FORMULATION AND STANDARDISATION OF VALUE ADDED SWEETENED STEAMED RICE CAKE AND SUGAR BISCUITS BY INCORPORATION OF BROWN RICE FLOUR

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Abstract:

The exact origin of rice, historians believe that rice was grown for food in Asia(India, china and Thailand) as long ago as 5000 year BC. Rice cultivation has been carried into all regions having the necessary warmth and abundant moisture favorable to its growth, mainly subtropical rather than hot or cold. Modern culture makes use of irrigation and a few varities of rice may be grown with only a moderate supply of water. The scientific name for rice is Oryza sativa. Each rice grain is made up of many layers. The outermost layer is the husk or hull which is made up of two interlocked halves which protect the grain. The husk is removed in the milling process. The complete milling and polishing that converts brown rice into white rice destroys 67% of the vitamin B3, 80% of the vitamin B1, 90% of the vitamin B6, half of the manganese, half of the phosphorus, 60% of the iron, and all of the dietary fiber and essential fatty acids. In our daily life as were are consuming fully milled rice, we are lacking in the same nutrients. So, polished white rice is required to be "enriched" with vitamins B1, B3 and iron. So, the present project is focused to make the diet with the inclusion unmilled rice to meet the nutrient demand for healthy life and to promote education on nutritional importance and to popularize its potential benefits.

Keywords: Brown rice, Enrichment, B- vitamins, Healthy life

1.Introduction

Brown rice (or hulled or unmilled rice)is a whole grain rice. It has a mild, nutty flavour, and is chewier and more nutritious than white rice, but goes rancid more quickly because of the bran and germ. These bran and germ are removed to make white rice contain fats that can spoil any rice, including long-grain, short-grain or glutinous rice, may be eaten as brown rice. When compared to white rice, the brown rice comprises more nutritive value. Because, the hull and bran which are the outer layers of brown rice are not removed, thereby nutrients present in hull and bran are retained. But in the case of white rice, during polishing, the hulls and bran(nutrients present in the outer layer) are removed under milling and results in the loss of nutrients. Eating whole grains, such as brown rice, has been linked to protection against atherosclerosis, ischemic stroke, diabetes, insulin resistance, obesity and premature death. They aids in lowering cholesterol, reduces the risk of metabolic syndrome, lowering breast cancer, prevention of gall stones. Hence, considering the above facts, for the present study the brown rice was selected for the incorporation in preparation of the sweetened steamed rice cake and sugar biscuits.

2.Materials and methods

The brown rice was selected for the study and purchased from the department store. Make sure there was no evidence of moisture in raw material. Other ingredients such as polished rice, oil, sugar, jaggery, spices, and remaining ingredients were purchased form the local department store. All the purchased raw materials were checked for the presence of any impurities.

Preparation of brown rice flour

Selection of brown rice
⬇
Clean and free from dirts
⬇
Grind into a fine powder
⬇
Sieve the brown rice flour
⬇
Fine powder obtained

Formulation and Standardisation of Value added recipies

Standard sweetened steamed rice cakes were prepared with the ingredient raw rice. Value added sweetened steamed rice cakes were prepared with raw rice and brown rice flour which is incorporated at 20%, 30%, 50% levels.

Flour Preparation:

❖ Standard sweetened steamed rice cake – prepared with 100g of raw rice.

❖ **20% Level:** 20% brown rice flour incorporated sweetened steamed rice cake – 80g raw rice with 20g brown rice.

❖ **30% Level:** 30% brown rice flour incorporated sweetened steamed rice cake – 70g raw rice with 30g brown rice.

❖ **50% Level:** 50% brown rice flour incorporated sweetened steamed rice cake – 50g raw rice with 50g brown rice.

