Physicochemical and texture evaluation of Biscuits and Muffins for old age

[1] Bharti Kiran, [2] Singh Neetu

[1] Student M.Sc., Department of Food Science and Technology, School for Home Science, Babasaheb Bhimrao Ambedker University, Lucknow, Uttar Pradesh, India

[3] Assistant Professor, Department of Food Science and Technology, School for Home Science, Babasaheb Bhimrao Ambedker University, Lucknow, Uttar Pradesh, India

Abstract
Various types of natural fibre-rich ingredients are added into bakery-based products to improve their fibre content for health promotional purposes. However, most of these products are frequently added with imported dietary fibre ingredients. Texture analysis of dietary fiber rich biscuits and muffins were done by Texture Analyzer (Make Stable Micro System, U.K, Model TA - XT2). Texture analysis of biscuits was done by two methods (TA and TPA test). TA test was done for measuring cutting force of biscuits and TPA test for firmness, cohesiveness and springiness. Instrumental analysis of muffin textural properties was performed to record hardness, springiness, cohesiveness, resilience and chewiness. The texture of the biscuit was found good in all aspects of texture analysis (Hardness 4175.8g). The texture of the muffins was found good in all aspects of texture analysis. Hardness 693.3g, chewiness 284.8, gumminess 397.26, adhesiveness is nil. The cookies and muffins are easy to taken by elderly peoples to see health benefits from eat.

Keywords: physiochemical, texture, hardness, muffins, biscuits

1. Introduction
Bakery products include biscuit, muffin, cake, bread, pastries and pies. They contain significant amount of flours which are mixed with various other ingredients and ultimately undergo dry-heating process in a baking oven (Cauvain & Young 2007) [7]. Various types of natural fiber-rich ingredients are added into bakery-based products to improve their fiber content for health promotional purposes. However, majority of bakery products are high in carbohydrate, fat and calorie, but low in fiber content (Mishra & Chandra 2012) [4]. These attributes have set them as unhealthy choices for daily consumption. Therefore, manipulating the ingredients used in bakery products with potentially nutritive ingredients would be beneficial to improve the nutritional quality of the baked products. Nutritive value of dietary fiber and energy has increased in the prepared dietary fiber rich muffins when it is assessed in the laboratory, these nutrient were the major area on which study was done and to enhance the muffins dietary fiber and energy content. Other components also increased but the one factor, vitamin content was decreased in dietary fiber rich muffins which is a good for dietary fiber of the muffins.
Dietary fiber is that part of plant material in the diet which is resistant to enzymatic digestion which includes cellulose, noncellulosic polysaccharides such as hemicellulose, pectic substances, gums, mucilages and a non-carbohydrate component lignin. The diets rich in fibre such as cereals, nuts, fruits and vegetables have a positive effect on health since their consumption has been related to decreased incidence of several diseases (Devinder Dhingra *et al*, 2011). American Association of Cereal Chemists (AACC) in 2000 defined dietary fiber as the edible parts of plant or analogous carbohydrates that are resistant to digestion and absorption in the human small intestine with complete or partial fermentation in the large intestine. Dietary fiber includes polysaccharides, oligosaccharides, lignin and associated plant substances. Dietary Fiber promotes beneficial physiological effects, such as laxation, and or blood cholesterol attenuation. (Vikas Rana *et al*, 2011)

2. Materials and methods
2.1 Materials
1. **Raw Materials:** Vegetables used in this study were obtained from Lucknow city in Ashiyana local area. Waste materials used were namely cauliflower (brassicaceae) stems and potato (solanum tuberosum L) peels.
2. **Ingredients:** Sugar, unsalted butter, fresh whole egg, baking powder, milk, orange juice, vanilla essence and orange essence and whole wheat flour were purchased local market of Lucknow area.

2.2 Methods
Preparation of cauliflower stems (cs) and potato peels (pp) powder
The cauliflower stems and potato peels were separated from the washed fresh vegetables, cut into small pieces, separated in tray to rinse water, dries at sun light for 4 days, then grind in laboratory grinder to fine power.

2.3 Sample Preparation
Two samples are taken for experimental in this study, for utilization of vegetable waste as a source of dietary fibre rich food for old age.

