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RESEARCH ARTICLE

FORMULATION AND EVALUATION OF HEALTH MIX FOR TRAUMA SUBJECTS

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ABSTRACT

Food fortification and food value addition with functional foods are continued to be an important tool, not only to promote a general state of wellbeing in different populations, but also to prevent diseases. Time dependent optimal nutrition support and energy production after severe illness becomes increasingly protein dependent (1.5g–2.0g/kg of body weight), also prevents malnutrition and specific nutrient deficiencies. Keeping these factors the investigator carried out this study with the objective of formulating and evaluating health mix and value addition and incorporation of high quality protein isolates such as Soy protein isolates, Whey protein, Egg white and Skimmed milk powders. The sensory evaluation showed that the health mix incorporated with soy protein isolate variation III was highly acceptable with the overall acceptability score of 4.8±0.4 even though the health mix incorporated with whey protein powder varition III had higer score of 4.8±0.5. The overall acceptability increases with the proportion of protein isolates The nutrient analysis showed that the health mix incorporated with soy protein isolate powder variation III had the higer amount of protein of 25.4g and energy (450.6 Kcal) and supplied less amount of carbohydrate of 76g among the other mixes with the iron content of 6 mg. The health mix with Whey protein powder variation III(15g) showed the minimum microbial content and cost of all the health mixes also low. It is also evident from the study that Health mix is one of the most significant products and with the incorporation of functional foods like soya protein isolates which is used widely in the Medical Nutrition therapy due to its high biological value and many preventive health benefits.

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INTRODUCTION

Nutritional support has become a routine part of the care of critically ill patients and it is now widely accepted for the treatment and prevention of malnutrition and specific nutrient deficiencies and to improve outcome. The metabolic consequences of excessive nutritional support in patients have been increasingly recognized in recent years. Time dependant optimal nutrition support is desired for early and uncomplicated recovery after severe injury or illness. In healthy person without protein intake, there is an obligatory loss of 20g to 30g protein per day. In hyper metabolic critical trauma patients, protein degradation and synthesis typically increase in connection with a net loss. After injury, energy production becomes increasingly protein dependent and for this reason 1.5g – 2.0g of protein per kilogram of ideal body weight is recommended. Protein is more satiating than carbohydrate or fat, and high-protein diets (25%-35% of energy) are commonly used for weight loss.

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High-protein diets usually replace carbohydrate with protein and may be low or high in saturated fat (Clifton and Keogh, 2011). Medical nutrition therapy plays a major role in diet management of trauma patients and macronutrient composition has been debated for a long time. However, there is increasing evidence that a modest increase in dietary protein intake above the current recommendation is a valid option toward better weight control and weight reduction, maintain blood pressure, lipid profile, and biomarkers of inflammation. Increasing the protein intake to 1.5-2 g/kg (or 20-30% of total caloric intake) during weight reduction has been suggested for overweight and obese patients with type 2 diabetes and normal kidney function. In addition, a higher dietary protein intake reduces hunger, improves satiety, increases thermogenesis, and limits lean muscle mass loss during weight reduction using a reduced calorie diet and increased physical activity (Hamdy and Horton, 2011). Food fortification and food value addition with functional foods are continued to be an important tool, not only to promote a general state of wellbeing in different populations, but also to prevent diseases. The identification and development of fortifying agents that guarantee product

Table 1. Formulation and Incorporation of High Biological Value Protein Powders

S.No	Ingredients	Quantity (g)	Whey Protein Powder			Soy Protein Isolate powder			Egg White Powder			Skimmed Milk Powder (Standard)		
			I	II	III	I	II	III	I	II	III	I	II	III
1	Ragi	30	5	10	15	5	10	15	5	10	15	5	10	15
2	Wheat	10												
3	Maize	10												
4	Whole Bengal gram	10												
5	Whole horse gram	10												
6	Whole green gram	10												
7	Peas	10												
8	Cow peas	10												

quality and high bioavailability are technological and scientific challenges (Karmes *et al.,* 2016). Some of the highest-quality proteins like whey protein, soy protein isolate, egg white powder, skimmed milk powder and so on are available for commercial use. The basis for the high-protein quality value of whey protein is that it contains higher concentrations of branched-chain amino acid (BCAA) and essential amino acids than other sources of protein. Additionally, whey protein contains a number of peptides and protein fractions that promote general health and well-being (Baldwin, 2010). With this view the present study is carried out to formulate and evaluate the functional foods based protein mix for critically ill patients intervention strategies namely nutrition educaion and health mix supplementation on selected trauma patients.The investigator recognizes the significance of functional food based approach which is easily available and affordable to prevent the complications related to critically ill conditions and also maintain their health status.

