Research Paper

Home Science

Nutritional Approaches to Tackle Obesity: A Cause of Non Communicable Diseases

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ABSTRACT

Obesity has become a major problem in India in the 21st century with morbid obesity affecting 5% of the country's population. It also leads to other non communicable diseases affecting the productivity of the nation. Legumes are a good source of fibre, antioxidants, phytochemicals and unsaturated fatty acids. So in this research work, Instant idli has been prepared by using legume extract-bovine milk blends. Legumes soybean, pigeonpea, chickpea and cowpea extracts (SoE, PiE, ChE and CoE) were prepared and blended with bovine milk (BM) at 50% ratio. Proximate and mineral analyses of these extracts were also done. Results indicated that SoE, PiE, ChE and CoE were found to be a good source of protein, fat and carbohydrates. On the basis of overall acceptability of Instant idli, standard got the first place which was followed by variants A, E, B, C and D respectively. Except variant A, significant difference was found in variants B, C, D and E when compared with standard but all the variants were acceptable.

KEYWORDS

Bovine milk, Instant idli, Legume extract, Obesity.

Introduction:

Obesity is a state in which there is a generalized accumulation of excess adipose tissue in the body leading to breathlessness on moderate exertion and predisposes a person to diseases like atherosclerosis, high blood pressure, stroke, diabetes, gall bladder diseases and osteoarthritis of weight bearing joints (Ramachandran et al., 1997). For obese people, low calorie diet and physical exercise are preferred. Satiety value of diet is extremely important so vegetables and fruits should be included to produce bulk in the diet. Bovine milk is high in saturated fat which is again a cause of obesity (Tholstrup, 2006). To overcome this problem, legume extract-bovine milk blends were used to prepare curd which was further used for the preparation of *Instant Idli*. So in this research work, SoE, PiE, ChE and CoE were prepared using household processing methods. Thereafter, proximate principle and mineral analysis (calcium and iron) of these extracts were carried out. SoE, PiE, ChE and CoE were blended with BM in the ratio of 50:50 to prepare Instant idli.

Methodology:

Preparation of legume extracts using appropriate household processing methods:

JS-335 of soybean, Bahar of pigeonpea, RSGK-6 of chickpea and RC-101 of cowpea varieties were used to prepared legume extracts. Extracts of the four legumes were prepared by improvising over a method of *Omueti and Ajomale* (2005) and the salient steps of the method are given as here under:
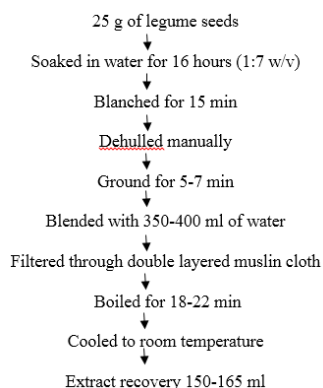
25 g of legume seeds
↓
Soaked in water for 16 hours (1:7 w/v)
↓
Blanched for 15 min
↓
Dehulled manually
↓
Ground for 5-7 min
↓
Blended with 350-400 ml of water
↓
Filtered through double layered muslin cloth
↓
Boiled for 18-22 min
↓
Cooled to room temperature
↓
Extract recovery 150-165 ml

Fig.1 Flow chart elucidating preparation of legume extracts

Nutrient and mineral analysis:

Moisture, ash and crude fibre of legume extracts and their raw forms were determined by AOAC (2000) method. Crude protein and crude fat were determined by the Micro- Kjeldahl and Soxhlet

extraction method respectively. Carbohydrates were obtained by difference method. Calcium and iron were estimated by following the AOAC (2000) method.

Method of preparation of *instant idli* with variants and its sensory evaluation:

For standard recipe, semolina was added in sour curd. Salt and eno's powder were mixed in it. It was steamed immediately. Idli was allowed to cool and cut into 4 pieces. Vegetables were chopped finely. Oil was heated in a pan and all the seasoning was added in it followed by chopped vegetables and *Idli*. In variant A, soy extract-bovine milk (50:50) blend curd was used in place of bovine milk curd. Rest of the procedure was followed same as that of control. In variant B, pigeonpea extract-bovine milk (50:50) blend curd was taken for making the recipe. Same method was used to make *Instant idli* as that of control. In variant C, chickpea extract-bovine milk (50:50) blend curd was added in the recipe. Rest of the method was same as that of control. In variant D, cowpea extract-bovine milk (50:50) blend curd was selected to prepare the *Instant idli* along with the same procedure. In variant E, four legume (soybean, pigeonpea, chickpea and cowpea) extract-bovine milk (50:50) blend curd was chosen for the recipe following the standard procedure (Table no.1). Their sensory evaluation was carried out by using nine point hedonic rating scale.

