1. Introduction

Initially the researcher’s world wide concentrated on phytochemicals & pharmacological analysis of herbs and herbal products. This was further continued to isolate, characterize the lead molecule. Attempts were made to structurally modify them with the intention of reducing the toxicity and enhancing the efficacy of them. However these attempts were gone in vain. Therefore many of them are being withdrawn. Since several centuries Ayurveda is using such toxic natural drugs either in their crude form or after subjecting them to shodhana processes for treating human ailments.

Traditional/Ayurvedic medicines are gaining increasing popularity worldwide for the treatment of various diseases in recent times. Even there is a growing interest in research on Ayurvedic science. As a first phase of research, analysis of components in the herbs and the discovery and development of new drugs from natural origin, as well as quality assurance and toxicological investigations of them is carried out worldwide. But there are claims that most of medicinal herbs have demonstrated none or mild side effects. But it is established behind doubt that certain herbs are highly toxic. Even Ayurvedic science classified such herbs into Visha (Toxic) eg. Aconite and upavisha (moderately toxic) eg. Nux-vomica.

Inspite of this, such toxic herbs are being adopted by Ayurvedic practioners for treating various diseases and pathological conditions, since the ages after subjecting them to the process of shodhana (detoxification). Even Ayurvedic science adopted mercurial and lead
salts in therapy after detoxification. The traditional shodhana procedures have been claimed to reduce the toxicity and enhance the efficacy of various toxic herbs.

These shodhana processes are so well explained in the literature and evolved logically into an ancient science of detoxification. It is also clear from the literature that a single detoxification process is not sufficient to detoxify all the herbs. Therefore many shodhana processes have been evolved ranging from simple washing to boiling the herbs in dola yantra (drug packed in cloth & hanged in the given liquid) for days/hours in various media (eg cow milk, cow urine, lime etc). Even more than one shodhana process is applied for detoxification of certain herbs [1].

Similarly, certain native systems of medicine in other parts of the world also evolved and adopted detoxification process for using toxic herbs or herbal products to treat different diseases eg. Chinese native system of medicine (Kampo system of medicine). However, there are no scientific reports or scanty reports on the scientific validity of such detoxification procedures in modern literature. Though there are no scientific validation studies for such detoxification processes, the native system of medicines have been adopting such toxic herbs/herbal products effectively and safely in treating human ailments.

Hence, in the present study it was hypothesized that these shodhana processes of Ayurvedic system of medicine must have some qualitative and quantitative influence on the phytochemical profiles of
toxic herbs; thereby they alter the efficacy and toxicity of them. Keeping this hypothesis in view the present study is planned to scientifically validate the shodhana processes prescribed by Ayurvedic system of medicine for some selected herbs namely *Strychnos nux-vomica, Commiphora mukul* and *Datura metel var. fasuosa.*

**Strychnos nux-vomica Linn**

*Strychnos nux-vomica* is one of the toxic herb classified as Upavisha in Ayurveda [1-3]. Similarly it is also studied and reported to be highly toxic in modern system of medicine [4-9]. But Ayurvedic practitioners are using the seeds of this plant for treating various disease including liver cancer, arthritis, alleviating pain and inflammation, digestion, gastric ulcers, hepatic and renal diseases after subjecting them to a specific shodhana process [4, 5]. Ayurveda prescribe three stepped shodhana process for detoxification of the seeds of *S. nux-vomica*. The first step is immersing the seeds in cow’s urine for seven nights and changes the urine every day, in the second step they are boiled in dola yantra in cow’s milk for three hours and in final step fried with cow’s ghee [1-3]. The ancient literature claims that this process enhances the therapeutic efficacy, decreases the toxicity and increases the brittleness of the seeds. Similarly in Chinese system of medicine the seeds of nuxvomica are detoxified by frying the seeds in sesame oil. There are reports that the Chinese method of detoxification reduced strychnine, brucine and total alkaloidal content. In addition there are reports that frying in sesame oil reduced the toxicity of the seeds and attributed the same to the
enhanced N-oxides of strychnine, brucine and reduced loganic acid content in the seeds [10-16]. But no such studies were carried on to validate the influence of Ayurvedic method of detoxification of seeds of nuxvomica. Keeping the paucity of information on this, the present study was planned to provide scientific basis for this ancient knowledge of shodhana/detoxification of nuxvomica seeds.

Commiphora mukul (guggul)

It is one of the most popularly used herbal anti-inflammatory, anti-hyperlipidemic and cardioprotective agent. Guggul is an oleo-gum resin obtained from the stem of Commiphora mukul. Many marketed preparations containing guggul are available and are used in the treatment of inflammation, arthritis and antihyperlipidemic etc. But the usage of this, without subjecting to detoxification processes as described by Ayurveda may lead to the enhanced side effects like gastric irritation and gastric distress [1-3]. However Ayurveda describes two different methods for detoxification of guggul namely: i. Boil guggul with cow’s milk in dola yanthra (swedana), ii. Boil guggul with aqueous extract of triphala. But, there are no reports regarding the scientific rationale of these detoxification processes. Therefore this herbal product is selected for the assessment of the influence of detoxification on the phytochemical and pharmacological profiles of guggul [17].
**Datura metel var. fastuosa**

The seeds of datura are known for years for their anticholinergic properties and used in the treatment of ulcers, inflammation, spasms, and cough. Various parts of Datura are known to contain tropane alkaloids like hyoscine, hyoscyamine and atropine etc., which are known anticholinergic alkaloids. It is classified as upavisha and its toxicity is manifested due to exaggerated anticholinergic property of it. However, there are claims in Ayurveda that the toxicity/adverse effect of the seeds are reduced upon subjecting them to detoxification process [1, 2]. Similarly there is a claim that the therapeutic efficacy is enhanced upon detoxification of them. As per Ayurvedic system of medicine seeds are detoxified by two processes, namely i. soaking in cow urine for 12 h and ii. Soak in cow urine for 12 h and boiled with cow milk in dola yantra for 3 h [1-3]. But no scientific reports are available to support the rationale of these methods of detoxification. Therefore the present study is planned to carry out scientific study to provide the scientific basis for this ancient knowledge.

Literature review on shodhana process, nuxvomica seeds, guggul, datura seeds and materials and methods used in the study, results, discussion and the conclusions drawn and scope for further study were recorded in the next sections of this thesis.