Research Journal of Chemical Sciences _____ ISSN 2231-606X
Vol. **5(6),** 46-49, June **(2015)** *Res. J. Chem. Sci.*

Development, Antioxidant Activity, Physico-Chemical and Aflatoxin Evaluation of Herbal Brain Boosting Product

Zahra N*, Nisa A, Kalim I, Saeed K, Hina S and Ahmed I
Food and Biotechnology Research Centre, Pakistan Council of Scientific and Industrial Research Laboratories Complex, Ferozepur Road, Lahore-54600, PAKISTAN

Available online at: www.isca.in, www.isca.me
Received 25th May 2015, revised 3rd June 2015, accepted 13th June 2015

Abstract

Herbal products as a best source of medicines have been known since prehistoric times. It is found that the use of synthetic drugs, taken in high doses results in higher occurrence of adverse drug reactions. These health concerned issues has encouraged the human to return to nature for safer herbal products and medicines. The present study aims to prepare herbal brain boosting product from natural plant sources which are readily available and harmless to human health. The prepared herbal brain boosting product exhibits the highest % inhibition (43.21% for 20mg/ml) which shows the presence of anti-oxidants which help support brain cell integrity. The chemical analysis shows the absence of toxic heavy metals which confirms its non-toxicity. Nutritional analysis shows 153 Kilo Calorie energy; 12 % Protein; 5% Fat and 15% Carbohydrates in herbal brain boosting product. Aflatoxin analysis was performed and no contamination of Aflatoxins was found in developed product which shows product is fit for human consumption.

Keywords: Herbal, brain boosting, memory, antioxidant, nutritional, toxic metals, aflatoxins.

Introduction

Brain is the most valuable part of the body and memory is the gifted ability of an individual to sense stimuli, events, information, etc., and to preserve all these over short or long periods of time and reminiscence the same at a later date when required. Memory is conceivably the most vivacious of the aspects that differentiates human beings from other animals. Poor Memory, lower preservation and sluggish recall are common problems in today's stressful and competitive world. Memory loss, amnesia, anxiety and high blood pressure are considered as diseases due to age factor, stress and emotions[1]. Herbs are generally safe and well tolerated. However, they still contain phytochemicals that modify biochemical processes in the body. The combination of four seeds/nuts is known as Char Magaz which consists of Almonds, Pumpkin seeds, Cantaloupe Seeds and Water melon seeds. Factually deciphered Char means 4, and Magaz means intellect and brain power. It is thought that consumption of this amalgamation results in brain growth and rebuilding. This product is mostly used in Rajasthan area. Char Magaz is also considered useful for nursing mothers and it is believed that rudiments will be passed through milk to babies for their brain development. Similarly, Pumpkin seeds and Almonds are high in fatty acids that are good for constructing and maintaining parts of the brain[2]. Fennel locally recognized as Sounf is useful for stomach. It is best stimulant and antispasmodic. It provides relief in indigestion[3]. Coriander is a yearly, therapeutic and herbaceous plant which instigated from the Mediterranean and Middle Eastern regions. In Coriander essential oil is present upto 0.03-2.6%. Coriander is helpful and is used as stomachic, spasmolytic and carminative which have a greater bioactive property. Different parts of coriander plant, for example leaves, seeds, fruit and flower, show antioxidant activity, anthelmintic activity, anti-convulsant, diuretic, anti-diabetic activity, and anti-microbial activity and hence may be useful for pain relief[4]. Almonds (*Prunus dulcis*) are best nutritious source of dietary fiber, protein, copper and phosphorus and also a good source of α-tocopherol, riboflavin, magnesium, and manganese[5,6]. Additionally, almonds contain arginine, a substrate for synthesis of the endothelial dilator[7]. Almonds are considered as best source for memory boost up and for better eyesight[8]. These also contain monounsaturated fats over 9 g per oz (~28 g).

