ScienSage

Journal of Advanced Scientific Research

Available online through http://www.sciensage.info/jasr

ISSN
0976-9595
Research Article

STUDIES ON THE PRODUCTION OF MUSABBAR FROM *ALOE VERA*

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ABSTRACT

Musabbar, a solid powder has been prepared from the processed leaves juice of *Aloe vera* by a developed technology for the use in Unani, Ayurvedic and many modern medicinal preparations and also in some popular cosmetic products. The physico-chemical constants and mineral contents of the product are ascertained. The analysis of mineral (metal and non-metal) contents revealed that sodium, potassium, magnesium, calcium and iron are all present in significant quantity with trace or no heavy metals. The florescence analysis of musabbar has been observed through ultraviolet light. The minerals are determined by flame photometer, atomic absorption spectrometer. The phytochemical investigation of pet. ether, n-hexane, ethyl acetate, di-chloro methane and aqueous methanol extracts of the product are carried out for identifying the presence of possible classes of active compounds.

Keywords: *Aloe vera*, phytochemical screening, minerals, fluorescence.

1. INTRODUCTION

Modern use of *aloe vera* (Bengali name ghritakumari) was first documented in the 1930s to heal radiation burns [1]. Aloe vera juice taken internally has been shown to have various beneficial effects on the body [2, 3]. *Aloe vera* is a perennial plant belonging to the family of Liliaceae, of which there are about 360 species [4]. Taxonomists now refer to *Aloe barbadens*is as *Aloe vera* [5]. Aloe is one of the few medicinal plants that might maintain its popularity for a long period of time. The plant has stiff, graygreen lance-shaped leaves containing clear gel in a central mucilaginous pulp. *Aloe vera* gel has hypoglycemic [6], wound healing [7], and anti-inflammatory effects [8]. The leaf of *Aloe vera* is rubbery and smooth in touching from outside and inside the plant is the *Aloe vera* gel. It is available in a variety of products such as medicated cream, hand and body lotion, heat rub, pure *aloe vera* juice, mini lift mask, medicated jelly, moisturizer etc. Commercially aloe can be found in pills, sprays, ointments, lotions, liquids, drinks, jellies and creams to name a few of the thousands of products available [9]. More than 200 chemical components have been identified from the leave pulp and exudates of *A. vera* plant [10, 11]. The cutting of leaves is made annually in the month of March and April during the heat of the day. Each plant continues to yield Aloes for about 12 years, after which the plants are dug up [12]. However there are many aloe products of questionable quality on the market which may in the early 1980's led to the foundation of a product quality certification programme administrated by IASC (International Aloe Science Council). In March 2009(IASC) has certified about 500 finished aloe products and raw materials from more than 80 companies world-wide but there are hundreds of another aloe product on the marked which are not certified [13]. Aloe products have long been used in health foods and for medicinal and cosmetic purposes. These products range from aloe drinks to aloe gels, powders, capsule, creams & oils etc for both external and internal uses for a wide variety of indications. Aloe gel contains phenolic anthraquinones, carbohydrates polymers and various other organic and inorganic compounds. It has a wide range of medicinal application such as wound healing effect, reduces blood sugar levels in diabetes, soothes burning, reduces intestinal problems, stimulates immune response against cancer; reduce arthritis, swelling ulcer curative effect etc [14]. Every year Bangladesh imports a huge quantity of processed medicinal plants or its extracts from abroad at the cost of our foreign exchange to meet the country's demand. This foreign exchange could be saved if the indigenous pharmaceutical raw materials could be identified from these vast resources and properly processed to render them suitable for use in the pharmaceutical industrial products and development of new drugs.

2. MATERIAL AND METHODS

2.1. Collection of plant materials

For the present study fresh leaves of ghritakumari (*Aloe indica)* plants were collected from the experimental field of BCSIR Laboratories, Rajshahi and washed with water to remove the soil and other adhering.

2.2. Extraction of plant materials [15]

Cleaned and washed ghritakumari (*Aloe indica)* leaves (5 kg) were taken and extracted the fillet from the leaves with the help of a chopper. A grinding machine followed by cloth filtration then crushed it. Through this, the suspended particles as well as small pieces of leaves and other impurities were removed from the juice. The clear dense juice obtained was then transferred to a flat metallic vessel and dried in an oven at 60°C for 4 hours. At this stage a semi-solid product was obtained which on triturating with starch (5 g) yielded the desired musabbar (500 g). This process for the production of musabbar was found to be economically feasible. The specification and other physico-chemical properties of the product were determined and summarised in Table 1-Table 3.