Table - 1 Ingredients for the preparation of sweetened steamed rice cake

Ingredients	Standard	Level of incorporation of brown rice		
		20%	30%	50%
Raw rice (g)	100	80	.70	30
Brownrice flour(g)	-	20	30	50
Coconut (g)	25	25	25	25
Jaggery (g)	75	75	75	75
Yeast (g)	a pinch	a pinch	a pinch	a pinch
Cardomom (g)	2	2	2	2
Cashew nut(g)	2	2	2	2
Raisins	2	2	2	2
Ghee(g)	As required	As required	As required	As required
Water	As required	As required	As required	As required
Salt	As required	As required	As required	As required

Sequential steps for the preparation of biscuits

- Add little water to the yeast and mix well, soak the raw rice in water for 3hrs.
- For standard sweetened steamed rice cake, ground the soaked rice(100g) and grated coconut (25g), into a fine paste while grounding add coconut water or plain water.
- Mix the brown rice flour with raw rice and cooked rice in the ratio of 20%, 30% and 50% .
- Then add yeast and allow it to ferment for further 8 hrs, add little amount of cardamom powder, sugar, jaggery and a pinch of salt and mix well and cook in a idly cooker.

Preparation of Sugar Biscuit

Flour preparation

❖ Standard Sugar biscuits – 80g of maida flour and 20g of corn flour

❖ 20% Level : 65g of maida flour , 15g of corn flour and 20g of brown rice

❖ 30% Level : 60g of maida flour , 10g of corn flour and 30g of brown rice

❖ 50% Level : 45g of maida flour , 5g of corn flour and 50g of brown rice

Table – II Ingredients for the preparation of sugar biscuits

Ingredients	Standard	Level of incorporation of brown rice		
		20%	30%	50%
Maida flour(g)	80	65	60	45
Corn flour(g)	20	15	10	5
Brown rice flour(g)	-	20	30	50
Sugar(g)	80	80	80	80
Butter(g)	80	80	80	80
Baking powder	¼ tsp	¼ tsp	¼ tsp	¼ tsp
Salt	A pinch	A pinch	A pinch	A pinch
Vanilla essence	Few drops	Few drops	Few drops	Few drops
Egg	1	1	1	1

Sequential steps for the preparation of biscuits

> ➢ Powder the sugar finely and then sieve maida flour, corn flour, sugar powder, salt and baking powder.
> ➢ Mix the brown rice flour with the finely sieved flour in the ration of 20%, 30%, and 50% level.
> ➢ Add butter into the flour and knead the dough with addition of vanilla essence and egg with fine foaming and knead the dough into chappathi dough consistency.
> ➢ Mix into firm dough, roll out once the flowed surface and then cut into desired shapes.
> ➢ Place on the baking sheet and bake in at 200 degree C for 15 min.

Organoleptic may be stated as the being, affecting or relating qualities(as taste, colour, odour) of a substance that stimulates the sense organs. Sensory judgements can be scaled for acceptance or likeability. A scale can be used to rate the overall quality or specific quality attributes (Colour, appearance, texture, taste and flavour). The formulated standard recipies and value added recipes were to organoleptically evaluated by semi trained panel members using the score card. Nutritive values of all formulated recipes were calculated by using the Nutritive value of Indian foods(NIN, ICMR 2010).The Nutrients present in the value added recipes were compared with the standard products.

3.Result and Discussion

Nutrient content of the rice, maida flour, corn flour and selected brown rice were given in the following table.

Table – III Nutrient content of the rice, maida flour, corn flour and selected brown rice per 100g

Nutrient	Rice	Brown rice flour	Maida flour	Corn flour
Energy(kcal)	345	110	455	361
Protein (g)	6.8	2.56	52.3	18.9
Fat (g)	0.5	0.89	10.3	6.9
Carbhohydrate (g)	78.3	22.78	393	310
Calcium (mg)	10	50	18.7	7.0
Iron(mg)	0.7	5.2	5.8	2.4
Phosphorus(mg)	160	0.43	135	272
Magnesium(mg)	64	143	27.5	93.0
Sodium(mg)	-	301	7.4	5.0
Potassium(mg)	-	43	134	315.0
Fiber (g)	0.2	3.9	3.4	7.3
Zinc(mg)	1.3	2.8	0.9	1.7
Moisture(g)	13.7	10.37	14.9	10.9
Carotene(μg)	0	-	2.51	2.14
Thiamine (mg)	0.06	0.61	1.0	0.2
Riboflavin (mg)	0.06	0.14	0.6	0.1
Niacin (mg)	1.9	5.3	7.4	0.9