Objectives

- Formulate and evaluate the cereal and pulse based health mix.
- Value addition of high quality protein isolates to the formulated health mix and
- Incorporation and the Sensory evaluation of the value added health mix.

MATERIALS AND MATHODS

Phase I- ***formulation of the cereal and pulse based health mixes***

Selection of ingredients

Variety of cereals and pulses were selected for the presence of macro and micro nutrients and functional foods in it and used for the formulation of health mix. The selected cereals and pulses are listed in Table I. In addition to below mentioned cereals and pulses some of the high biological value protein isolates were used for value addition and are, Whey protein powder, Soy protein isolates, Skimmed milk powder and Egg white powder.

This list of cereals, pulses and high biological value protein isolates were used for the formulation and value addition of health mix, as its cost effectiveness and nutrient content and also easy usage of these health mixes among the various age and sex, physical activities and income groups whoever having the problems of critical illness.

Formulation of value added cereal-pulse based health mix

A total of twelve variations were prepared using four high biological value protein isolates. Cereals and pulses were used for the preparation of the standard health mix. In the first step, the selected cereals and pulses were thoroughly cleaned, washed and allowed for germination. Germination enhances taste, texture and nutrient contents and converts the complex nutrients into simple nutrients, increases vitamin C and minerals. Availability of nutrients increases due to the action of cytases and pectinases, by breaking the walls of cells, reduces the phytic acid content and also decreases the cooking time.Thereby providing variety to the diet. With these nutritional significance, the selected cereals and pulses were germinated and for flour extraction using different quantities of cereals and pulses, the flour was used as the standard for the value addition of high biological value protein.

Incorporation of the high biological value protein powders with the functional foods based health mix

Whey protein has been reported to possess anti- inflammatory or anti-cancer properties and provides an excellent source of essential branched chain amino acids (BCAAs).The major protein fractions in whey are beta-lacto globulin, alpha-lactalbumin, bovine serum albumin and immunoglobulin's (Haug *et al.,* 2007).Soy protein isolate (SPI) is a commercial soy protein product having at least 90 percent protein (dry basis) which has been widely applied in the food industry as an important ingredient due to its nutritional value, desirable functional properties and low cost (Hao *et al.,* 2013). Skimmed milk powder contains calcium present that promotes growth and maintenance of teeth and bones at every stage in life (Devine *et al.,* 2007). The egg white powder is high in protein, a "source" of vitamin A, folate, choline, phosphorus and selenium and rich in vitamin D, riboflavin, vitamin B12, biotin and iodine.

The lipid matrix within the egg yolk is believed to enhance the bio availability of nutrients, such as lutein and zeaxanthin (Heron and Fernandez, 2004). Keeping the above factors in mind, the flour was mixed with four types of high biological value protein powders in different quantity of using 5g, 10g, and 15g in each variation like that, a total of twelve, the cereal and pulse based health mix was used for value addition with whey protein powder, soy protein isolate powder, egg white powder and skimmed milk powder (Standard) in different proportion

Table II highlights the incorporation of high biological protein isolates in different variation

Table 2. Mean acceptability score of health mix incorporated with high biological value (HBV) protein isolate powder

Nutrients	Soy protein isolate powder(SPI)			Whey protein powder(WPP)			Skimmed milk powder(SKM)-Standard			Egg white powder(EWP)		
	Variation1	Variation2	Variation3	Variation1	Variation2	Variation3	Variation1	Variation2	Variation3	Variation1	Variation2	Variation3
Appearance	4.6±0.5	4.9±0.3	4.6±0.5	4.7±0.4	4.7±0.4	4.7±0.4	4.6±0.5	4.6±0.5	4.7±0.4	4.7±0.4	4.8±0.4	4.7±0.4
Colour	4.6±0.4	4.7±0.5	4.7±0.5	4.4±0.5	4.6±0.5	4.7±0.4	4.5±0.5	4.6±0.5	4.6±0.5	4.7±0.4	4.7±0.4	4.6±0.5
Flavour	4.6±0.4	4.7±0.4	4.9±0.4	4.5±0.7	4.5±0.7	4.8±0.7	4.6±0.5	4.7±0.5	4.6±0.5	4.0±0.0	4.0±0.0	3.8±0.4
Taste	4.8±0.4	4.8±0.4	4.8±0.5	4.3±0.4	4.3±0.4	4.8±0.4	4.5±0.5	4.7±0.4	4.7±0.4	4.3±0.4	4.1±0.3	4.0±0.0
Overall acceptability	4.6±0.4	4.7±0.4	4.8±0.4	4.6±0.5	4.5±0.5	4.8±0.5	4.4±0.5	4.6±0.5	4.7±0.5	4.0±0.4	4.4±0.4	4.6±0.7