Results:

Proximate and mineral analysis:

Proximate analysis of legumes and their extracts was shown in table no. 2. Mean values of moisture content was found to be highest in PiR (10.66 ±.10 g/100g) and lowest in SoR (08.41±.01). Same pattern was also seen in their extracts. To compare the nutritive values of legume extracts, nutrient content of BM was also estimated; mean value of moisture content of BM stood 88.33±.58. Except PiE, no significance difference was observed among SoE, ChE, CoE and BM. Total ash content was found to be highest in SoR (04.83±.01 g/100g) followed by PiR (04.00 ±.10 g/100g), CoR (03.72±.05 g/100g) and ChR (3.17±.02 g/100g). Similar trend was also seen in their extracts. BM got highest mean value of ash

content *i.e.* 00.73±.01 g/100 ml when it was compared with ash content of legume extracts. No significant difference was found among them except PiE. Protein content of SoR, PiR, ChR and CoR was 39.33 ±.11 (g/100g), 22.58±.03 (g/100g), 23.30±.43 (g/100g), and 24.28±.26 (g/100g) respectively. Protein content in SoE was found to be highest i.e. 04.76±.23 (g/100ml). ChE, CoE and BM had near the same mean value of protein content i.e. 03.50 ±.10, 03.17 ±.15 and 03.53±.02 respectively. Lowest value was observed in PiE (01.62±.02 g/100ml). Significant difference was observed in SoE and CoE when it was compared with BM. Fat content of SoR, PiR, ChR and CoR was found 19.32 ±.02 g/100g, 01.50±.10 g/100g, 03.50±.10 g/100g and 01.50±.02 g/100g which depicts that SoR is a good source of fat especially unsaturated fatty acids. Though other legumes had fewer amounts of fats, these are healthy food especially for middle age and elderly. SoE competed with BM fat content; values were 02.36±.04 g/100ml and 03.41±.01 g/100ml respectively. Other ChE, CoE and PiE had very less amount of mean value of fat content 00.87 ±.06 g/100ml, 00.18 ±.01 g/100ml and 00.16±.00 g/100ml respectively. No significant difference was observed among them. Crude fiber content in SoR, PiR, ChR and CoR was 03.53±.15, 06.12±.03, 03.63±.36 and 03.78±.32 g/100g respectively. Removal of outer husk of legumes in the preparation of extracts decreased fibre content. Mean value of fibre content of SoE, PiE, ChE and CoE was found to be 00.32±.01, 00.47±.01, 00.32 ±.01 and 00.35 ±.02 respectively. Since BM does not have fibre content, no value was obtained for it. Legumes are good source of carbohydrates. PiR, ChR and CoR had mean value of carbohydrates 54.92±.06 g/100g, 55.19±.25 g/100g and 56.28±.48 g/100g. In comparison with PiR, ChR and CoR , SoR had less amount of carbohydrates i.e. 24.25 ±.12 g/100g. Its content decreased in legume extracts because of the addition of water in preparing extracts. Mean value of SoE, PiE, ChE and CoE was found to be 04.49±.18, 03.95±.05, 05.63±.06 and 05.77±0.15 g/100 ml respectively. Except PiE, no significant difference was observed among legume extracts and BM i.e. 04.31±.05 g/100ml. The highest mean value of calcium was found in SoR (272.33±6.42 mg/100g) while the lowest was observed in CoR (68±1 mg/100g). And same pattern was seen in their extracts. While BM had the highest mean value of calcium (124±1 mg/100g) when compared with SoE, PiE, ChE and CoE. Significant difference was observed among SoE, PiE, ChE, CoE and BM. Legumes are considered to be a good source of iron in comparison with milk. In their uncooked form, SoR (8.83±.11 mg/100g) got first place followed by CoR (6.85±.01 mg/100g), ChR (6.60±.1 mg/100g) and PiR (4.26±.11 mg/100g). Same trend was also observed in their extracts. Significant difference was also seen in SoE, PiE, ChE, CoE and BM. Proximate composition and minerals are given in table no. 2 and 3 respectively.

Sensory evaluation of *Instant idli:*
On the basis of overall acceptability, standard got the first place which was followed by variants A, E, B, C and D respectively. Significant difference except variant A was found in variants B, C, D and E when compared with standard but all were liked. Sensory evaluation and nutritive value of *Instant idli* along with variants have been mentioned in figure no.2 and table no.4 respectively. Jain et al. (2014) prepared *Idli* using semolina and curd. Its three variants incorporating soyfibre (15%), roasted soyflour (15%) and defatted soyflour (15%) were developed and subjected to sensory and chemical analysis. Soyfibre added *Idli* was like *Plain idli* in sensory attributes. Roasted soyflour added product had highest fat and protein. There was a significant difference between nutrient content of *Idlis* (p<0.05). Glycemic index (GI) was also evaluated. *Plain idli* had highest GI (66.50%). Soyfibre added *Rawa idli* had lowest GI (37.22). Addition of soy in *Rawa idli* significantly reduced the GI.

Conclusion:
According to a study published in the noted journal Lancet, India is just behind US and China in global hazard list with highest number of obese people. Dietary approach also plays an important role in the prevention and management of obesity. On the basis of nutritional and sensory evaluation of legume extract-bovine milk blends it can be concluded that this combination can be used for the preparation of many food products. The sensory evaluation of *Instant idli* showed that this recipe is also a good option for obese people.