Table – IV Nutrient calculation of the standard sweetened steamed rice cake

Nutrient	Rice(100g)	Jaggery(75g)	Coconut (25g)	Cardamom(2g)	Total
Energy(kcal)	345	287.2	111	4.58	747.47
Protein (g)	6.8	0.3	1.13	0.204	8.434
Fat (g)	0.5	0.08	10.5	0.044	11.124
Carbhohydrate (g)	78.3	7.3	3.25	0.842	153.592
Calcium (mg)	10	75	2.5	2.6	90.1
Iron(mg)	0.7	1.98	0.43	0.092	3.202
Phosphorus(mg)	160	40	240	3.2	443.2
Magnesium(mg)	64	-	-	3.48	67.48
Sodium(mg)	-	-	-	-	-
Potassium(mg)	-	-	-	-	-
Fiber (g)	0.2	-	0.9	0.402	1.502
Zinc(mg)	1.3	-	5	0.056	6.356
Carotene(μg)	0	-	0	0	0
Thiamine (mg)	0.06	-	0.05	0.044	0.154
Riboflavin (mg)	0.06	-	0.10	0.34	0.5
Niacin (mg)	1.9	-	0.8	0.16	2.86

The above table reveals the nutrient calculation of the steamed rice cake . The standard sweetened steamed rice cake were prepared by using rice, jaggery, coconut and cardamom. 75g of jaggery were used in this recipe which contains 75mg of calcium, 1.98mg of iron, 40mg of phosphorus.25g of coconut were used in this recipe which contains 10.5g of fat, 25g of calcium, 240mg of phosphorous.

Table – V Nutrient calculation of the 30% of brown rice incorporated sweetened steamed rice cake

Nutrient	Rice(100g)	Brown rice flour(30)	Jaggery(75g)	Coconut (25g)	Cardamom(2g)	Total
Energy(kcal)	241.5	33	287.2	111	4.58	677.28
Protein (g)	4.76	0.768	0.3	1.13	0.204	7.162
Fat (g)	0.35	0.267	0.08	10.5	0.044	11.241
Carbhohydrate (g)	54.3	6.834	7.3	3.25	0.842	137.036
Calcium (mg)	7	15	75	2.5	2.6	102.1
Iron(mg)	0.49	1.56	1.98	0.43	0.092	4.552
Phosphorus(mg)	112	0.124	40	240	3.2	395.324
Magnesium(mg)	44.8	42.9	-	-	3.48	91.18
Sodium(mg)	-	90.3	-	-	-	90.3
Potassium(mg)	-	12.9	-	-	-	12.9
Fiber (g)	0.14	1.17	-	0.9	0.402	2.612
Zinc(mg)	1.3	0.84	-	5	0.056	6.806
Carotene(µg)	0	-	-	0	0	0
Thiamine (mg)	0.06	0.183	-	0.05	0.044	0.319
Riboflavin (mg)	0.06	0.042	-	0.10	0.34	0.524
Niacin (mg)	1.9	1.59	-	0.8	0.16	3.88

Table – VI Nutrient calculation of the 50% of brown rice incorporated sweetened steamed rice cake

Nutrient	Rice(100g)	Brown rice flour(30)	Jaggery(75g)	Coconut (25g)	Cardamom(2g)	Total
Energy(kcal)	172.5	55	287.2	111	4.58	630.28
Protein (g)	3.4	1.28	0.3	1.13	0.204	6.314
Fat (g)	0.25	0.445	0.08	10.5	0.044	11.319
Carbhohydrate (g)	39.15	11.39	7.3	3.25	0.842	125.932
Calcium (mg)	5	25	75	2.5	2.6	110.1
Iron(mg)	0.35	2.6	1.98	0.43	0.092	5.452
Phosphorus(mg)	80	0.214	40	240	3.2	363.415
Magnesium(mg)	32	71.5	-	-	3.48	106.98
Sodium(mg)	-	150.5	-	-	-	150.5
Potassium(mg)	-	21.5	-	-	-	21.5
Fiber (g)	0.1	1.95	-	0.9	0.402	3.352
Zinc(mg)	0.64	1.4	-	5	0.056	7.096
Carotene(µg)	0	-	-	0	0	0
Thiamine (mg)	0.03	0.305	-	0.05	0.044	0.429
Riboflavin (mg)	0.03	0.07	-	0.10	0.34	0.54
Niacin (mg)	0.95	2.65	-	0.8	0.16	4.56

