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Studies on cup-cakes incorporated with beetroot and wheatgrass powder

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Abstract
Cup-cakes are enjoyed by all age people and hence they can act as a very good source for providing nutrients. Beetroot is high in betanin and fiber. Wheat grass is traditionally used to treat various diseases. The present investigation was evaluated for preparation of healthy and nutritious cupcakes retaining the beneficial properties of beetroot and wheatgrass. Studies were carried out for the effects of beetroot and wheatgrass powder incorporation on physiochemical, sensory and microbiological properties of cupcakes. Treatment were T_0: control with 100g of wheat flour,T_1: 90g wheat flour, 5g beetroot powder, and 5g wheatgrass powder,T_2: 90g wheat flour, 6g Beetroot powder, 4g wheatgrass powder, T_3: 90g wheat flour, 7g beetroot powder, and 3g wheatgrass powder. Results show that high quality beetroot and wheatgrass cupcake, with good taste and appearance. The indicative optimal formulation for this cupcake was T_1, wheat flour 90%, beetroot 5% and wheat grass 5% and its validation was made with a larger panel.

Keywords: cup-cakes, beet root, wheat grass, betanin, anti-oxidant

1. Introduction
A cup cake is a small cake that has a cup like shape. Such cakes are made more attractive, flavored, tasty and consumer appealing by incorporating various additional ingredients into it like cashew nuts, resins, dry fruits, vanilla etc.
They're portion-controlled, portable, easy to make, tasty and can be inexpensive to make. The use of white flour derived from the processing of whole wheat grain, which is aimed at improving the aesthetic value, it has also led to the drastic reduction in the nutritional density and the fiber content compared to bread made from whole grain cereals. Recently consumer's awareness of the need to eat high quality and healthy foods known as functional foods. Therefore, the trend is to produce specialty bakery products made from whole grain flour and other functional ingredients known as health foods or functional foods. The development and consumption of such functional foods not only improves the nutritional status of the general population but also helps those suffering from degenerative diseases associated with today's changing lifestyle and environment. (Jideani and Onwubali, 2009) [3].
Beetroot is a rich source of potent nutrients and possess many health benefits but is a seasonal crop in India, due to its high moisture content one of the way of ensuring beetroot preservation is drying. Beetroot (*Beta vulgaris*) is an excellent source of calcium, iron, fiber, folic acid. Beetroot are rich in valuable, active compounds such as carotenoids (Dias *et al*., 2009) [1], glycine, betalaine, saponins, betacyanines, folates, betanin, polyphenols and flavonoids (Vali. *et al*., 2007) [6]. Therefore, beetroot ingestion can be considered a factor in cancer prevention. They have antimicrobial and antiviral effects and also can inhibit the cell proliferation of human tumour cells. Beetroot is a rich source of both betaine and nitrate. Betaine is a trimethyl derivative of amino acid glycine. Betaine supplementation promotes muscular endurance, strength and power (Hoffman and Ratamess, 2009) [2].
Wheat grass powder contains various antioxidant compounds and has excellent antioxidant activity. Wheatgrass is an inexpensive and efficient source to provide all the required nutrients and medicinal benefits for a healthy and rejuvenating body. (Singhal *et al*., 2012) [4]. Hence, the present investigation was undertaken by considering its advantages of high fiber and antioxidant rich wheat grass powder in the production of cupcakes. Wheat grass (Triticum aestivum) belongs to the class of poaceae family that includes various grasses such as wheat grass. Wheat grass powder contains antioxidants such as phenolic compounds and added to food as a supplement, can provide beneficial health effects. Wheat grass extract is also used to treat breast cancer cell line because of its antioxidant activity (Tandon and Arora, Amrita *et al*., 2011) [5]. The cytochrome oxidase is a respiratory enzyme which helps in oxygen utilization by the cells. Its destruction causes cancerous degeneration of cells as the oxygen utilization by the cells (cell respiration) gests disturbed.

2. Materials and Methods
The experimental studies were carried out in the Food tech lab I, Warner College of Dairy Technology, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad during Jan-June 2019.

2.1 Materials
The materials adopted in the present investigation are as follows:
1. **Wheat Flour:** Wheat flour was obtained from the local market of Prayagraj. The flour was of white color and free from bean fragments.
2. **Shortening:** Vegetable oil was purchased from local

supermarket of Prayagraj. The term 'shortening' refers to the ability of a fat to lubricate, weaken, or shorten the structure of food components so that they function in a characteristic way to provide desirable textural properties to a food product.

