Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

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Product development of over nutrition and under nutrition and effect of dietary intervention on anthropometric and biochemical parameters

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Abstract
Malnutrition is the most underrated problem faced by India. Over nutrition and under nutrition has pose a threat to human health. According to 'The State of Food Security and Nutrition in the World, 2020' report 14 per cent of India's population is undernourished. The present study aims to develop a product for over nutrition and under nutrition. Nutritional value of developed product was Analysed & calculated. Effect of dietary intervention on anthropometric and biochemical parameters was evaluated. Significant results was found for anthropometric and biochemical parameters.

Keywords: High fibre multi grain momo, nutri dense laddoo, anthropometric, biochemical

Introduction
Over Nutrition and under nutrition is a form of Malnutrition. Deficiencies and excesses in an individual's intake of nutrients is malnutrition. Under nutrition is characterized by an insufficiency of nutrients and energy supply, whereas over nutrition is characterized by uncontrolled nutrient and energy intake (Human Nutrition).

According to WHO, malnutrition, 2020, 1.9 billion adults are overweight or obese, while 462 million are underweight. The developmental, economic, social, and medical impacts of the global burden of malnutrition are serious and lasting, for individuals and their families, for communities and for countries (WHO malnutrition, 2020). Under Nutrition makes vulnerable to disease and death. Deficiency of Iodine, vitamin A, and iron are the most important in global public health terms, posing a major threat to the health and development of populations worldwide, particularly children and pregnant women in low-income countries.

Accumulation of excessive fat can impair health. In adults, overweight is defined as a BMI of 25 or more, whereas obesity is a BMI of 30 or more. Combating malnutrition in all its forms is one of the greatest global health challenges. Being underweight is linked to nutritional deficiencies, especially iron-deficiency anaemia, and to other problems such as delayed wound healing, hormonal abnormalities, increased risked to infections and some chronic diseases such as osteoporosis. In the present study locally available resources were utilised to developed a product and effect on its intervention in anthropometric and biochemical parameters was experimented.

Methodology
This study was conducted in college of Community Science, CAU, Tura, Meghalaya. High Fibre multi grain momo and Nutri Dense laddoo Product were developed by locally available resources. Nutritional values of developed product were analysed by following methods. Sugar, Iron, Zinc and Phosphorus was analysed by AOAC 20th Edition method. Energy and Carbohydrate was estimated by UN FAO Chapter 3,2003. Moisture, Total Ash, Reducing Sugars was estimated through FSSAI Manual. Total Fat by GL/SOP/C-196. Protein by IS:7219:1973 and Dietary Fibre by clause 5 of IS: 11062 and by referring Indian Food Composition Tables(Longvah *et. al*, 2017). IEC was constituted at college level, ethical clearance was taken to conduct project work. Subjects were consented. Sample size of 30 in experimental (n=30) and 30 in control (n=30) were taken, in both to be experiment developed products (High Fibre multi grain momo and Nutri Dense laddoo).

Anthropometric measurement
Anthropometric measurement was done using weighing scale and height measuring scale. Waist circumference and hip circumference were measured using measuring tape. Standard procedures by WHO from guide to physical measurements were referred to measure all the

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Anthropometric measurements. Height is measured in cm and weight in kg. BMI (Body mass index was calculated by using measured height and weight. Waist circumference and hip circumference were also measure and waist hip ratio (WHR) was calculated.

Biochemical parameters
Biochemical parameters like Cholesterol, Tryglycerides, High Density Lipo protein, Low Density Lipo Protein, were determined. Lipidocare analyzer was used to analyse Lipid profiles.
The subjects were farm women of moderate worker aged 30-50 years. Body Mass Index of volunteered subjects for over nutrition was >22.9 and for under nutrition it was <18.5. Subjects voluntarily participated in the study. Written consent was taken at first. The purpose of the study were briefed and explained to the Volunteers. Blood sample was drawn by medical personnel at the initial stage and parameters like Cholesterol, Tryglycerides, High Density Lipo protein, Low Density Lipo Protein, were determined for pre-test.

Dietary intervention was done for 120 days duration by substituting $1/3^{rd}$ of their Recommended Dietary Allowance RDA. The develop food product mix was packed in small packets and it was of 50 gm. Subject were instructed to prepare and take the product at home. Blood samples were drawn again to analyse parameters like Cholesterol, Tryglycerides, High Density Lipo protein, Low Density Lipo Protein, were determined for pre-test after the dietary intervention.