Table 3. Nutrient content of cereal-pulse based health mix incorporated with high biological value protein powder

Nutrients	Whey protein powder			Skimmed milk powder			Soy protein isolate powder			Egg white powder		
	Variation1	Variation2	Variation3	Variation1	Variation2	Variation3	Variation1	Variation2	Variation3	Variation1	Variation2	Variation3
Energy (kcal)	419.1	437	455.7	418.6	436.5	454.3	416.6	434.5	450.6	403.4	406	408.6
Carbohydrate (g)	76.5	78.4	80.7	77.5	80.1	82.7	75.2	75.5	76	75.9	76	76.2
Protein (g)	15.5	17.8	20	15.1	16.8	18.5	17.3	21.3	25.4	14.2	14.6	15
Fat (g)	1.92	1.92	1.92	1.94	2.0	2.1	2	2.2	2.3	1.92	1.92	1.92
Calcium (mg)	163.2	147.3	131.3	222	264.8	307.6	170.8	162.5	154.2	162.1	144.9	127.7
Iron (mg)	4.3	4.1	4.1	4.2	4	3.82	4.9	5.4	6	4.2	4	3.82
Phosphorous(mg)	279	282	285	312	347	382	280.7	283.2	285.9	264.8	263	237.6
Riboflavin (mg)	0.20	0.19	0.18	0.28	0.36	0.43	0.20	0.19	0.18	0.20	0.19	0.18
Vitamin-C (mg)	2.10	2	1.98	2.10	2	1.98	2.10	2	1.98	2.10	2	1.98
Dietary fiber (g)	3.32	3.14	2.96	3.32	3.14	2.96	3.6	3.7	3.8	3.32	3.14	2.96

Phase II **Nutritional evaluation of the formulated cereal-pulse based high protein health mixes**

Sensory evaluation of the formulated cereal-pulse based high protein health mixes

Scientific methods of sensory analysis of foods is becoming increasingly important in assessing the acceptability of food products .Sensory evaluation is a method of subjective evaluation that evaluates food quality like color, taste, flavor and texture (Sethi and Rao,2011) and evaluation by a group of panel members

Shelf life analysis and cost effectiveness of the value added cereal-pulse based health mix

The shelf life of a product can be defined as the time phase in which the product is safe and has acceptable qualities to be purchased and consumed (Malshe *et al.,* 2012).The formulated twelve variations were treated for shelf life study and were packed in different HDPE bags and stored at ambient temperature for the period of two months. It was observed for 30 days and 60 days and the products were subjected to find out the keeping quality (shelf life) and nutrient content. Microbial load estimation for the healthmix samples were carried out for fresh, 30 and 60 days old samples of health mix.

The formulated recipes should be in such a way that it is reachable to the consumer. The cost of 100g of value added health mix was calculated by computing the cost of raw ingredients purchased from the departmental stores at the time of products preparation.

RESULTS AND DISCUSSION

Results are discussed under the following headings

Acceptability trial of health mixes incorporated with high biological value protein isolate

Protein isolates are rich in Branched Chain Amino Acids (BCAA) which is must for protein synthesis, the process by which muscle fibers grow and contain less amount of fat which helps to reduce cardiovascular disease. It also has high Protein Digestibility Corrected Amino Acid Score (PDCAAS). Considering these benefits whey protein powder, skimmed milk powder, soy protein isolate and egg white powder are incorporated in different variations in health mix.

Table II gives the mean acceptability scores of health mixes incorporated high biological value protein isolate.

After incorporating HBVprotein isolate powders in the health mix, the appearance was as same as for all variations except for Soy protein isolate that had high value (4.9±0.3).The colour of the variations was higher than the Standard health mix.The score for flavour was high for the variations with SPI (4.9±0.4)and WPP (4.8±0.7).The taste factor was comparatively had higher score for both the variations with SPI and WPP that is 4.8±0.5 and 4.8±0.4. Respectively.Majority of panel members stated that the health mix with the Soy protein isolate variation III was highly acceptable with the overall acceptability score of 4.8±0.4 even though the health mix incorporated with whey protein powder varition III had higer score of 4.8±0.5 for overall acceptability.