3. **Baking Powder:** Baking powder was purchased from local market of Prayagraj. This was used as leavening agent.
4. **Milk:** Toned milk was purchased from local market of Prayagraj to provide desirable moisture content.
5. **Sugar:** Sugar was purchased from local market of Prayagraj, Apart from sweetening characteristics, sugar also function as humectants, plasticizer, texterizing agent, coloring agent, flavor binding agent and flavor producing agent (browning).
6. **Vanilla Essence:** Vanilla essence was purchased from the local market of Prayagraj to provide essential flavor.
7. **Beetroot and Wheatgrass Powder:** Both of the products were purchased online from amazon. Which are used as a fortifying agents in this project.

2.2 Treatment Combination

1. Cup-cakes made from wheat flour.
2. Cup-cakes made from wheat flour fortified with beetroot and wheatgrass powder(90:5:5)
3. Cup-cakes made from wheat flour fortified with beetroot and wheatgrass powder(90:6:4)
4. Cup-cakes made from wheat flour fortified with beetroot and wheatgrass powder(90:7:3)

2.3 Preparation of Cup-cakes

Receiving of vegetable oil (20%)
↓
Addition of refined sugar (40%)
↓
Addition of condensed milk and beat well for 10mins (5%)
↓
Addition of sieved wheat flour (90%), beetroot powder and wheatgrass powder (in the ratio $_0$=100:0:0 T_1=5:5 T_2=6:4, T_3=7:3) and baking powder (1%)
↓
Addition of milk (250ml) and 0.5ml of vanilla essence
↓
Pouring the batter into a previously greased mould
↓
Bake at 160 degree Celcius for 25-30min
↓
Cool the cake to room temp (25ºC)

3. Result and Discussion

The data collected on the different aspects were tabulated and analyzed statistically using the method of analysis of variance and critical difference technique. The significant and non-significant differences observed have been analyzed critically within and between the treatment combinations.

The analyzed data is presented in this chapter under the following headings:

3.1 Chemical characteristics

1) In terms of Carbohydrate percentage in samples of different treatments and control, the highest mean Carbohydrate percentage was recorded in the sample of T_0 (55.92) followed by T_1(54.86), T_2(54.46),T_3(54.36).
2) The Protein percentage in samples of different treatments and control, the highest mean Protein percentage was recorded in the sample of T_1 (5.62) followed by T_2(5.55), T_3(5.46),T_0(5.24).
3) The Fat percentage in samples of different treatments and control, the highest mean Fat percentage was recorded in the sample of T_3 (15.35) followed by T_2(15.34), T_1(15.33),T_0(15.31).
4) For Ash percentage in samples of different treatments and control, the highest mean Ash percentage was recorded in the sample of T_3 (2.00) followed by T_2(1.85), T_1(1.76),T_0(1.34).
5) In terms of Moisture percentage in samples of different treatments and control, the highest mean Moisture percentage was recorded in the sample of T_3 (22.82) followed by T_2(22.78), T_1(22.42),T_0(22.18).
6) The Total solids percentage in samples of different treatments and control, the highest mean total solids percentage was recorded in the sample of T_0 (77.82) followed by T_1(77.58), T_2(77.22),T_3(77.18).
7) For Anti-oxidant percentage in samples of different treatments and control, the highest mean Anti-oxidant percentage was recorded in the sample of T_3 (6.94) followed by T_2(6.56), T_1(6.26),T_0(5.53).
8) The Dietary Fiber percentage in samples of different treatments and control, the highest mean Dietary Fiber percentage was recorded in the sample of T_3 (2.27) followed by T_2(2.26), T_1(2.25),T_0(2.12).

3.2 Microbial characteristics

1) Yeast and Mould score in samples of different treatments and controls, the highest mean percentage was recorded in the sample T_2(1.20) followed by T_0(1.00), T_3(1.00) and T_1(0.80)
2) Coli form test for control and experimental sample was 100%.It shows the absence of gram negative bacteria which means the strict hygienic practice was maintained during the procedure preparation.
3) Standard Plate Count score in samples of different treatments and controls, the highest mean percentage was recorded in the sample T_3(4.40) followed by T_2(4.20), T_1(4.00) and T_0(3.80)

3.3 Organoleptic characteristics

1) The Colour and Appearance score in samples of different treatments and controls, the highest mean percentage was recorded in the sample T_1 (8.08) followed by T_0 (7.54), T_2(7.39) and T_3(6.70).
2) In terms of Body and Texture score in samples of different treatments and controls, the highest mean percentage was recorded in the sample T_1 (8.04) followed by T_0 (7.85), T_2(7.44) and T_3(6.76).
3) The Flavor and Taste score in samples of different treatments and controls, the highest mean percentage was recorded in the sample T_1 (8.16) followed by T_0(7.73), T_2(7.54) and T_3(7.24).
4) The Overall Acceptability score in samples of different treatments and controls, the highest mean percentage was recorded in the sample T_1(8.09) followed by T_0(7.69), T_2(7.41) and T_3(6.85).

