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Preparation of natural food supplement and its chemical composition

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Abstract: A product of natural food supplement was prepared by developing economically feasible technology based on utilization of indigenously available resources and also save foreign exchange spends on the import of synthetic products. The invention relates to the development of a process for the preparation of readily reconstitutable (i.e. instant) natural food supplement. The product in powder form has been prepared from indigenous materials. The process parameters and addition of food grade ingredients as powder milk, icing sugar, dextrose, corn starch, edible oil, coca/vanilla powder and natural herb as source of vitamins/minerals have been standardize for the product development. The natural food supplement and a synthetic product was analyzed chemically for moisture, total ash, fat, protein, carbohydrates, some vitamins and minerals. The product is a good source of valuable macro and micro nutrients. The prepared product upon addition of water or milk has good flavor and refreshing taste.

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INTRODUCTION

Pakistan has an annual market of nearly Rs. 1 billion of the food supplements. More than 50% of the products go to foreign imported food products, while there are some national firms preparing the food supplements, but these products can not compete with the products of these foreign firms in their quality and characteristics. Currently many supplement products are available and they include vitamins, minerals, other nutrients, and botanical supplements as well as ingredients and extracts of animal and plant origin, are very costly and also imported. The choice of supplement depends on its nutritional profile, palatability and acceptability, as well as cost. Consumer's preference is important, after choosing a product with the correct nutritional profile, in order to ensure good compliance.

Supplement use is increasing in many countries throughout the world. Several epidemiological studies and randomized clinical trials have suggested that vitamin/ mineral dietary supplement use might modulate the risk of several conditions including cancer and cardiovascular disease[1-4]. Product intended to supplement the diet that bears or contains one or more of the following dietary ingredients: a vitamin, mineral, amino acid, herb or other botanical; or a concentrate, constituent, extract, or combination of any ingredient described above; and intended for ingestion in the form of a capsule, powder, soft gel, and not represented as a conventional food or as a sole item of a meal or the diet. The most prevalent type of dietary supplement was a multivitamin/mineral tablet or capsule that was available in pharmacies by prescription or "over the counter." Supplements containing strictly herbal preparations were less widely available.

Multivitamins-minerals supplementation is recommended before and during pregnancy to ensure adequate intake of several key nutrients including folate, iron and more recently vitamin D, all of which have importance among women of childbearing age, and during fetal development[5-10]. Folic acid supplementation has been well documented to reduce the risk of neural tube defects (i.e. spina bifida)[11-13], and emerging evidence suggests that folic acid-containing multivitamins supplements are associated with reducing the risk of other malformations and certain pediatric cancers[14,17].

Taking supplements containing *Safed Musli* (*Asparagus adscendens*) benefit the body in many different ways. They can improve strength and physical endurance, buffer lactic acid, fight general body weakness, aid in recovering from the physical exhaustion of exercise and build muscle mass while lowering heart and respiration rates as well as systolic blood pressure[18]. Safed musli, a herb belongs to family Liliaceae. It was originally grown in the thick forests of India. About 300 species are distributed throughout the tropical and subtropical parts of the world. In India, it is considered a valuable medicinal herb, whereas in other parts of the world it is being used as ornamental plant. The roots are rich in alkaloids, vitamins, minerals, proteins, carbohydrates, saponins, polysaccharides and steroids of various therapeutic values as total rejuvenator, antioxidant and immuno modulator[19].

Keeping in view the nutritive value of herb Safed musli the present study was undertaken with the objectives of developing economically feasible technology based on utilization of indigenously available resources and also save foreign exchange spends on the import of synthetic products. The commercialization of product would be a great achievement as an additional diet source as compared to many synthetic products available in market. This will be beneficial for

food/pharmaceutical industries to promote economical food product.

MATERIALS AND METHODS

Preparation of natural food supplement

Dry herbs (Root tubers of *Asparagas ascendens*) were cleaned by removing dust and foreign matter. The cleaned herb was grinded in powder form by pin grinder. The weighed quantity of grinded herb, dry milk, icing sugar and dextrose were mixed together in dry mixer for 15 minutes. A known amount of food grade additives as corn starch, coca powder and vanilla powder were mixed in dry mixture for 20-30 minutes. The homogeneous mixture thus obtained was mixed with cooking oil for 25 minutes. The final product was sieved through mesh size of 20, than packed in polyethylene bags and sealed.