Statistics: Analysis of data was done by two tailed paired t test, significant level was established at 0.05 level.

Result and Discussion
High Fibre multi grain momo contains high level of Total dietary Fibre and low level of fat, less in energy. Whereas, Nutri Dense laddoo is high in energy, protein, fat and calcium. The result is shown in Table 1.

Table 1: Nutrient composition of developed product RTU High fibre multigrain momo and Nutri dense laddoo

Name of the product	Moisture (g)	Protein (g)	Fat (g)	Ash (g)	Crude Fibre (g)	CHO (g)	Energy (Kcal)	Total Dietary fibre (g)	Calcium (mg)	Iron (mg)	Zinc (mg)
High Fibre multi grain momo	133.6	24.29	2.63	2.93	0.33	80.88	447.19	20.95	135.39	6.4	18.85
Nutri dense laddoo	25.13	10.46	17.96	0.40	-	46.52	935.35	4.01	61.18	1.78	1.36

The results in Table 2 shows effect of dietary intervention on anthropometric parameters. The result has same effect in the study done by Hammad, 2017, where dietary fibre has an effect on anthropometric parameters. Significant result was found in both experimental group and control group.

Table 2: Effect of dietary intervention on anthropometric parameters of obese subjects and underweight subjects

Name of Product	BMI						WHR					
	Experimental(n=30)			Control(n=30)			Experimental (n=30)			Control(n=30)		
	Pre	Post	t value	Pre	Post	t value	Pre	Post	t value	Pre	Post	t value
High Fibre multi grain momo	30.03	28.88	1.93*	30.65	30.69	0.52*	0.88	0.86	9.9ns	0.88	0.88	0.8*
Nutri dense laddoo	15.48	16.48	1.70*	17.18	17.21	0.4*	0.76	0.75	0.69*	0.79	0.79	0.37*

The results in Table 3a shows effect of biochemical parameters on dietary intervention in obese subjects and Table 3 b of under weight subjects. Significant change was found at High Density Lipo Protein for obese experimental subjects. Significant result was found for Total cholesterol, ldl and HDL for control group in obese subjects.

Table 3a: Effect of dietary intervention on biochemical parameters of obese subjects

High fibre multigrain momo intervened subjects							
Subjects	Total cholesterol (mg/dl)		Triglyceride (mg/dl)		LDL (mg/dl)		HDL (mg/dl)
Exp.(n=30)	190.03	186.03	138.41	134.83	106.47	101.51	55.89	57.56
	(t=9.80 ns)		(t=9.0 ns)		(t=3.97 ns)		(t=1.20*)	
Control(n=30)	185.03	184.40	139.27	138.37	106.11	105.53	51.07	51.2
	(t=0.0*)		(t=4.12ns)		(t=0.10*)		(t=0.40 *)	

Table 3b: Effect of dietary intervention on biochemical parameters of under weight subjects

Nutri dense laddoo intervened subjects												
Subjects	Total cholesterol (mg/dl)			Triglyceride (mg/dl)			LDL (mg/dl)			HDL (mg/dl)		
	Pre	Post	t value	Pre	Post	t value	Pre	Post	t value	Pre	Post	t value
Exp.(n=30)	106.8	107.6	0.16*	74.3	74.5	0.4*	69.1	69.7	0.6*	55.6	55.8	0.10*
Control(n=30)	107.8	107.9	0.09*	69.6	69.7	0.32*	74.1	77.9	5.48ns	59.13	59.8	0.05*

*significant at 0.05 level; ns: Non-Significant, HDL: High Density Lipoprotein, LDL: Low Density Lipoprotein

Statistically significant result was found for Total Cholesterol, Triglycerides, LDL and HDL for experimental group of Nutri Dense ladoo. Significance level at 0.05 level was also found for control groups of nutri dense subjects except in LDL parameter.

Conclusion
This study shows that there is beneficial is consuming high fibre diet for management of body weight in over nutrition subjects. It was evident from the study that high fibre multi grain momo is statistically significant. Nutri dense laddoo rich

in energy is also statistically significant. Hence it is also beneficial for the underweight subjects.

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