicine content slightly decreased and vasicinolone and vasicinolone contents slightly increased. Fermentative organisms were not found in the ingredients. *Saccharomyces cerevisiae* yeast was identified in two commercial and standard Vasakarishtaya. *Zygosaccharomyces bisporus* was also found in the standard (laboratory prepared) Vasakarishtaya. *Mucor cereus* was found in one of the commercial (Bimal) samples as well as in the standard vasakarishtaya. It would appear that the source of microorganisms for this traditional fermentations is the environment.

Immunomodulatory activities were similar in both commercial Vasakarishtaya samples. The standard preparation showed highest anticomplementary activity. Most of the physico-chemical parameters were similar to each other in the commercial products and the standard product.

Maximum immunomodulatory activity and constant values of physico-chemical parameters were obtained at the end of the traditional 30 days fermentation period in the standard preparation of Vasakarishtaya.
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