Physiochemical analysis

The instant natural food supplement prepared has been analyzed for its color, flavor and acceptability. The final product of PCSIR and synthetic product (Ensure) available in market were comparatively analyzed for their energy value, moisture, ash, fat, protein, some vitamins (B_1, B_2, panthothenic acid, niacin, biotin, folic acid, A, D, K) by standard methods[20]. The concentration of vitamin C was determined by titrimetric method using 2, 6-dichlorophenol indophenols method[21].

Determination of micro and macro minerals (Fe, Zn, Mn, Cr, Cu, Na, K, Ca, Mg) by atomic Absorption spectrophotometer equipped with hollow cathode lamps as radiation source using air acetylene flame. The instrument setting and operations were done in accordance with the manufacturers user specification[22].

RESULTS AND DISCUSSION

Dry herbs were processed for the preparation of instant natural food supplement. The process parameters and addition of food grade ingredients have been standardize for the product development. In order to compare its suitability for nutritional purpose the physiochemical analyses of the instant natural food supplement and synthetic food supplement (Ensure) are presented (Table 1).

It was observed that the moisture content of natural food supplement and synthetic supplement was 4.0% and 5.2% respectively. The ash content of the natural food supplement and the synthetic supplement were 2.4% and 2.6%. These samples contains fat 15.0% and 15.5%, protein 13.5% and 14.0%, carbohydrates 58% and 60.9%, respectively. The ascorbic acid of natural food supplement was (68.4 mg/100g) while that of synthetic supplement was (64 mg/100g). The effectiveness of protein energy supplements in improving weight, mid-arm muscle circumference and survival was investigated Results from 30 randomized controlled trials, involving 2,062 patients, showed clinically significant improvements in weight and mid-arm muscle circumference in treated groups compared with controls[23]. The macronutrients (excluding fiber and water) provide structural material (amino acids from which proteins are built and lipids from which cell membranes and some signaling molecules are built), energy. Some of the structural material can be used to generate energy internally and in either case it is measured in Joules or kilocalories (often called "Calories" and written with a capital *C* to distinguish them from little 'c' calories). Carbohydrates and proteins provide 17 kJ approximately (4 kcal) of energy per gram, while fats provide 37 kJ (9 kcal) per gram[24].

Table 1: Chemical composition of natural food supplement (PCSIR) and synthetic food supplement (Ensure)

No	Parameters	Natural Food Supplement	Synthetic Food Supplement
1	Energy (Kcal/100g)	426.8	431
2	Moisture (%)	4.0	5.2
3	Ash (%)	2.4	2.6
4	Fat (%)	15	15.5
5	Protein (%)	13.5	14.0
6	Carbohydrates (%)	58	60.9
7	Vitamin C (mg/100g)	68.4	64

Table 2: Vitamins composition in natural food supplement (PCSIR) and synthetic food supplement (Ensure)

Parameters	Natural Food Supplement	Synthetic Food Supplement
Vitamin B_1 (mg/100g)	0.61* ± 0.01**	0.72 ± 0.02
Vitamin B_2 (mg/100g)	0.82 ± 0.03	0.80 ± 0.03
Pantothenic acid (mg/100g)	4.2 ± 0.1	5.0 ± 0.15
Niacin (mg/100g)	8.7 ± 0.2	10.0 ± 0.21
Biotin (mcg/100g)	148 ± 2.5	150 ± 2.0
Folic acid (mcg/100g)	158 ± 3.0	200 ± 3.4
Vitamin A (mcg/100g)	279 ± 4.0	351 ± 4.5
Vitamin D (mcg/100g)	2.0 ± 0.2	2.4 ± 0.14
Vitamin K (mcg/100g)	17.3 ± 0.3	18.0 ± 0.2

*Average of triplicate determination;
**Standard deviation values

Table 3: Minerals composition of natural food supplement (PCSIR) and synthetic food supplement (Ensure)