2.4 Ratio of ingredients for two samples are taken in different ways

Table 1

Sample	Ingredients	Ratio
T1	Wheat flour +cauliflower stem flour+ potato peel flour+ almond powder+ coconut powder	150:25:25:25:25
T2	Wheat flour +cauliflower stem flour+ potato peel flour	150:25:25

2.5 Dietary fibre rich Biscuit preparation
Ingredients-200gm whole wheat flour, 25gm potato peels powder, 25gm cauliflower stem powder,125gm castor sugar, 1oogm butter, 1/2th tsp baking powder, 1 egg, 1tsp vanilla essence, 1 tsp orange essence, 25gm coconut powder, 25gm, almond powder.

Process
- Combine flour, potato peel flour, cauliflower stem flour, baking powder,
- Butter, sugar, and egg and essence into mixture
- Mix flour with fingertip and add coconut and almond flour. Make smooth dough.
- Roll out the dough to the thickness of 1/4 inch. Cut wid a round biscuit cutter.
- Prick wid a fork, arrange in a baking tray and bake at 180 degree c for about 12-15 minute

2.6 Dietary fibre rich muffins preparation
Ingredients
200 gm. whole wheat flour, 25gm potato peels powder, 25gm cauliflower stem powder,125gm castor sugar, 1oogm butter, 1/2th tsp baking powder, 1 egg, 1tsp vanilla essence, 1 tsp orange essence, 1/2 cup milk, 1/2 cup fresh orange juice,1 tea spoon grated orange peel,1/4 teaspoon baking soda,1/2 teaspoon salt.

Process
- In a large bowl beat the eggs lightly
- Add the butter and milk and beat until just combined then add the sugar and whisk until you have a smooth batter
- Sift in the flour and salt (and baking powder if using) then mix until just smooth.
- Fill muffin cases two-thirds full and baked at 200°c for18-20 minute, until risen, firm to the touch and a skewer inserted in the middle comes out clean.
- Cool it in fridge.

2.7 Nutritional characteristics
The test was determined at the RFRAC (Regional Food Research Analysis Centre) Lucknow. The energy content was determined by Kilo calories/100gram, protein, fat and dietary fibre content was determined by AOAC method. Carbohydrate content was determined by SP: 18 method.

2.8 Texture analysis
Texture analysis of dietary fiber rich biscuits and muffins were done by Texture Analyzer (Make Stable Micro System, U.K, Model TA -XT2).Texture analysis of biscuits was done by two methods (TA and TPA test). TA test was done for measuring cutting force of biscuits and TPA test for firmness, cohesiveness and springiness (Shiv kumar *et al*, 2010). The

soft inner portion of muffin was evaluated. Each muffin was cut into 2.5 cm sided cube, where the upper and lower crusts were eliminated. A 75 mm diameter aluminium plate (P/75) was used for compression. The test was performed under the following states: Test speed: 1 mm/s; strain: 50% and trigger force: 5 g. Muffin cube was compressed twice to obtain the four primary texture parameters (hardness, springiness, cohesiveness and resilience). Chewiness, the only secondary texture parameter, was calculated as the product of hardness × cohesiveness × springiness (Jauharah, *et al,* 2014) [2]. Instrumental analysis of muffin textural properties was performed to record hardness, springiness, cohesiveness, resilience and chewiness (Baixauli *et al*. 2008; Sanz *et al*. 2009) [5].

3. Result and discussion
3.1 Physiochemical and nutritive value characteristic of developed product
3.1.1 Biscuit formulation and preparation

Table 2: Source NIN Hydrabad, 2010

Nutritive Value	Whole wheat flour amount (per 100gm)
Energy	341kcal
Fat	1.7gm
Protein	12.1gm
Carbohydrates	69.4gm
Dietary fiber	1.9gm
Moisture	12.2gm

3.1.2 Distribution of cauliflower stem on the basis of Nutritional value.

Table 3: Source NIN Hydrabad, 2010

Nutritive Value	Cauliflower stem amount per 100 gm
Energy	66kcal
Fat	1.3gm
Protein	5.9gm
Carbohydrates	7.6gm
Dietary fiber	2.0gm
Moisture	88.0gm

