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Physico-Chemical Evaluation of *Pushyanug Churna*- An Ayurvedic Compound Formulation

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Abstract: *Although, Indian traditional system of medicine is much older in origin as well as in practice in comparison to other existing systems of medicine, still it is not fully accepted by a large group of population in Indian sub-continent. One of the important reasons for this is non-availability of quality drugs. After considering the vital importance of above fact, the organizations related to Ayurveda are now orienting its resources for the improvement of its products. Pushyanug Churna is a herbo-mineral formulation containing 25 herbal drugs and one mineral drug i.e. gairika (red ochre) as its ingredients. In the present paper, three samples of Pushyanug Churna were prepared as per the reference of Charaka Samhita and one sample was purchased from market. The market sample was having Messua ferrea as one of its ingredients instead of Crocus sativus. All the four samples were analysed for various physico-chemical parameters.*

Keywords: *Ayurveda, Physico-chemical, Pushyanug Churna*

Introduction

Ayurveda is a divine and holistic science of life. Today, inspite of development of various advanced techniques in the field of medicine, Ayurveda is still serving mankind successfully. Medicaments of any system play a great role in establishment as well as in propagation of a particular system. So, enough amount of attention has been provided in allopathic system of medicine in regards of quality production of medicaments. Result is well known that this very modern system of medicine expanded their roots across the globe. But unfortunately in spite of the fact that our traditional system of medicine is much older in origin as well as in practice in comparison to other systems of medicine, still its existence is doubtful. Many reasons are behind it. One of them is our incapability to produce quality drugs. After considering the vital importance of this fact, Ayurveda is now orienting its resources for the advancement of this ignored pharmaceutical science.

Pushyanug Churna is one of the renowned formulations described in various texts of Ayurveda. The first and foremost description is found in one of the renowned text of Ayurveda- *Charaka Samhita*. The word '*Pushya*' refers to *Pushya nakshatra*. By showing its relevance, Ancient scholars said that the collection of constituent drugs of *Pushyanug Churna* should be done in *pushya nakshatra* i.e. during the months of December and January. The reason behind this could be the presence of maximum amount of active ingredient in the drugs during this period, which would lead to the production of a formulation with maximum potency. *Pushyanug Churna* is a compound formulation which consists of fine powders of *Patha- Cissampelaos pareira*, Kernel of *Jambu- Syzygium cumini*, Kernel of *Amra- Mangifera indica*, *Pasanbhed- Bergenia lingulata*, *Rasanjana-*



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Berberis aristata, *Ambastha (Patha)*- *Cissampelos pareira*, *Mochrasa*- *Salmalia malabarica*, *Samanga*- *Mimosa pudica*, *Vatsaka*- *Holarrhena antidysentrica*, *Balhika*- *Crocus sativus*, *Ativisa*- *Aconitum heterophyllum*, *Bilva*- *Aegle marmelos*, *Mustaka*- *Cyperus rotundus*, *Lodhra*- *Symplocos racemosa*, *Gairika*- *Ochre or Haematite*, *Katvanga*- *Ailanthus excels*, *Maricha*- *Piper nigrum*, *Sunthi*- *Zingiber officinale*, *Mridvika*- *Vitis vinifera*, *Raktacandana*- *Pterocarpus santalinus*, *Katphala*- *Myrica esculenta*, *Indrayava*- *Holarrhena antidysentrica*, *Ananta*- *Hemidesmus indicus*, *Dhataki*- *Woodfordia fruticosa*, *Madhuka*- *Glycyrrhiza glabra*, *Arjuna*- *Terminalia arjuna* (Tripathi B, 2008, p. 1026).

Pushyanug Churna has been selected for the study because it is one of the popular traditional formulations used widely in females suffering from diseases related to genito-urinary system. The formulation comprises of twenty-six different herbs which are believed to possess the astringent property in a synergistic way. Due to the astringent property of the ingredients, it is an excellent haemostatic drug and it acts especially in the Genito-urinary system of females. *Pushyanug Churna* is indicated for menstrual disorders as well as congestion in female reproductive system. Conditions involving menstrual irregularities such as menorrhagia, metrorrhagia, dysmenorrhoea and endometriosis are treated with this formulation. It is also useful in piles, diarrhoea, bloody stools and different types of discharges from vaginal tract as mentioned in *Charaka Samhita*.