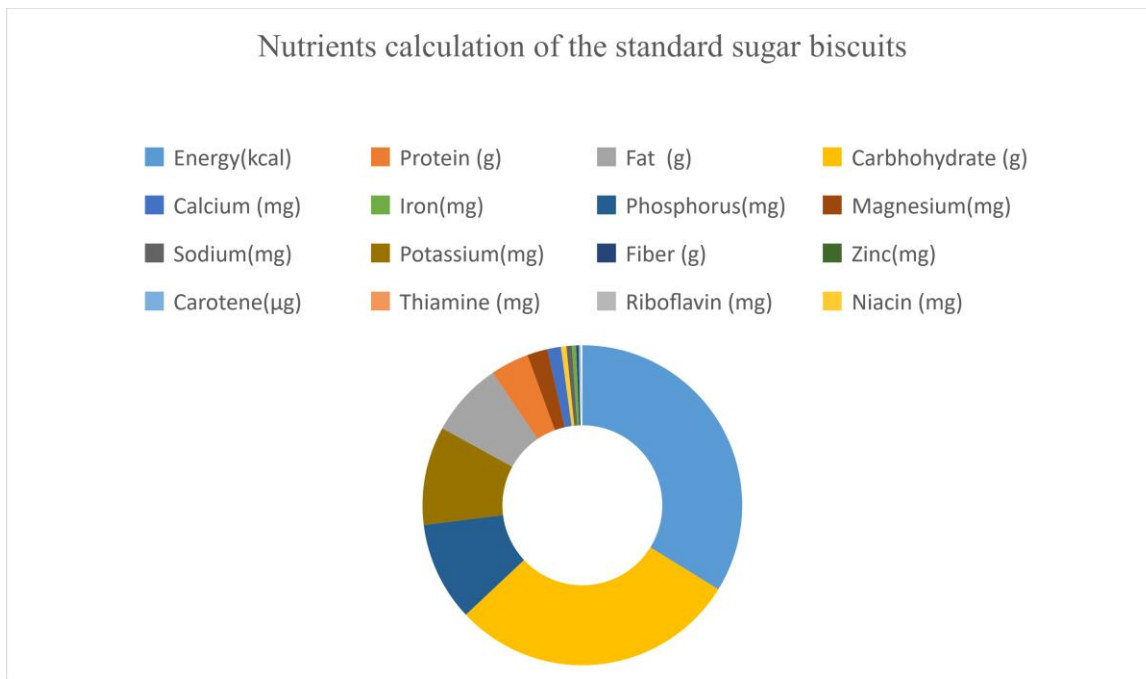Fig – I Nutrient calculation of the standard sugar biscuits