3.1.3 Distribution of potato on the basis of Nutritional value

Table 4: Source NIN Hyderabad, 2010

Nutritive Value	Potato amount per 100 gm
Energy	97kcal
Fat	0.1gm
Protein	1.6gm
Carbohydrates	22.6gm
Dietary fiber	0.4gm
Moisture	74.7gm

3.1.4 Distribution of almond on the basis of Nutritional value.

Table 5: Source NIN Hyderabad, 2010

Nutritive value	Almond per 100gm
Energy	655kcal
Fat	68.9gm
Protein	20.8gm
Carbohydrates	10.5gm
Dietary fiber	1.7gm
Moisture	5.2gm

3.1.5 Distribution of dry coconut on the basis of Nutritional value

Table 6: Source NIN Hyderabad, 2010

Nutritive value	Coconut per 100gm
Energy	662kcal
Fat	62.3gm
Protein	6.8gm
Carbohydrates	18.4gm
Dietary fiber	6.6gm
Moisture	5.3gm

3.2 Physiochemical and nutritive value characteristics of developed product

Nutritional value of the developed dietary fiber rich biscuit are assessed in the Food Analysis Laboratory with different specific equipments for each nutritional parameters like dietary fiber, protein, carbohydrate, Total energy, fat, content.

3.2.1 Nutritive value of dietary fiber rich biscuit

Table 7: Source RFRAC, Lucknow

Nutritive value	Dietary fiber rich biscuit
Energy	538 kcal
Fat	32.23%
Protein	8.60%
Carbohydrate	62.30%
Dietary fiber	2.02%
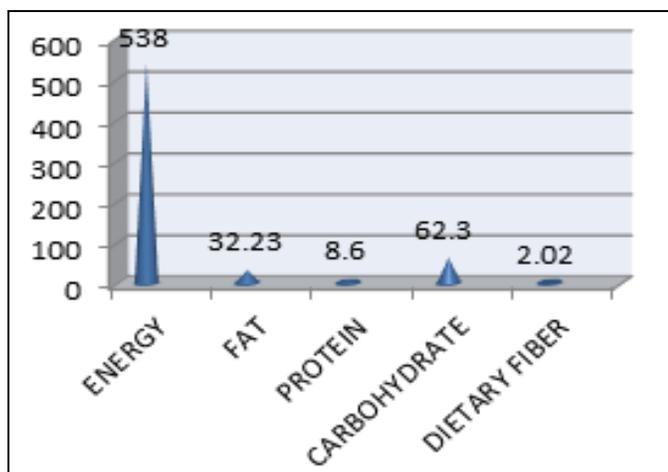
Fig 1: Graphical representation of nutritive value of dietary fibre rich biscuits

3.2.2 Dietary fiber rich muffins nutritive value

Table 8: Source Rfrac, Lucknow

Nutritive value	Dietary fiber rich muffins
Energy	308kcal
Fat	6.82%
Protein	6.13%
Carbohydrate	55.59%
Dietary fiber	12.5%
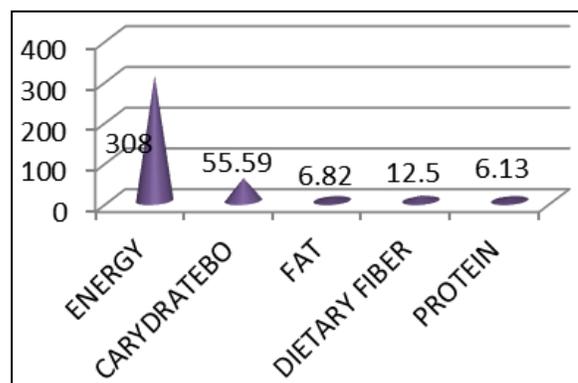
Fig 2: Graphical Representation of nutritive value of dietary fiber rich muffins

3.3 Texture analysis

Texture analysis of the developed dietary fiber rich biscuit are assessed in the Food Analysis Laboratory with different specific equipments for each texture parameters like hardness, adhesiveness, chewiness and gumminess

Biscuit: The texture of the biscuit was found good in all aspects of texture analysis. Hardness 4175.8g

Muffins: The texture of the muffins was found good in all aspects of texture analysis. Hardness 693.3g, chewiness 284.8, gumminess 397.26, adhesiveness is nil.