2.3. Phytochemical features of musabbar [16]

For identifying the presence of possible classes of chemical components a phytochemical screening of musabbar was done. Dried musabbar (100 g) was defatted with pet. ether (40-60°C) for 7 hours in cold condition. The procedure was repeated 2 times. The extracts were combined and evaporated to obtain light yellow oil (F 1). The defatted matter was then extracted with 500 ml ethanol for 7 hours by a soxhlet apparatus. It was repeated twice. Combined extracts were then concentrated in rotary evaporator under reduced pressure at 40°C. The so concentrated ethanol extract was treated with 100 ml distilled water and the supernatant liquid was filtered off through coarse cloth leaving the solid residue in the flask (F2). The filtrate was evaporated to dryness to yield reddish brown liquid (F3). Dissolving it succession with n-hexane, di-chloro methane, ethyl acetate and 70% aqueous methanol subsequently fractionated the solid residue F2. The successive fraction yielded n-hexane soluble sub-fraction- F2-1, di-chloro methane F2-2, ethyl acetate F2-3 and 70% aqueous methanol F2-4 respectively. The results are summarised in Table 4.

2.4. Determination of mineral contents of musabbar

Chemical analysis was performed for the determination of sodium (Na), potassium (K), calcium (Ca), magnesium (Mg), zinc (Zn), copper (Cu), iron (Fe), lead (Pb), chromium (Cr) and arsenic (As). The aqueous digest was analyzed using Atomic Absorption Spectroscopic standard method for Ca, Mg, Zn, Cu, Cr, As, Pb and Fe. Na and K was estimated using flame photometer.

2.5. Sample preparation for the analysis of metal ions

Weighed quantities of both bael powders was taken in a crucible dish and heated in an oven at 110°C to evolve moisture. Then the dried sample after charring was heated in a furnace for 6 hours at 600°C. The contents of crucible dish was cooled in desiccators and 2.5 mL 6M HNO_3 was added to the dish to dissolve its contents. The solution was filtered and transferred to a 25 mL flask and diluted to the mark [17].

2.6. Methods of analysis

Na and K were estimated by using flame photometer (Model AnA-135, OSK, Japan). For estimation of Ca atomic absorption spectrophotometer (Model AA-6401 F- Shimadzu, Japan) was used. Atomic absorption spectrophotometer (Model AA-240FS Varian, Australia) was used to determine Mg, As, Pb, Cr and Fe. For estimation of Zn and Cu atomic absorption spectrophotometer (Model AA-240z Varian, Australia) was used.

3. RESULTS AND DISCUSSION

A quality musabbar is produced by extracting the juice from leaves of *Aloe indica* at low temperature under reduced pressure avoiding heating at higher temperature. Because many of the active ingredients contained in *Aloe vera* leaves juice appear to deteriorate on storage. Rather, the product is sensitivity to enzymatic, oxidative or microbial degradation on heating during extraction [12].

Table 1 - Table 3 describes the reactions of chemicals and fluorescence's analysis of musabbar and that of its test for total ash, acid insoluble ash, alcohol soluble residue, foreign organic matter, and water-soluble extracts. These are ascertained in accordance with national requirements. The result is satisfactory and conforms to chemical literature [18].

Table 1: Reaction of chemicals with musabbar

Chemicals	Observation
Triturated with water	Emulsion formed
Shaked with water	Little froth appears
Treated with 50% NaOH and then heated	No change in colour
Treated with 5% $FeCl_3$	No change in colour
Treated with 66%H_2SO_4	No change in colour
Pressed between two folds of a filter paper	Oily strain absent

Table 2: Fluorescence analysis of mussabar

Treatment	Observation under	
	Ordinary light	Ultra-violet light
Dry powder as such	Dark brown	Dark green
Powder treated with 1N NaOH in methanol	Chocolate brown	Green
Powder treated with 1N HCl	Deep brown	Black
Powder treated with 1N NaOH in water	Chocolate brown	Black
Powder treated with 50% HNO_3 (Aq)	Reddish brown	Blackish
Powder treated with 50% H_2SO_4 (Aq)	Chocolate brown	Blackish

Table 3: Identity, strength & assay of mussabar (%)

Constituents	Amount
Foreign organic matter	Nil
Purity	100%
Total ash	17.36%
Water soluble ash	12.5%
Acid insoluble ash	2.25%
pH values (1% solution)	6.9
pH values (10% solution)	6.6
Loss on drying at 105°C	10.15%
Solid content (organic materials)	68.50%
Successive extractive values with:	
Pet. ether (60-80°)	5.20%
Chloroform	6.10%
Ethanol	12.65%
Distilled water	40.0%

The result of the phytochemical screening (Table 4) revealed the presence of some medicinally active ingredients e.g. anthraquinones (anti-inflammatory and pain killing properties), amino acids (building blocks of protein), and saponins (cleansing and anti-septic properties) [19].

Table 4: Phytochemical screening of mussabar

Class of compounds indicated	Fractions						
	F1	F2	F3	F2-1	F2-2	F2-3	F2-4
Anthraquinine	+	+	+	+	+	-	-
Polysaccharides	-	+	-	-	-	-	+
Lignin	-	-	+	-	-	-	-
Saponins	+	+	-	+	+	-	-
Amino acids	-	-	-	-	-	-	+

Alkaloids which are one of the largest groups of phytochemicals in plant have amazing effects on humans and this has led to the development of pain killer. The presence of saponins in plant has supported the management of inflammation. Flavonoids have activities like antimicrobial, antioxidant anti-inflammatory, analgesic and anti-allergic properties.