Fig – II Nutrient calculation of the 20% brown rice flour incorporated sugar biscuits
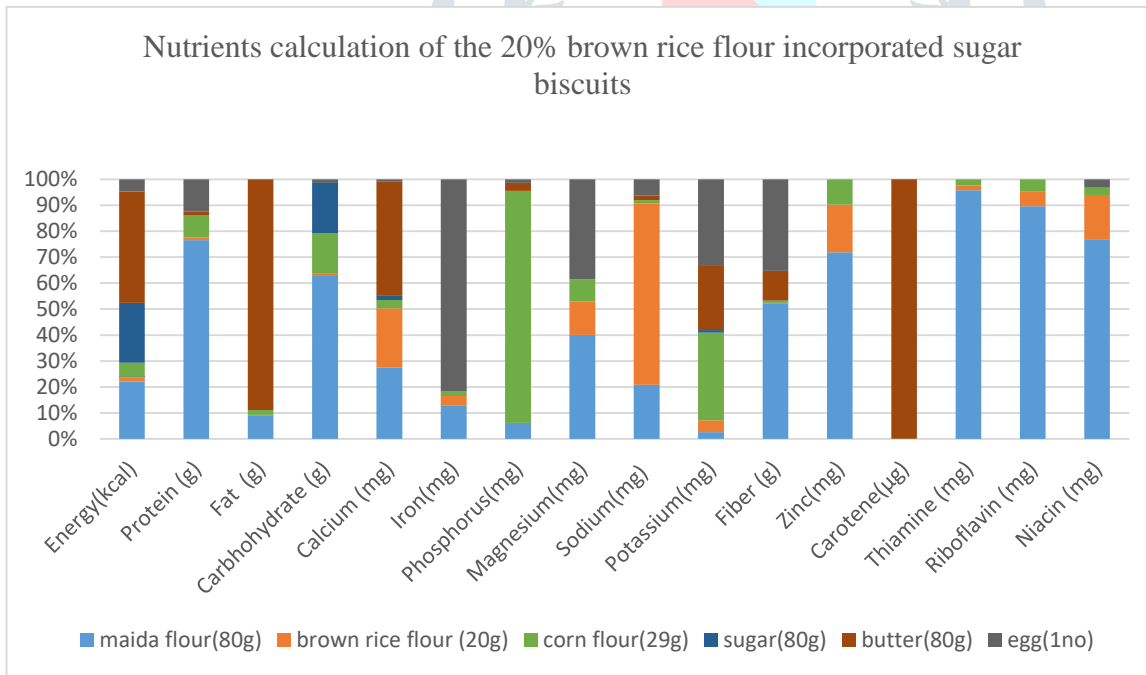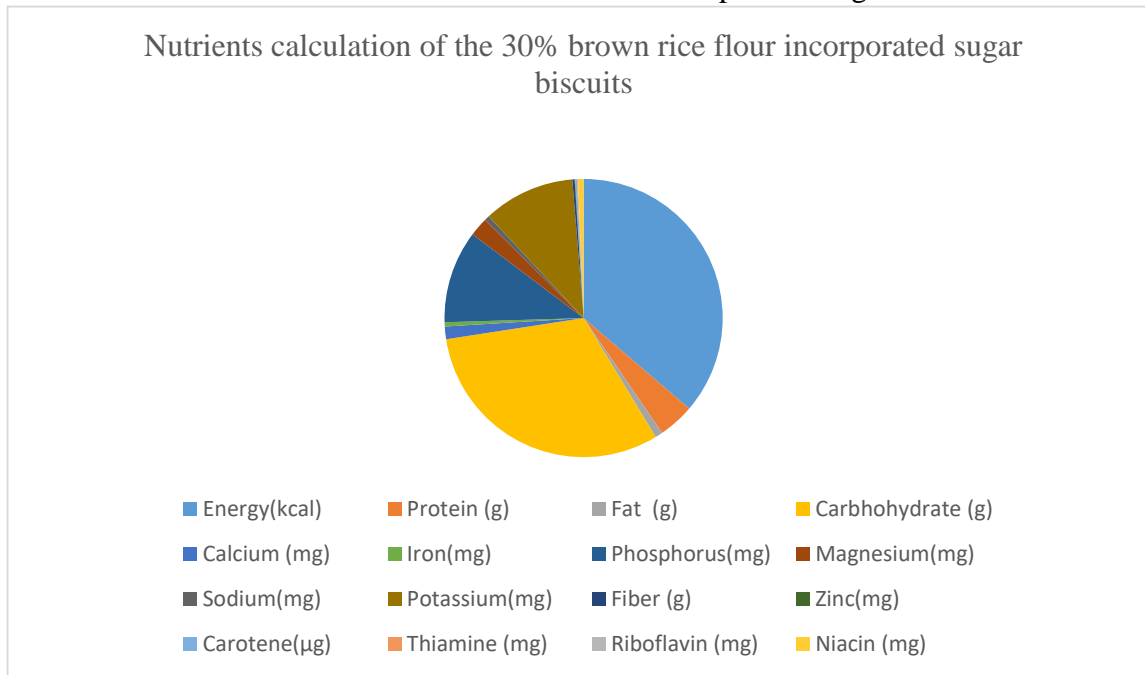
Fig – III Nutrient calculation of the 30% brown rice flour incorporated sugar biscuits