The analytical work has not been done on *Pushyanug Churna* yet. But there are some studies which show anti-bacterial potential against enteric bacterial pathogens (Tambekar and Dahikar, 2010) and activity against *klebsiella pneumonia* (Barik *et.al*, 2014).

Materials and Methods

The three samples of *Pushyanug Churna* (Sample-I, Sample-II and Sample-III) were prepared as per the reference of *Charaka Samhita*. The samples were prepared in the laboratory of department of *Rasa-shastra and Bhaishajya Kalpana* in Rishikul campus, Uttarakhand Ayurveda University, Haridwar. The ingredients of *Pushyanug Churna* were procured from raw traders of Haridwar, Uttarakhand. The whole procedure was divided into three parts- Purification of *Gairika* (Ochre), Preparation of fine powder of each ingredient of *Pushyanug Churna* separately and Preparation of *Pushyanug Churna* by mixing all the ingredients. One sample (Market sample) was collected from the market which was containing *Mesua ferrea* as one of its ingredients instead of *Crocus sativus*, for the comparative study. All the four samples were analysed in the laboratory of International Testing Centre (ITC), Panchkula.

Organoleptic characters such as particle size, colour and odour of all the samples were observed. Ash value, acid insoluble ash, water soluble extractive, alcohol soluble extractive and loss on drying were carried out to know the process progress and quality of all prepared products. The microbiological study and heavy metal content of the samples of *Pushyanug Churna* was carried out to finally fulfill and establish the quality standard at finished product level. The values of iron, magnesium and calcium were also found other than the heavy metals because one ingredient is from the mineral origin, the ferric oxide and calcium & magnesium plays an important role in the coagulation process of blood. These tests were carried out on the market sample also for a comparative study.

Results

The samples of self-prepared *Pushyanug Churna* and market sample were subjected to analysis. Organoleptic evaluation of the samples shows that all the samples are fine reddish-brown powders with faint odour. The analytical findings of various samples of *Pushyanug Churna* were almost similar. Not much variation is found in any of the samples and the values of various analytical tests performed falls under permissible limits, as per the Ayurvedic Pharmacopoeia of India (Table 1, Table 2, Table 3, Table 4, and Table 5).

Table 1: Physico-chemical parameters of various samples of *Pushyanug Churna*

Tests	Results(% w/w)				
	Sample-I	Sample-II	Sample-III	Mean±SD	Market sample
Total ash	10.64	13.57	13.34	12.51±1.63	10.79
Acid insoluble ash	1.30	1.26	1.32	1.29±0.03	2.10
Water soluble extractive	13.78	15.29	14.60	14.55±0.76	14.10
Alcohol soluble extractive	12.20	14.10	13.72	13.34±1.01	14.20
Loss on drying	5.60	5.75	6.17	5.84±0.29	6.10

Table 2: Estimation of heavy metals in various samples of *Pushyanug Churna*

Tests	Results (% w/w)			
	Sample-I	Sample-II	Sample-III	Market sample
Lead (Pb)	1.03	1.06	1.02	1.12
Cadmium (Cd)	Not detected	Not detected	Not detected	Not detected
Arsenic (As)	Not detected	Not detected	Not detected	Not detected
Mercury (Hg)	Not detected	Not detected	Not detected	Not detected

Table 3: Estimation of Fe, Ca &Mg in various samples of *Pushyanug Churna*

Tests	Results (% by mass)				
	Sample-I	Sample-II	Sample-III	Mean±SD	Market sample
Iron (Fe)	0.24	0.67	0.41	0.44±0.22	0.30
Calcium (Ca)	0.41	0.82	0.84	0.69±0.24	0.46
Magnesium(Mg)	0.04	0.06	0.08	0.06±0.02	0.06

Table 4: Microbial load of various samples of *Pushyanug Churna*

Microbial load	Sample-I*	Sample-II*	Sample-III*	Market sample*
Total bacterial count	409	331	440	416
Total Fungal count	Less than 10	Less than 10	Less than 10	Less than 10

*cfu/gm

Table 5: Microbial limit of specific pathogens in various samples of *Pushyanug Churna*

Pathogen	Sample-I*	Sample-II*	Sample-III*	Market sample*
E. coli	Absent	Absent	Absent	Absent
Salmonella	Absent	Absent	Absent	Absent
S. aureus	Absent	Absent	Absent	Absent
P. aeruginosa	Absent	Absent	Absent	Absent

*cfu/gm

Discussion



In the present study, the formulation has been prepared by following the reference of *Acharya Charaka* which stated *Bahlika/Kesar (Crocus sativus)* as one of the ingredients of *Pushyanug Churna*. *Crocus sativus*, being an expensive medicine/food product cannot be afforded by common man. The cost of *Pushyanug Churna* with *Crocus sativus* is much higher than that prepared with *Mesua ferrea*. Taking this point into consideration various pharmaceutical companies use *Mesua ferrea* instead of *Crocus sativus*.