Material and Methods

The natural products are considered as a good source of medications since ancient times. This formulation is developed using different useful herbs. Herbs are more potent and effective. The Raw materials for the preparation of herbal brain boosting product are easily available in the local market. Its development is simple and no sophisticated procedure is involved. All ingredients were separately cleaned. All the ingredients were mixed thoroughly and ground well.

Evaluation of Physico-Chemical Parameters: Determination of pH: pH of 5% solution of prepared is determined by pH meter.

Determination of Heavy Metal Contamination: The product solution was prepared by means of dissolving 1 gm of prepared product in distilled water and then filtered to make volume 100

ml using distilled water. Heavy metals[9] (Lead, Mercury, Iron, Nickel and Cobalt) were then measured by AAS (Atomic Absorption Spectrophotometer) along with their representative standards. Arsenic was determined on ICP (Inductively Coupled Plasma).

Table-1
Weight of ingredients

Sr. #	Name of Ingredients	Wight (gm)
1	Fennel	250 Grams
2	Dry Coriander	250 Grams
3	Almond	60 Grams
4	Cardamon	02 Grams
5	Candy Sugar	60 Grams
6	4 Seeds	60 Grams
7	Ground Coconut	25 Grams
Total Wight		707 Grams

Nutritional analysis: The nutritional analysis of herbal brain boosting product was carried out for moisture content, total ash, crude fat, carbohydrate, crude protein and energy value[10].

Antioxidant activity (DPPH radical scavenging assay): The electron or hydrogen atom donation ability of the herbal brain boosting product was detected by bleaching of methanol solution of DPPH (2, 2-Diphenyl-1- picrylhydrazyl) at 517 nm. In present Spectrophotometric assay; a stable free radical DPPH was used as a reagent. DPPH (purple colored) is reduced to 2, 2-diphenyl-1-picrylhydrazine (yellow colored) by reacting with an antioxidant[11]. Hundred microliters of various concentrations of the herbal brain boosting product concentrate in methanol were added to 3 ml of 0.004% methanol solution of DPPH. After a 30 minutes incubation period at room temperature, the absorbance was measured against a blank at 517 nm by digital Spectrophotometer. The inhibition (%) of free radical (DPPH) was calculated by using following formula:

Inhibition % (DPPH) = (A blank – A sample/ A blank) x 100

A blank is the absorbance of the all reagents except the test sample and A sample is the absorbance of the test sample.

Aflatoxin Determination: Thin Layer Chromatographic (TLC) technique was used for detecting Aflatoxins in the product[12]. Aflatoxins were analyzed in prepared herbal brain boosting product which was first prepared through a specific method[13]. The presence of Aflatoxins in the product was then further detected through the method explicated by Romer[14]. The standard was compared with the extract of sample for Aflatoxin determination[15].

Results and Discussion

The herbal brain boosting product consisting of fine powder of herbs in appropriate ratio was subjected to standardization by means of various physical and chemical methods. pH of the product solution was found to be 7.45. Percentage Recovery was calculated and was found to be 92.64 %.

Total Weight of Ingredients Taken = 707 Grams
Total Wight of Herbal Brain Boosting Product = 655 Grams
Recovery (%) = 92.64 %

Heavy metals if present in formulations will have a deleterious effect on different organs of body in particular kidneys and leads to renal toxicity. Hence, evaluation of heavy metals is an important role. Heavy metals include arsenic, iron, lead and mercury. Heavy metals were determined and all the heavy metals were not detected in prepared herbal product (table-2).

Table-2
Results of Physico-Chemical Tests

Sr. No.	Parameter	Values
1.	pH	7.45
2.	% Recovery	92.64
	Heavy metals	**Values**
1.	Arsenic	Nil
2.	Iron	Nil
3.	Nickel	Nil
4.	Mercury	Nil
5.	Cobalt	Nil
6.	Lead	Nil

The moisture and ash contents were found to be 8.38 % and 5.86% respectively. Protein contents were 12%. 5.0 % fat and 15% carbohydrates were found in prepared herbal brain boosting product. Food energy of herbal brain boosting product was found to be 153 Kcal/100g. The obtained nutritional analysis results suggest that the prepared product can be considered as a potential food product having high calories in order to overcome dietary deficiencies as well. The results of nutritional analysis are given in table-3.

