



PHYSICOCHEMICAL AND PHYTOCHEMICAL PROPERTIES OF MARKETED SAMPLE OF HERBAL NUTRACEUTICAL SUPPLEMENTS OF SHATAVARI (ASPARAGUS RACEMOSUS)

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ABSTRACT Shatavari was called as "Queen of Herb". It improves female reproductive health including hormonal imbalance, dysfunctional uterine bleeding, polycystic ovarian syndrome, follicular growth, oocytes quality and infertility. Shatavari act as galactagogue and also as anti-inflammatory, antimicrobial and immunomodulator for many infectious diseases. The present study was carried out to analyze the physicochemical and phytochemical properties of different forms of Shatavari supplement available in local markets. Three different forms of supplement such as tablet, capsule and powder were chosen by purposive sampling technique. Experimental research design was adopted for the study. Shatavari standard sample was found to have 5.29% of moisture content. The Total ash yield was 3.70%. The percentage of acid insoluble ash was found to be 2.39 and water soluble ash was 1.21%. The water extractives value (45.72%) was considerably higher than alcohol extractive (8.91%). Physicochemical analysis of Tablet, Capsule and Powder divulge the percentage of various parameters moreover similar to standard. The pH value reported that Shatavari was slightly acidic in nature. The phytochemical study revealed the presence of bioactive components like Saponins, Tannins and Glycosides in all forms of samples including standard. The present study reported that the formulation of different forms of Shatavari supplement contains several bioactive components which was essential to consider as an ideal Herbal Nutraceutical supplements. Hence Shatavari - An Herbal Nutraceutical supplement can be suggested to promote overall Health.

KEYWORDS : Shatavari, *Asparagus racemosus*, physicochemical properties, phytochemical properties.

INTRODUCTION:

In ayurvedic medicine *Asparagus racemosus* was widely used for preventing and treating the reproductive disorder of women like sexual debility, amenorrhoea, dysmenorrhoea, dysfunctional uterine bleeding, endometriosis, gonorrhoea, prolapse of uterus etc. And also during Lactational inadequacy shatavari is used as galactagogue as it improve the milk production and reproduction capacity. It also act as anti-inflammatory, anti-microbial and immunomodulator for many infectious diseases (Santosh K et al., 2008). Shatavari has phytoestrogenic compound that will bind to the estradiol receptor and therefore it is beneficial for postmenopausal women since postmenopausal estradiol deficiency contributes to sarcopenia and osteoporosis (O'Leary, M. F et al., 2021). Extract of *A.racemosus* was also used in managing type 2 diabetes as it helps in the inhibition of α -amylase and α -glucosidase and contains a high amount of phytochemical constituents like total flavonoids and triterpenoids content (Vadivelan, R. et al., 2018). Shatavari root powder of 100g contain 5.44% of saponin, 212Kcal energy, 2.17mg of iron and 26mg of calcium (Rani.et.al., 2019).

NEED FOR THE STUDY:

Nutraceuticals due to its potential therapeutic and nutritional use, gains more interest. Many studies reveled the positive results in treating various complications (Nasri, H., 2014). The demand for nutraceuticals is increasing day by day. To take advantage of this demand, many new companies have begun manufacturing nutraceutical products. Varieties of nutraceutical supplement were available in local market across the country. By analyzing the physicochemical and phytochemical parameters of the various samples of shatavari and comparing their results with standard sample would aids in the identification of quality of locally available samples at the market.

OBJECTIVE:

- To elicit the background information of the standard supplement of Shatavari.
- To study and compare the physicochemical properties of the selected samples of herbal nutraceutical supplement of Shatavari

To study and compare the phytochemical parameters of the selected samples of herbal nutraceutical supplement of Shatavari

METHODOLOGY:

Sample selection: Shatavari is the nutraceutical herbal supplement which was selected for the analyses after reviewing recent literature studies. Different forms of shatavari like tablet, capsule and powder were selected for the analysis and coded as SSS, SST, SSC and SSP

respectively. Quantitative analysis of physicochemical parameters and Qualitative analysis of phytochemical parameters was carried out and the obtained results were compared with standard sample.

Sampling technique: This present study adopted the purposive sampling method to select the samples which are commercially available in the market. Shatavari sample in three different forms such as tablet, capsule and powder were selected for the current study.

Sample collection: Different samples of shatavari health supplement which was available at the local market within Chennai were collected and used for the analysis. Shatavari samples that are available in various forms like Tablet, Capsule and Powder were chosen. Physicochemical and phytochemical parameters was analyzed for the three forms of shatavari samples and were compared with standard sample.

