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# Studies On Preparation & Optimization Of Composite Flour Pancakes

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**Abstract**

**This study was undertaken to formulate composite flour which was further blended with refined wheat flour and optimized to make pan cake. Composite flour was prepared by blending of dry Green gram flour (Moong Dhal)- 30%, Barley flour (Jow atta)- 30%, Deoiled Rice Bran flour- 20%, Pearl Millet flour (Bajra atta)- 10% and Finger Millet flour (ragi atta)-10%. Pan cakes were prepared using Refined Wheat Flour (RWF) and Composite Flour (CF) blended in three different proportions 50: 50, 55: 45and 60: 40 respectively on the basis of 40 g sample flour weight. It was observed that the sample prepared with 55: 45 (RWF: CF) blended with 80 g of curd and cooked in microwave oven with 1350 wattage for 2 minutes 30 seconds at P100 (100% power) had the most acceptable results in terms of sensory and chemical characteristics along with texture attributes.**

## Introduction

Availability of nutritious diet is one of the major and foremost concerns of today's civilized world. In general, dietary choices are primarily influenced by the demographic life style and geographic location. But natural and organic healthier foods are universally accepted and demanded by consumers worldwide. (Singh A. et al. 2015). Studies have shown that intake of fatty food leads to chronic metabolic diseases like diabetes, cardiovascular diseases and ageing. Hence, disease prevention through dietary modulation plays a vital role in the present times. Dietary management of fast spreading metabolic disorder disease diabetes mellitus involves the reduction of postprandial hypoglycemia and results in good glycaemic control. Dietary fibre plays a multifaceted in preventing a number of health disorders through their influence in the gastrointestinal tract (Shukla K. et al. 2014). The increasing dietary fiber intake lowers blood pressure and serum cholesterol levels, improves glycaemia and insulin sensitivity in non-diabetic and diabetic individuals. The recommended intake of dietary fiber is ranging from 30 to 45 g per day (Daou C. et al. 2014). Also, it has been illustrated that higher intake of cereal fibre can improve insulin sensitivity and reduce risk of diabetes (Rahaie S. et al. 2014). Coarse grains refer to cereal grains other than wheat and rice or those used primarily for animal feed or brewing. Coarse cereals include maize (Zea mays), sorghum (Jowar; Sorghum vulgare), oats (Jai; Avena sativa), barley (Jow; Hordeum vulgare), pearl millet (Bajra; Pennisetum glaucum) and other minor millets such as finger millets (Ragi; Eleusine coracana). They are rich in dietary energy, vitamins, several minerals (especially micronutrients such as iron and zinc), insoluble dietary and phytochemicals with antioxidant properties (Kaur K.D. et al. 2014).

Millets contains water soluble gum β-glucan, which is useful in improving glucose metabolism. The composition of finger millet is protein 7.3%, fat 1.3%, carbohydrates 72%, crude fibre 3.6%, and mineral 2.7% with calcium 344 mg%. It is one of the richest sources of calcium which is about 10 fold higher as

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compared to other food grains. It has advantages like low cost and better nutritional quality. Therefore millets are suitable for diabetic diet but the characteristic flavour and difficulty in processing are the limitation for its incorporation in diets (Arora S. et al. 2002). Rice bran generated by the milling and polishing of brown rice is a major agricultural waste. Recently, the biological properties of rice bran including its anti-oxidant, anti-dyslipidemia and anti-tumor activities have attracted much attention (Abe T. et al. 2013). It is found that insoluble part of rice bran has high amounts of dietary fibre (62.73%) and protein (8.35%), while B type hemicellulose of rice bran has higher levels of dietary fibres (82.94%) and lower protein amounts (2.69%) (Rahaie S. et al. 2014). Wheat is third most produced cereal after maize and rice. Refined wheat flour has a peculiar property of forming extensible viscous dough upon kneading with water. This property is because of the wheat protein called gluten. The gas produced during fermentation process is arrested by a network of gluten, giving structure to bread. Barley (Hordeum vulgare), contains about 12.5 % moisture, 11.5 % protein, 69.9 % carbohydrate, 1.3 % fat, 3.9 % crude fibre, 1.2 % mineral matter, 0.025 % calcium and 0.215 % phosphorus. It contains a sizeable amount of hydrocolloidal carbohydrates collectively referred to as β- glucans and helps to reduce the cholesterol level (Prakash J. et al. 2015). Among the grain legumes, mung beans are known for its easy digestibility, low flatulence potential and high protein content. Mung beans have been reported to contain 23.8-27% protein, 1.2% fat, 3.3% ash, 62.6% carbohydrate, and 16.3% fibre (Kaur M. et al. 2015). The importance of legumes as component of traditional diets worldwide is based on their high protein, starch and lysine contents (Sashikala V.B. et al. 2015).