Table-3
Results of Nutritional Analysis

Sr. No.	Parameter	Values
1.	Moisture	8.38%
2.	Ash	5.86%
3.	Protein	12%
4.	Fat	5.0%
5.	Carbohydrates	15%
6.	Energy	153 K Cal

Antioxidants are the chemical compounds which prevent the oxidation of other molecules. Free radicals are produced by oxidation reactions which can start chain reaction. This chain reaction can cause destruction or death to the cell. Antioxidants stop these chain reactions by removing free radical intermediates[16]. The prepared product shows antioxidant behavior and it was noted that by increasing the concentration mg/ml, the % inhibition also increases.

Table-4
Antioxidant Activity of Herbal Brain Boosting Product

Sr. No.	Concentration	% Inhibition
1.	1 mg/ml	9.14
2.	5 mg/ml	17.82
3.	10 mg/ml	26.74
4.	15 mg/ml	35.83
5.	20 mg/ml	43.21

Figure-1 shows the linear relationship between concentration and % Inhibition. Antioxidants are widely used in dietary products and have been investigated for the prevention of harmful diseases and hence the prepared product has antioxidants which may be useful for disease cures.

Aflatoxins are detrimental and carcinogenic fungal substances known which may affect food quality to greater extent. Most common Aflatoxins[17] are mainly named as Aflatoxin B1, B2, G1 and G2.

In this study; product was analysed for Aflatoxin contamination and found safe as no Aflatoxin was detected. It depicts that product is safe for health.

Table-5
Aflatoxin Analysis of Herbal Brain Boosting Product

Aflatoxin	Amount (ppb)
B1	Not Detected
B2	Not Detected
G1	Not Detected
G2	Not Detected

Conclusion

From the all above study it can be concluded that Herbal Brain Boosting product contains essential herbs which are normally nontoxic and well stomached. Conversely, they may contain phytochemicals that transform biochemical processes in the body. From literature the usefulness of herbs used in brain boosting product depicts that it is safe and gentle and may assist the brain with cognitive tasks and functions. It contains anti-oxidants which may help to support brain cell veracity.

References

1. Vivek J., Praveen K. and Kamlesh D., Indian traditional memory enhancing herbs and their medicinal benefits, *Indian Journal of Research in Pharmacy and Biotechnology,* **2**, 1030-1037 **(2014)**

2. http://www.indiacurry.com/faqspice/cfaqcharmagaz.htm, **(2014)**

3. Ahmad M., Hussain S. A., Zubair M. and Rab A., Effect of different sowing seasons and row spacing on seed production of fennel, *Pakistan Journal of Biological Sciences,* **7**, 1144-1147 **(2004)**

4. Muhammad N., Faqir M. A., Muhammad I. K. and Saima T., Nutritional and medicinal aspects of coriander (Coriandrum sativum L.) A review, *British Food Journal*, **115**, 743-755 **(2013)**

5. Chen C. Y., Lapsley K. and Blumberg J., A nutrition and health perspective on almonds, *Journal of the Science of Food and Agriculture*, **86**, 2245-2250 **(2006)**

6. Kornsteiner M., Wagner K. H. and Elmadfa I., Tocopherols and total phenolics in 10 different nut types, *Food Chemistry*, **98**, 381-387 **(2006)**

7. Sabate J., Haddad E., Tanzman J. S., Jambazian P. and Rajaram S., Serum lipid response to the graduated enrichment of a Step I diet with almonds: a randomized feeding trial, *The American Journal of Clinical Nutrition*, **77**, 1379-1384 **(2003)**