From Table 5 it is evident that the prepared musabbar contains sodium, potassium, calcium, magnesium, iron and zinc all are present in significant quantity. The role of some inorganic elements like vanadium, zinc, sodium, potassium, calcium, copper, manganese, and traces of chromium in the improvement of impaired glucose tolerance and their indirect role in the management of diabetes mellitus are being increasingly recognized.

Na together with Cl and K are electrolytes that maintain normal fluid balance inside and outside cells and a proper balance of acid and bases in the body and deficiency of this element may result in muscle cramp and hypertension [20]. Magnesium is one of the important mineral which takes part in the Carbohydrate and fat metabolism. In the deficiency of this element there is a chance of diabetes mellitus because it also plays role in the release of insulin. Zn is a versatile element which has been well known to be an important trace element in diabetes as a cofactor for insulin. Zn also enhances the effectiveness of insulin [21].

Table 5: Analysis of minerals (metal and non-metal) content in mussabar (ppm)

Name	Na	K	Ca	Mg	Fe	Zn	Mn	Cu	Pb	Cr	As
ppm	10.4	59.0	81.2	6.40	0.055	0.043	0.012	0.026	0.007	0.001	0.0002

Cu also helps to regulate neurotransmitter levels and its deficiency can impair the function of the nervous system [22]. Fe takes part for haemoglobin formation, normal functioning of the central nervous system and in the oxidation of carbohydrates, proteins and fats [23]. Cr has also been identified as the active ingredient of the glucose tolerant factor [24], a dietary factor required to maintain normal glucose tolerance in the rat. In conclusion, the presence of various inorganic trace elements in the mussabar might account for the hypoglycemic nature of the plant.

4. CONCLUSION

A. vera has a long history as a medicinal plant with diverse therapeutic applications.The presence of all the essential elements in *Aloe Vera* may ready account for the most of the therapeutic efficiencies. The identified compound play important role in the insulin secretion of the body. Although some elements also absorbed with suitable techniques it can be used for various disease safe and useful drug.

5. REFERENCES

1. Collins CE. *Radiol Rev Chicago Med Rec,* 1935; **57:**137-138.
2. Tyler V. The honest herbal: A sensible guide to the use of herbs and related remedies, ed. 3. New York Pharmaceutical Products Press; 1993: 25-28.
3. Krinsky DL, Hawkins EB, Pelton R, Willis NA, Lavalle JB. Natural therapeutics pocket guide, ed. 2. Cleveland: Lexi-Comp, Inc.; 2003:379.
4. Klein AD, Penneys N. *J Am Aca Dermatol,* 1988; **18:**714–720.
5. Coats BC, Ahola R. *A modern study of Aloe vera,* Garland, Dallas, 1979.
6. Rajasekaran S, Sivagnanam K, Ravi K, et al. *J Med Food,* 2004; **7:** 61–66.
7. Pandarinathan CB, Sajithlal GB, and Gowri C. *Indian J Exp Biol,* 1998;**36:** 896–901.
8. Davis H, Parker L, Samson T, et al. *J Am Pod. Med Assoc,* 1991; **81:** 258–261.
9. Vogler BK, Enst E. *Journal of Ethnopharmacology* ; **56(1):**81-87.
10. Reynolds T, Dweck AC. *J. Ethnopharmacol*, 1999; **68:** 3-37.
11. Choi S, Chung MH. *Semin Integ Med,* 2003; **1:** 53-62.
12. Grindlay D, Reynolds T. *Journal of ethnophamacol,* 1986; **16:** 117-151.
13. IASC, URL*: http://iasc.org/certify.html* 2009-0515.
14. Rajendran A, Narayananand V, Gnanavel I. *Journal of Applied Science Research*, 2007; **3(11):** 1476-1478.
15. Haque MZ, Saki MA, Maruf MA, Ali MU, Ali M Y. *Bangladesh J Life Sci,* 2007; **19(2):**103-107.
16. Kundu JK, Hossain MN, Das B, Bachar SC, Rouf AS. *Bangladesh J Integ Med,* 2001; **2:** 10-13.
17. Radojevic M, Vladimir, "Practical Environmental Analysis", Royal Society of Chemistry, Cambridge, UK. 1999; 366.
18. Kalipadha B and Gosh A, Bharotio Bonowshadhi (5th part), 1973, 1218- 1219.
19. Stickland FM. *J Investigative Dermatology,* 1993; **9:** 197.
20. Adotey DK, Serfor-Armah Y, Fianko JR, Yeboah PO. *Afri J Food Sci,* 2009; **3(9):** 243-249.
21. Underwood MK, Rosentha MJ, Hong S. Trace elements in human and animal nutrition, Academic, New York, 1986.
22. Watts D. Writer's B-L-O-C-K Edn., 1997; United States of America.
23. Adeyeye EI, Otokiti MKO.*Discovery and Innovation,* 1999; *11: 75-81.*
24. Brown M, *Drug Discovery today,* 2003; **8:** *962-963.*