3.3.1 Texture analysis of Dietary fiber rich biscuit

Table 9: source Allahabad University

Test Parameter	Result (unit)
Hardness	4175.8g

From the above table the amount of hardness is 4175.8 gm per 100gm of sample.
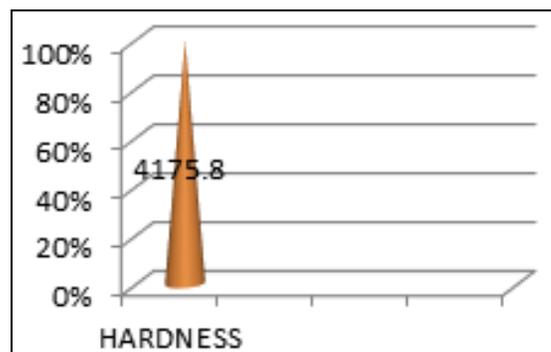
Fig 3: Graphical representation for texture analysis of dietary fiber rich biscuit

3.3.2 Texture analysis of Dietary fiber rich muffins

Table 10: source Allahabad University

Test Parameter	Result (unit)
Hardness	693.8g
Chewiness	284.8g
Gumminess	397.26
Adhesiveness	Nill
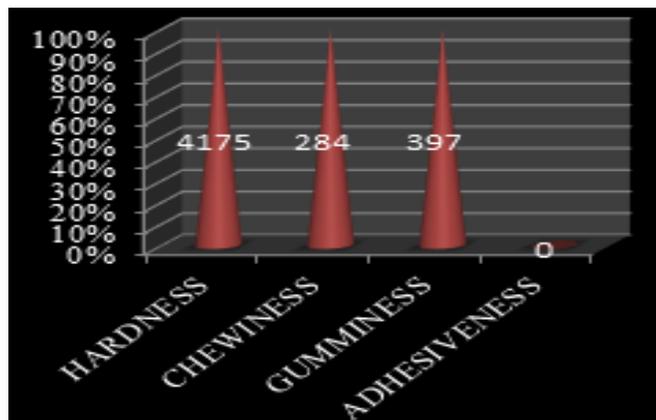
Fig 4: graphical representation for texture analysis of dietary fiber rich muffin

4. Conclusion

Nutritive value of dietary fiber and energy has increased in the prepared dietary fiber rich muffins when it is assessed in the laboratory, these nutrient were the major area on which study was done and to enhance the muffins dietary fiber and energy content. Other components also increased but the one factor, vitamin content was decreased in dietary fiber rich muffins which is a good for dietary fiber of the muffins. The texture of the biscuit was found good in all aspects of texture analysis (Hardness 4175.8g). The texture of the muffins was found good in all aspects of texture analysis. Hardness 693.3g, chewiness 284.8, gumminess 397.26, adhesiveness is nill. The cookies and muffins are easy to taken by elderly peoples to see health benefits from eat. Dietary Fiber promotes beneficial physiological effects, such as laxation, and or blood cholesterol attenuation.

5. References

1. Dhingra D, Michael M, Rajput H, Patil RT. Dietary fibrein foods: a review. Journal of food science and technology. 2012; 49(3):255-66.
2. Jauharah MA, Rosli WI, WAN, Robert SD. Physicochemical and sensorial evaluation of biscuit and muffin incorporated with young corn powder. *Sains Malaysiana*. 2014; 43(1):45-52.
3. Mishra N, Chandra R. Development of functional biscuit from soy flour & rice bran. International Journal of Agricultural and Food Science. 2012; 2(1):14-20.
4. Rana V, Bachheti KR, Chand T, Berman A. Dietary fibre and human health. International Journal Food Safety, Nutrition and Public Health. 2011; 4(2/3/4):101-118.
5. Sanz T, Salvador A, Baixauli R, Fiszman SM. Evaluation of four types of resistant starch in muffins. II. Effects in texture, colour and consumer response. European Food Research and Technology. 2009; 229(2):197-204.
6. Wang R, Zhou W, Isabelle M. Comparison study of the effect of green tea extract (GTE) on the quality of bread by instrumental analysis and sensory evaluation. Food Research International. 2007; 40(4):470-479.