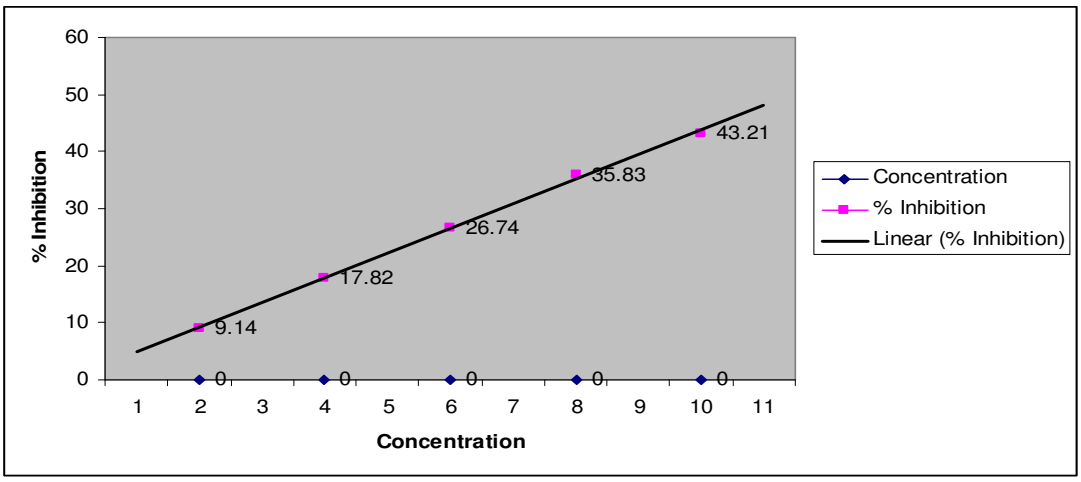

Figure-1
Graph showing the relationship between Concentration and % Inhibition

8. Maguire L. S., O'Sullivan S. M., Galvin K., O'Connor T. P. and O'Brien N. M., Fatty acid profile, tocopherol, squalene and phytosterol content of walnuts, almonds, peanuts, hazelnuts and the macadamia nut. *International Journal of Food Science and Nutrition*, **55**, 171-178 **(2004)**

9. Bhowmik S., Chowdhury S. D., Kabir M. H. and Ali M. A., Chemical composition of some medicinal plant products of indigenous origin, *The Bangladesh Veterinarian,* **25**, 32-39 **(2008)**

10. AOAC, Association of official analytical chemists, Official Methods of Analysis, 19th Ed., Arlington, Virginia, USA, **(2012)**

11. Nisa A., Saeed K., Hina S., Zahra N., Mazhar S., Kalim I. and Syed Q., Nutritional, Antioxidant, Microbiological and Toxicological Studies on Red Dye Extracted from Red Beet Roots (Beta vulgaris), *Research Journal of Chemical Sciences,* **5**, 1-6 **(2015)**

12. Nisa A., Zahra N., Firdous S., Ejaz N. and Hina S., Detection of aflatoxins in various samples of red chili, *Pakistan Journal of Scientific and Industrial Research,* **55**, 27-29 **(2012)**

13. Begum N., Adil R. and Shah F. H., Contamination of groundnuts with Aflatoxins, *Pakistan Journal of Medical Research,* **24**, 129-31 **(1985)**

14. Romer T. R., A screening method for Aflatoxins in mixed feed and other agriculture commodities, *Journal of the Association of Official Analytical Chemists,* **59**, 110-117 **(1976)**

15. AOAC. Association of Official Analytical Chemists, Official Methods of Analysis, 18th Edition, Washington DC, USA, **(2005)**

16. Sasikala M., Vadivelan R., Seetha L. G. and Kanagavalli, P. P., Antioxidant Herbs In Siddha Medicine –A Mini-Review, *Journal of Science,* **4**, 674-677 **(2014)**

17. Nisa A., Zahra N., Hina S., Hayat R. and Ejaz N., Quantification and Detoxification of aflatoxin in food items, *Pakistan Journal of Scientific and Industrial Research*, **56**, 98-104 **(2013)**