**Table 1.0 Nutrient composition of millets and other cereals (**per 100 g edible portion)

| FOOD | Protein(g) | Fat(g) | Ash(g) | Crude fiber (g) | Carbohydrate(g) | Energy(kcal) |
|---|---|---|---|---|---|---|
| **Rice** | 7.9 | 2.7 | 1.3 | 1.0 | 76.0 | 362 |
| **Wheat** | 11.6 | 2.0 | 1.6 | 2.0 | 71.0 | 348 |
| **Pearl millet** | 11.8 | 4.8 | 2.2 | 2.3 | 67.0 | 363 |
| **Finger millet** | 7.7 | 1.5 | 2.6 | 3.6 | 72.6 | 336 |
| **Little millet** | 9.7 | 5.2 | 5.4 | 7.6 | 60.9 | 329 |

Source: (FAO 1998)

Functional foods represent one of the most interesting areas of research and innovation in the food industry. Functional foods are the foods that contain ingredients that provide additional health benefits beyond the basic nutritional requirements. Therefore, the tendency is to produce speciality breads made from whole-grain flour and other functional ingredients known as functional breads. Consumption of such functional breads not only improves the nutritional status of the general population but also helps those suffering from degenerative diseases associated with today's changing lifestyles (Ruiz-Ruiz J.C. et al. 2015).

The present work was done to prepare pan cakes similar to buns (Flat Round Breads) using using blends of refined wheat flour and composite flour in different proportion with an objective of increasing the dietary fibre and protein in the product.

**Materials And Methods**

Refined wheat flour of 'Shakti Bhog' brand was used. Barley under the brand name of 'Mother Organic Flour' and Finger Millet Flour under the

brand name of 'Pure and Sure Organic' was procured through online service by Amazon. Clean, decorticated green gram dhal was procured from the local market of Agra. Dhal was ground into flour of fine particle size. Defatted rice bran flour was procured from Awadh Solvent Industry located in the Bahraich district of Uttar Pradesh. Good quality pearl millet flour was procured from the local market of Agra. Curd under the brand name of Amul Masti Dahi was procured from local market of Agra. Baking Soda and Baking powder for use as chemical leavening agent manufactured by Ajanta Food Product Company was procured from local market of Agra. A good quality rock salt under the brand name of Tata was procured from the local market of Agra. A good quality turmeric powder, red chilli powder and black pepper under the brand name of Catch were procured from the local market of Agra.For the preparation of Nutritional Pancake samples Refined Wheat Flour and Composite Flour (Table 2) was used in 3 different ratios. The amount of leavening agents (Baking Powder and Baking Soda), and spices was same in all the samples (Table 3). A varied amount of curd was taken and added in order to give the mix a batter like consistency. The batter mix was blended thoroughly to get a uniform mixture and poured into a microwave safe plastic mould. The mix was baked in the microwave oven at different time-pulse combinations and the best results were optimized.

The sensory evaluation of the samples was done using Numerical Scoring method to analyze the colour, texture and taste of the product. Texture profile analysis of prepared pancake sample was done using Universal Testing Machine (TA.XT plus Texture Analyser, Stable Micro Systems, Surrey, England, U.K.), interfaced with a personal computer.

**Table 2.0: Composition of Experimental Composite Flour**

| Ingredients | Composition (%) |
|---|---|
| Green gram flour (Moong Dhal) | 30 |
| Barley flour (Jow atta) | 30 |
| Deoiled rice bran flour | 20 |
| Pearl millet flour (bajra atta) | 10 |
| Finger millet flour (ragi flour) | 10 |

**Table 3.0: Experimental Formulation of Pancake for 40 g dry mix**

| Ingredients | 60: 40 ratio (RWF: CF) (in g) | | | 55: 45 ratio (RWF: CF) (in g) | | | 50: 50 ratio (RWF: CF) (in g) | | |
|---|---|---|---|---|---|---|---|---|---|
| | $T_1C_1$ | $T_1C_2$ | $T_2C_3$ | $T_2C_1$ | $T_2C_2$ | $T_1C_3$ | $T_3C_1$ | $T_3C_2$ | $T_3C_3$ |
| Refined Wheat | 24 | 24 | 24 | 22 | 22 | 22 | 20 | 20 | 20 |
| Composite Flour | 16 | 16 | 16 | 18 | 18 | 18 | 20 | 20 | 20 |
| Curd | 75 | 80 | 85 | 75 | 80 | 85 | 75 | 80 | 85 |
| Baking Powder | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Baking Soda | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Salt | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| Turmeric Powder | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Red Chilli Powder | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Black Pepper | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |

**Results And Discussions**

**Chemical analysis of Raw materials (Refined Wheat Flour and Composite Flour)**

The Chemical Analysis of the Raw materials as Refined Wheat Flour (RWF) and Composite Flour (CF) and the result has been summarized as under in table 4.0

**Table 4.0: Chemical Analysis of Raw Materials**

| S.No. | CONSTITUENT | RWF | CF |
|---|---|---|---|
| 1 | Moisture content | 14% | 13.86% |
| 2 | Ash content | 0.9% | 0.9% |
| 3 | Fat | 2.5% | 0.85% |
| 4 | Protein | 11.8% | 9.8% |
| 5 | Gluten | 10.61% | 3.91% |

**Optimization of Baking Parameters**

For the optimization of Baking, Microwave oven (1350 W) with the microwave power of 100 % was used. Pan cakes were baked for 2.0, 2.5, 3.0 and 3.5 minutes respectively. The parameters observed for optimization were crust colour, grain structure and rise in volume. On this basis 2.5 minutes of baking with the microwave power of 100 % was found to be best. The results are given in table 5.0

**Table 5.0: Optimization of Baking Parameters**

| S.No. | Baking Time | Texture | Grain Structure | Volume rise |
|---|---|---|---|---|
| 1 | 2.0min | Soggy | Layer formation | Low |
| 2 | 2.5min | Fluffy | Proper grain | Good |
| 3 | 3.0min | Hard | Proper grain | Good |
| 4 | 3.5min | Hard | Compact grain | Low |

**Sensory Evaluation of the Samples**

For the purpose of Sensory Evaluation all the 9 samples were prepared according to formulation and baked individually for 2.5 minutes in microwave oven. The sensory scores have been depicted in Table 6.0. In sensory analysis the sample $T_2C_3$ was found to be the best.

**Table 6.0: Sensory evaluation of the samples**

| Sample | Appearance 10 | Texture 10 | Taste 10 | Over all Acceptability 30 |
|---|---|---|---|---|
| $T_1C_1$ | 8.44 | 8.22 | 8.08 | 24.7 |
| $T_1C_2$ | 8.56 | 8.36 | 8.20 | 25.1 |
| $T_1C_3$ | 8.24 | 8.25 | 8.10 | 24.5 |
| $T_2C_1$ | 8.19 | 8.35 | 8.47 | 25.0 |
| $T_2C_2$ | 8.24 | 8.43 | 8.48 | **25.1** |
| $T_2C_3$ | 8.22 | 8.27 | 8.14 | 24.7 |
| $T_3C_1$ | 7.50 | 6.53 | 7.33 | 21.3 |
| $T_3C_2$ | 7.46 | 6.55 | 7.45 | 21.4 |
| $T_3C_3$ | 7.35 | 6.58 | 7.26 | 21.1 |

**Texture Profile Analysis of prepared products**

The texture analysis of the prepared samples showed that the sample $T_2C_2$ was having the texture close to the control sample (Bun). It was observed that as the amount of composite flour is increased in the formulation, the hardness increases and it is also affected the grain size of the pan cake. The details of texture analysis are given in table 7. 0

**Table 7.0: Texture Analysis of Prepared Samples**

| S. No. | Sample | +ve Force peak(g) |
|---|---|---|
| 1 | Control | 615.6 |
| 2 | T1C1 | 1014.5 |
| 3 | T1C2 | 1180.6 |
| 4 | T1C3 | 1240.5 |
| 5 | T2C1 | 926.4 |
| 6 | T2C2 | 760.8 |
| 7 | T2C3 | 1412 |
| 8 | T3C3 | 1760 |
| 9 | T3C1 | 1632 |
| 10 | T3C3 | 1825 |

**Chemical Analysis of the optimized pancake**

On the basis of sensory analysis, the most acceptable sample was considered to be sample

T2C2 with Refined Wheat Flour and Composite Flour ratio (RWF: CF) 55: 45. The samples was analysed for their chemical characteristics which are given in the table 8.0.

**Table 8.0: Chemical Analysis of the optimized product (Pan Cake)**

| S.No. | PARTICULARS | VALUE |
|---|---|---|
| 1 | Moisture content | 55% |
| 2 | Ash content | 0.89% |
| 3 | Fat | 6.05% |
| 4 | Protein | 10.8% |

**Conclusion**

On the basis of above results it can be concluded that the pancakes made by 55 % Refined Wheat Flour, 45% Composite Flour and 80 gm curd ($T_2C_2$) was the most acceptable product on the basis of Sensory Analysis and Texture Profile Analysis. The optimization of baking conditions showed optimum baking at 2 minute 30 seconds at 100% microwave power and this sample had the texture closest to the control sample (Bun) available in market.

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