The physico-chemical parameters of the self-prepared samples of *Pushyanug Churna* came out to be almost similar but slight variation is observed in the values of Market sample of *Pushyanug Churna*. The probable reason may be that Market sample of *Pushyanug Churna* contains *Mesua ferrea* instead of *Crocus sativus*. The permissible limits of *Crocus sativus* and *Mesua ferrea* are listed in Table 6 (Anonymous, 1999 and 2004).

The values of total ash are somewhat similar in self-prepared samples of *Pushyanug Churna* and its value is less in market sample. But the values of all the three samples are under the permissible limit (Not more than 15.0% w/w) as per API. The values of self-prepared *Pushyanug Churna* are similar and that of market sample is slightly more. Acid insoluble ash values of the prepared formulations show that comparatively small amount of the inorganic component is insoluble in acid. It indicates that adulteration of raw ingredients by substances like silica is less. But the values of all the three samples are under the permissible limit (Not more than 4.0% w/w) as per API. Comparatively higher water soluble extractive value of prepared samples of *Pushyanug Churna* implies that water is a better solvent for extraction of the formulations than ethanol and comparatively higher alcohol soluble extractive value of Market sample implies that alcohol is a better solvent for extraction of the formulation than water (Table 1) (Anonymous, 2008).

Table 6: Physico-chemical parameters of *Crocus sativus* & *Mesua ferrea*

Parameters	<i>Crocus sativus</i>	<i>Mesua ferrea</i>
Foreign matter	NMT 2 %	NMT 2 %
Total ash	NMT 7.5 %	NMT 6 %
Acid-insoluble ash	NMT 1 %	NMT 3 %
Alcohol soluble extractive	-	NLT 15 %
Water soluble extractive	-	NLT 12 %
Loss on drying	NMT 14 %	-

Among the heavy metals Cadmium (Cd), Arsenic (As) and Mercury (Hg) are not detected in any of the samples. Small amount of lead is detected in all the samples but it is under the permissible limit only i.e. 10 ppm. Therefore, the drug is safe for the clinical use and will not cause any toxic effect to the human being (Table 2). The estimated percentage of iron, calcium and magnesium are similar in prepared formulations of *Pushyanug Churna* and slightly less in market sample. In the human body, iron is mainly found in complex forms bound to protein as heme compounds such as hemoglobin and myoglobin, heme enzymes, or non-heme compounds (flavin-iron enzymes and ferritin). The body requires iron for the synthesis of its oxygen transport proteins and for the formation of heme enzymes and other iron-containing enzymes involved in electron transfer and oxidation-reduction reactions (Abbaspour *et.al*, 2014). Some amount of iron is found in all the three samples. So, it can be said that *Pushyanug Churna* acts as an additional source of iron in the body. Calcium and magnesium are minerals that are important for bone density and are regulated by parathyroid hormone (Norman *et.al*, 1981). All the samples show the presence of Ca & Mg which surely helps in the action of the formulation on the body (Table 3).

More bacterial count implies fast deterioration of the sample. Total bacterial count is under permissible limit in all the samples of *Pushyanug Churna*. Total fungal count is less than 10 in all the samples (Table 4). The specific pathogens- *E.Coli*, *Salmonella*, *S.aureus*, *P.aeruginosa* are absent in all the samples (Table 5).

Conclusion



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Pushyanug Churna prepared as per the reference of *Charaka Samhita* (*Kesar-Crocus Sativus* as an ingredient) proved to be costlier than that of market sample (containing *Nagakesar-Messua ferrea* instead of *kesar*). The analytical findings of both types of samples (in-house prepared and market sample) did not show relevant variations. So, it will not be wrong to substitute *Messua ferrea* with *Crocus Sativus* in *Pushyanug Churna*. Regarding the therapeutic part, not only the ingredients of *Pushyanug churna* have astringent property and the drug shows anti-bacterial activity but also it contains essential elements in minor quantity which are beneficial for the body.

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