QUANTITATIVE ANALYSIS OF PHYSICOCHEMICAL PARAMETERS:

The total ash method is designed to measure the total amount of materials remaining after ignition, including physiological and non-physiological ash. Acid insoluble ash is the parameter obtained after boiling the ash with dilute hydrochloric acid. The percent extractive values were determined in both water and alcohol. Loss on drying test was carried out in order to determine the amount of moisture content that occurs in the drug. It is important for any drug to know their moisture content because moisture facilitates the enzyme hydrolysis or growth of microbes that leads to deterioration of that particular drug. pH value was determined to know about the nature of the drug whether it is acid or alkaline in nature (Pathak A. V, et al., 2015).

Physicochemical properties like moisture content, total ash, water soluble ash, acid insoluble ash, water soluble extract, alcohol soluble extract and pH value were analyzed for all the three selected forms of nutraceutical supplement shatavari. All the experiments were repeated twice and the average value of the two trails were considered for further analysis (Association of Official Analytical Chemists, 2000).

QUALITATIVE ANALYSIS OF PHYTOCHEMICAL PARAMETERS:

The activity of any herb is dependent on the class of phytoconstituents or specific phytoconstituents that are present in that particular herb. Hence it's important to devise a method of standardization based upon the presence of these chemicals (Pathak A.V, et al., 2015). Akshay K. Singh et al., (2018), Found that the presence of many bioactive compound like steroidal glycosides, saponin such as Shatavarins I, II, III and IV, polyphenols, flavonoids, alkaloids (racemosol) and

vitamins makes shatavari popular supplement among the medicinal plants.

The fourteen phytochemical properties were analysed. They are; Test for Alkaloids, Steroid, Saponins, Cardiac glycosides, Tannins, Flavonoids, reducing sugar, Phenol, Protein, Anthraquinones, Quinones, Coumarin, Acid, and Glycosides (A manual of Laboratory Techniques, N.Raghuramulu, et al., 2003).

FINDINGS AND DISCUSSION:

Product profile of standard shatavari sample The product profile of Standard Shatavari sample was presented in the table 2

Table 1 Product profile of standard shatavari sample

s.no	PARAMETERS	SPECIFICATION
1	Moisture Content (Loss on drying)	<5%
2	Bulk density	0.3 – 0.7gm/ml
3	Bioactive component – Saponins	NLT 20%
4. Chemical control		
a)	Arsenic	NMT 1ppm
b)	Cadmium	MNT 1ppm
c)	Lead	NMT 3ppm
d)	Mercury	NMT 0.1ppm
e)	Heavy metal	NMT 10ppm
5. Microbiological control		
a)	Total plate count	<5000cfu/g by heat and steam
b)	Yeast and mold	<100cfu/g by heat and steam
c)	Salmonella	Negative
d)	E.coli	Negative
e)	Staphylococcus aureus	Negative

Source: Certificate of Analysis, 2022

(Note: NLT-Not Less Than, NMT- Not More Than, cfu-colony forming unit, ppm- parts per million)

Product Profile of the standard sample which was used as a reference for comparing the physicochemical and phytochemical parameters of three form of samples such as Tablet, Capsule and Powder were discussed.

The moisture content of the standard sample was found to be less than 5 percentage. Bulk density is the amount of powder by weight that is present in definite volume. The bulk density of shatavari powder was between 0.3 – 0.7 grams per milliliter. The bioactive component was saponin which was present at the rate of not less than 20 percentage. The chemical constituents like arsenic, cadmium, lead, mercury and heavy metal was not more than 1ppm, 1pp, 3ppm, 0.1ppm and 10ppm respectively. Only trace amount of mercy was found to be present in the standard sample. Total plate count was less than 5000 colonies per gram of powder was found by heat and steam. Other microorganisms like salmonella, E.coli and staphylococcus aureus were absent in the standard sample but however small amount yeast and mold of less than 100 colonies per gram of the sample was found to present by heat and steam.

PHYSICO-CHEMICAL PARAMETERS:

The physicochemical factors help to determine the purity and quality of the medicine. The obtained results of physicochemical parameters were represented in the table 1, and it was compared with the standard sample.