Nutritive value of the formulated cereal-pulsebased health mixes

Nutrient analysis refers to the process of determining the nutritional content of foods and food products. Table-III presents the nutrient content of health mix incorporated with different proportion high biological value protein powders. From the above Table III the nutrient analysis clearly shows that the health mix incorporated with soy protein isolate powder variation III had the higher amount of protein of 25.4g and energy (450.6 Kcal) and supplied less amount of carbohydrate of 76g among the other mixes.The Iron content of the same variation was comparatively higher among the all mixes that is 6 mg

Assessing microbial content and cost effectiveness

Among these variations the maximum mean value scored health mixes undergone for microbial testing in which the standard obtained values were $25.5x10^3$, $27.5x10^3$, $29.2x\ 10^3$ for fresh sample, 30days and 60 days of shelf life respectively. The health mix incorporated with 15 percent whey protein powder was $27.4x10^3$, $32x10^3$, $38.5x10^3$ for fresh sample, 30days and 60 days of shelf life respectively. The health mix incorporated with 15 percent skimmed milk powder was $35.5x10^3$, $46.3x10^3$, $54.5\ x\ 10^3$ for fresh sample, 30days and 60 days of shelf life respectively. The health mix incorporated with 15 percent soy protein isolate powder was $107x10^3$, $118.6x10^3$, $221.5\ x\ 10^3$ for fresh sample, 30days and 60 days of shelf life respectively. The health mix incorporated with 15 percent egg white powder was $75x10^3$, $84x10^3$, $96\ x\ 10^3$ for fresh sample, 30days and 60 days of shelf life respectively. The results show that the microbial content increases by the increasing storage days. Only meager amount of microbial growth is seen among these variations whey protein incorporated health mix had longer shelf life. The cost calculation of the formulated health mixes showed that the cost of health mix incorporated with whey protein powder ranges from Rs.14 for 100g and the cost of health mix incorporated with skimmed milk powder ranges from Rs.11 for 100g and the cost of health mix incorporated with soy protein isolate powder ranges from Rs.14 for 100g and the cost of health mix incorporated with egg white powder ranges from Rs.15 for 100g of food samples.

Conclusion

Health mix is one of the most significant products and with the incorporation of functional foods like soya protein isolates which is used widely in the Medical Nutrition therapy due to its high biological value and many preventive health benefits.The results obtained from the study evident to review that the proportion of high quality protein isolates increases, the scores for overall acceptability also increases. These results also evident to note that the high quality protein isolate can be blended easily in the health mixes and in common recipes.

REFERENCES

Baldwin, AJ. 2010. Insolubility of milk powder products a mini review. *Journal of Dairy Science Technol.,* Vol. 90, P. 169-179

Clifton PM, Keogh J. 2011. Metabolic effects of high-protein diets., *Diabetes Metabolic Research Rev.,* 27(3):230-2.

Hao, X, Jiangui, L., Qinghuas, 2013. Characterization of a novel Legumin alpha amylase inhibitor from chickpeas, Seeds bioscience, *Biochemistry*, Vol. 73 No. 5, Pp. 1200-1205.

Hamdy O, Horton ES. 2011. Protein content in diabetes nutrition plan., *Curr Diab Rep.,* 11(2):111-9.

Karmes, E and Harris, R.S. 2006. General discussion on the stability of nutrients, *Journal of Food Science and Nutrition,* Vol. 56, Pp. 234-242.

Slone, D.S. 2004. "Nutritional Support of the critically injured patient",in TraumaEdtrs:John C.,Mary Berry, M.Screiber, Critical care clinics of North America, 20(2),Pp no .135-157.

Schryver et al, 2006. Schryver T, Smith C. Participant's willingness to consume soy foods for lowering cholesterol and receive counseling on cardiovascular disease by nutrition professionals.

Sethi, M. And Rao, E.S. 2001. "Foodscience:Experiments and Application,Meenakshi Printers,Delhi,pp.189-195

Schmeltz LR1, Ferrise C. 2012. "Glycemic management in the inpatient setting", Hospital Practice, 40(2):44-55. doi: 10.3810/hp.2012.04.969.

Yadav C.P. 2002. Management of Hotel and Catering Industry. Samba publishers; Pp. 79.

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