Estimated cost of production was Rs 7.68/100g while for T_1 was Rs 29.42/100g, T_2 was Rs 27.82/100g and T_3 was Rs 26.22/100g.

Table 1: Average data for different parameters of control and experiments (in percent)

Parameters	Treatments				C.D. at 5% level
	T_0	T_1	T_2	T_3	
1. Chemical Analysis (%)					
Carbohydrates	55.92	54.86	54.46	54.36	0.774
Protein	5.24	5.62	5.55	5.46	0.023
Fat	15.31	15.33	15.34	15.35	0.013
Ash	1.34	1.76	1.85	2.00	0.235
Moisture	22.18	22.42	22.78	22.82	0.717
Total Solids	77.82	77.58	77.22	77.18	0.717
Antioxidant(mg/gm)	5.53	6.26	6.56	6.9	0.037
Dietary Fiber	2.12	2.25	2.26	2.27	0.022
2. Microbiological analysis					
Yeast & Moulds count (cfu/gm	1.0	0.80	1.20	1.0	0.947
Coliform count	Nil	Nil	Nil	Nil	Nil
SPC × 10^{-1} (colony forming unit /gm)	15.02	15.02	14.02	12.80	2.20
3. Organoleptic Score (9- point hedonic scale)					
Color and Appearance	7.54	8.08	7.39	6.7	0.300
Body and Texture	7.85	8.04	7.44	6.76	0.368
Flavor and taste	7.73	8.16	7.4	6.76	0.451
Overall acceptability	7.70	8.09	7.40	6.85	0.248
4. Cost analysis					
Cost in Rs./100g(Refined Flour, sugar, beetroot powder, wheatgrass powder, oil, baking soda, baking powder, vanilla essence)	7.68	29.42	27.82	26.22	

4. Conclusion

The present experiment entitled "Studies on cupcakes incorporated with Beetroot and Wheatgrass Powder" in proportions, (100:00:00), (90:5:5), (90:6:4), (90:7:3). Thus final product was analysed for their physico-chemical. Microbiological, sensory and cost. Our results show, therefore that high quality beetroot and wheatgrass cupcake, with good taste and appearance, suitable for all age groups, can be made from a mixture of 3 raw materials normally consumed in the form of other food products or in the juice form: refined flour, wheatgrass powder or beetroot powder. The indicative optimal formulation for this cupcake was (T1) wheat flour 90%, beetroot 5% and wheatgrass 5% and its validation was made with a larger panel.

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6. References

1. Dias MG, Camoes MFGFC, Oliveira L. Carotenoids in traditional Portuguese fruits and vegetables. Food Chemistry. 2009; 113:808-815.
2. Hoffman JR, Ratamess NA, Kang J, Rashti SL, Faigenbaum AD. Effect of betaine supplementation on power performance and fatigue. J IntSoc Sports Nutr. 2009; 27:7-17.
3. Jideani V, Onwubali F. Optimisation of wheat-sprouted soybean flour bread using response surface methodology. Afr. J. Biotechnol. 2009; 8(22):6364-6373.
4. Singhal A, Kumari S. Wheatgrass: An alternative household nutritional food security International Research Journal of Pharmacy. 2012; 3(7):246-250.
5. Tandon S, Arora A, Singh S, Monga J, Arora S. Antioxidant Profiling of Triticum aestivum (wheatgrass) and its Antiproliferative Activity In MCF-7 Breast Cancer Cell Line; Journal of Pharmacy Research. 2011; 4(12):246-250
6. Vali L, Stefanovits-Banyai E, Szentmihalyi K, Febel Sardi H, Lugasi E, Kocsis A, Blazovics I. Liver-protecting effects of table beet (*Beta vulgaris* var. Rubra) during ischemia-reperfusion, s Nutrition. 2007; 23:172-178.