Table 2 Physicochemical parameters for selected shatavari sample

Physicochemical Parameters	SSS (%)	SST (%)	SSC (%)	SSP (%)
Moisture Content	5.29	5.56	4.63	9.93
Total ash	3.70	2.60	3.09	3.36
Water soluble ash	1.21	1.48	0.29	1.36
Acid insoluble ash	2.39	1.31	2.27	0.74
Water extractives	45.72	50.28	48.71	39.29

Alcohol extractives	8.91	17.67	11.89	18.43
pH- value	4.70	5.86	5.21	5.27

(Note: SSS- Standard Shatavari Sample, SST- Shatavari Sample in Tablet form, SSC- Shatavari Sample in Capsule form, SSP- Shatavari Sample in Powdered form)

The loss on drying test showed that the moisture content of powdered sample was quite greater than the other three. The total ash yield on igniting the sample were closely similar in all 4 samples (3.70, 2.60, 3.09, 3.36) subjected to analysis. Water soluble ash of SSC (0.29) was found to be lower than SSS, SST and SSP. The value of acid insoluble ash for SSS (2.39) and SSC (2.27) were closely associated. Alcohol extractives of standard sample (8.91) was lower when compared to three forms of shatavari sample. Water extractive value of shatavari sample in tablet form (50.28) was considerably greater then capsule (48.71) and powder (39.29). The pH- value indicated that all the four samples analyzed was acidic in nature.

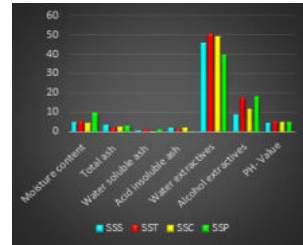


Figure 1

Comparison of three forms of shatavari sample with the standard shatavari sample

PHYTO-CHEMICAL PARAMETERS:

The activity of any herb is dependent on the class of phytoconstituents or specific phytoconstituents being present in it. The result obtained from qualitative analysis of phytochemical constituents are given in the following table

Table 3 Comparison of phytochemical properties

S.no	Phytochemical test	SSS	SST	SSC	SSP
1	Alkaloids	X	X	X	X
2	Steroids	X	X	X	X
3	Saponins	✓	✓	✓	✓
4	Cardiac glycosides	X	X	X	X
5	Tannins	✓	✓	✓	✓
6	Flavonoids	X	X	X	X
7	Reducing sugar	X	X	X	X
8	Phenol	X	X	X	X
9	Protein	X	X	X	X
10	Anthroquinone	X	X	X	X
11	Quinones	X	X	X	X
12	Coumarin	X	X	X	X
13	Acid	X	X	X	X
14	Glycosides	✓	✓	✓	✓

Note: Presence of compound (✓); Absence of compound (X)

SSS- Standard Shatavari Sample, SST- Shatavari sample in Tablet form, SSC- Shatavari sample in Capsule form, SSP- Shatavari sample in powdered form

The obtained result implicates that all the locally available three forms of shatavari sample such as Tablet, Capsule and Powder were found to contains Saponins, Tannins and Glycosides as same as the standard sample which indicates that the quality of all the samples subjected to analysis is similar to each other. Several other constituents like alkaloids, steroids, cardiac glycosides, reducing sugar, flavonoids, phenol, protein, Anthroquinone, quinones, Coumarin and acid were found to be absent in all forms of tablet, capsule & powder of shatavari sample and similarly also absent in standard shatavari sample.

SUMMARY AND CONCLUSION:

According to Indian pharmacopoeia (2016) standards the percentage of moisture content, total ash and alcohol extractives should not be more than fifteen percent similarly the percentage of acid insoluble ash should not be more than three percent. Water insoluble ash and water soluble extractives percentage should not exceed more than twenty percent. All the three forms of shatavari sample subjected to analysis was found to contain the standard parameters which implies that the quality of the three samples in respect to their physicochemical properties was within the permissible limits.

On analyzing Phytochemical parameters of shatavari using standard methods, It was revealed that all the selected sample subjected to analysis like Tablet, Capsule and powder showed the presence Saponins, Tannins and Glycosides including the standard sample.

Physicochemical analysis divulge that the percentage of various parameters like moisture content, total ash, water soluble ash, acid insoluble ash, water extractives and alcohol extractives were moreover similar to standard sample of shatavari. The pH value reported that all the four samples of shatavari were slightly acidic in nature Present study illustrated a clear analysis of physicochemical and phytochemical properties of the herbal nutraceutical supplement of *Asparagus racemosus*. It can be reported that the formulation of different forms like Tablet, Capsule and Powder of shatavari supplement contains good composition of bioactive components which was essential to consider as an ideal standard Herbal Nutraceutical Supplements. Hence Shatavari – An Herbal Nutraceutical Supplement can be suggested to promote overall Health.

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