Table no. 1. Ingredient used in the recipe *Instant idli* with variants (A, B, C, D and E)

| Ingredients	Standard (g)	Variant A (g)	Variant B (g)	Variant C (g)	Variant D (g)	Variant E (g)
Semolina	30	25	25	25	25	25
Black gram dhal	5	-	-	-	-	-
Soybean flour	-	5	-	-	-	1.25
Pigeonpea flour	-	-	5	-	-	1.25
Chickpea flour	-	-	-	5	-	1.25
Cowpea flour	-	-	-	-	-	1.25
Soybean dhal	-	5	-	-	-	1.25
Pigeonpea dhal	-	-	5	-	-	1.25
Chickpea dhal				5	-	1.25
Cowpea dhal	-	-	-	-	5	1.25
Curd	25	25	25	25	25	25
Onion	10	10	10	10	10	10
Cucumber	10	10	10	10	10	10
Tomato	10	10	10	10	10	10
Cabbage	10	10	10	10	10	10
Asafetida	1 pinch	1 pinch	1 pinch	1 pinch	1 pinch	1 pinch
Mustard seed	1/4 t	1/4 t	1/4 t	1/4 t	1/4 t	1/4 t
Red chilli whole	1 small	1 small	1 small	1 small	1 small	1 small
Curry leaves	1 sprig	1 sprig	1 sprig	1 sprig	1 sprig	1 sprig
Salt	To taste	To taste	To taste	To taste	To taste	To taste
Eno's powder	1 t	1 t	1 t	1 t	1 t	1 t
Oil	2	2	2	2	2	2
Total	**102**	**102**	**102**	**102**	**102**	**102**

Curd was made in variant A by using soybean extract-bovine milk blends (50%50), in variant B by incorporating pigeonpea extract-bovine milk blends (50%50), in variant C by adding chickpea extract-bovine milk blends (50%50), in variant D by mixing cowpea extract-bovine milk blends (50%50) and in variant E by using four legume (soybean, pigeonpea, chickpea and cowpea) extract-bovine milk (50:50).

Table no. 2. Mean value of proximate principles of legumes and their extracts

	Moisture (%)	Ash (%)	Protein (%)	Fat (%)	Fibre (%)	Carbohydrate (%)
SoR	08.41±.01	04.83±.01	39.33 ±.11	19.32 ±.02	03.53 ±.15	24.25 ±.12
PiR	10.66 ±.10	04.00 ±.10	22.58±.03	01.50±.10	06.12±.03	54.92±.06
ChR	10.47±.38	3.17±.02	23.30±.43	03.50±.10	03.63±.36	55.19±.25
CoR	09.60±.10	03.72±.05	24.28±.26	01.50±.02	03.78±.32	56.28±.48
SoE	87.33±.30	00.48±.01	04.76±.23	02.36±.04	00.32±.01	04.49±.18
PiE	93.10±.65	00.37±.06	01.62±.02	00.16±.00	00.47±.01	03.95±.05
ChE	89.17 ±.21	00.27 ±.01	03.50 ±.10	00.87 ±.06	00.32 ±.01	05.63 ±.06
CoE	89.97 ±.95	00.28 ±.01	03.17 ±.15	00.18 ±.01	00.35 ±.02	05.77 ±0.15
BM	88.33±.58	00.73±.01	03.53±.02	03.41±.01	-	04.31±.05

Table no. 3. Mean value of minerals of legumes and their extracts:

	SoR	PiR	ChR	CoR	SoE	PiE	ChE	CoE	BM
Calcium (mg %)	272.33±6.42	120.33 ±1.41	222.16±2.02	068.00±1	025.00±1.55	019.00±1	021.67±1.52	017.00±1	124.00±1
Iron (mg %)	8.83±.11	4.26±.11	6.60±.1	6.85±.01	0.88±.01	0.53±.01	0.75±.01	0.78±.01	0.25±.01
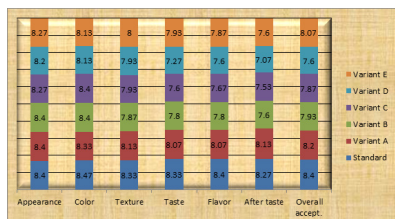
Fig/pic. 2: Mean sensory evaluation (9 point hedonic) scores of standard and variants of *Instant idli*

Table no. 4. Nutritive composition of the instant idli and its variants per 100 gram:

	Energy (kcal)	Protein (g)	Fat (g)	Carbohydrates (g)
Standard	162.50	5.42	3.29	27.79
Variant A	169.60	8.18	4.77	23.63
Variant B	156.58	5.75	2.76	27.16
Variant C	141.95	5.02	2.97	24.42
Variant D	141.25	4.93	2.64	24.41
Variant E	161.50	6.67	3.40	26.18

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