Sample	Microminerals (mg/100g)					Macrominerals (mg/100g)			
	Fe	Zn	Mn	Cr	Cu	K	Na	Ca	Mg
Natural food supplement (PCSIR)	4.02* ±0.1**	2.50 ±0.2	0.90 ±0.04	0.011 ±0.003	0.49 ±0.03	820 ±4.0	370 ±2.0	260 ±3.5	103 ±2.5
Synthetic food supplement (Ensure)	4.40 ±0.2	5.40 ±0.3	1.20 ±0.05	0.020 ±0.003	0.52 ±0.02	860 ±4.5	360 ±3.0	280 ±3.2	105 ±2.7

* Average of triplicate determination
** Standard deviation values

It was observed that the natural food supplement and synthetic supplement contains vitamin B_1 (0.61±0.01 mg/100g) and (0.72±0.02 mg/100g), vitamin B_2 (0.82±0.03 mg/100g) and (0.80±0.03 mg/100g), pantothenic acid (4.2±0.1 mg/100g) and (5.0±0.15 mg/100g), niacin (8.7±0.2 mg/100g) and (10.0±0.21 mg/100g), biotin (148±2.5 mcg/100g) and (150±2.0 mcg/100g), folic acid (158±3.0 mcg/100g) and (200±3.4 mcg/100g), vitamin A (279±4.0 mcg/100g) and (351±4.5 mcg/100g), vitamin D (2.0±0.2 mcg/100g) and (2.4±0.14 mcg/100g), vitamin K (17.3±0.3 mcg/100g) and (18.0±0.2 mcg/100g) respectively.

The concentration of these vitamins in natural food supplement is in close agreement to synthetic food supplement. Estimation of some micro (Fe, Zn, Mn, Cr, Cu) and macro (Na, K, Ca, Mg) minerals in natural food supplement and synthetic supplement were carried out by atomic absorption spectrophotometer and their concentration have been shown as milligram per hundred gram (mg/100g) on dry weight basis (Table 3).

In natural food supplement, among the micro minerals the concentration of Fe (4.02±0.1 mg/100g) was maximum; Zn (2.50±0.2mg/100g) showed higher amount then Mn (0.90±0.04 mg/100g) and Cu (0.49 ±0.03 mg/100g) which were on moderate level, while Cr (0.011±0.003 mg/100g) was the lowest. In the macro minerals, the amount of K (820±4.0 mg/100g) was maximum; Na (370±2.0 mg/100g) showed higher amount then Ca (260±3.5 mg/100g), which was on moderate level, while Mg (103±2.5 mg/100g) was the lowest.

In synthetic supplement, among the micro minerals the concentration of Zn (5.40±0.3mg/100g) was maximum; while Fe (4.40±0.2mg/100g) showed higher amount then Mn (1.20±0.05 mg/100g) and Cu (0.52±0.02 mg/100g) which were on moderate level, while Cr (0.020±0.003 mg/100g) was the lowest. In macro minerals, the amount of K (860±4.5 mg/100g) was higher than Na (360±3.0 mg/100g) and Ca (280±3.2 mg/100g), while Mg (105±2.7mg/100g) was the lowest.

It is claimed that regular intake of protective minerals in correct proportions are an important measure in the maintenance of health and prevention of disease. Minerals in biological sources are more efficient than pure elemental status, because of presence of elements as well as presence of vitamins and other physiological active compounds[25].

CONCLUSION

It is concluded that the natural food supplement was prepared by developing economically feasible technology based on utilization of indigenously available resources and also save foreign exchange spends on the import of synthetic products. The product is a good source of fat soluble vitamins (A, K, D), water soluble vitamins (B_1, B_2, pantothenic acid, biotin, niacin, folic acid) micro minerals (Fe, Zn, Mn, Cu, Cr) macro minerals (Na, K). The large scale manufacturing is therefore, necessary to explore ways and means for utilization of available indigenous materials by converting it into value added food product. The prepared product upon addition of water or milk has good flavor and refreshing taste. The commercialization of product would be a great achievement as an additional diet source. This will be beneficial for food/pharmaceutical industries to promote economical food product.

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