In countries where food is abundant, people choose food based on a number of factors which sum can be through of as "Quality". Quality has been defined as degree of excellence and includes such as taste, appearance and nutritional content. The quality is the composite of characteristics that have significance and make acceptability. Acceptability however, can be highly subjective. The average score obtained through organoleptic evaluation of formulated recipes were plotted in the following graph.

Fig- IV Organoleptic evaluation for standard and formulated sweetened steamed rice cake
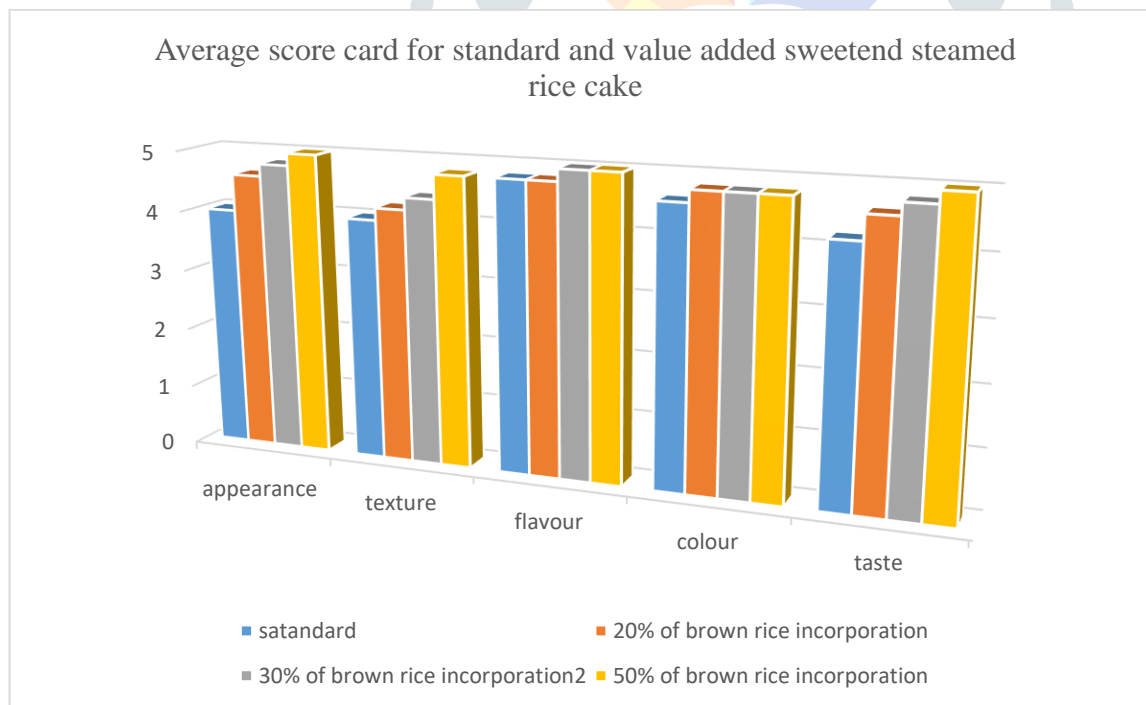
From the above figure, it was clear that, the average score for appearance, texture, colour, taste of the 50% brown rice flour incorporated sweetened steamed rice cake was higher than the average scores of standard sweetened steamed rice cake of 20%, 30% brown rice flour incorporated sweetened steamed rice cake. Upto 50%

of incorporation of brown rice flour instead of rice for preparing sweetened steamed rice cake was highly acceptable by semi- trained panel members.

Fig- V Organoleptic evaluation for standard and formulated sugar biscuits

AVERAGE SCORE CARD FOR STANDARD AND VALUE ADDED SUGAR BISCUITS
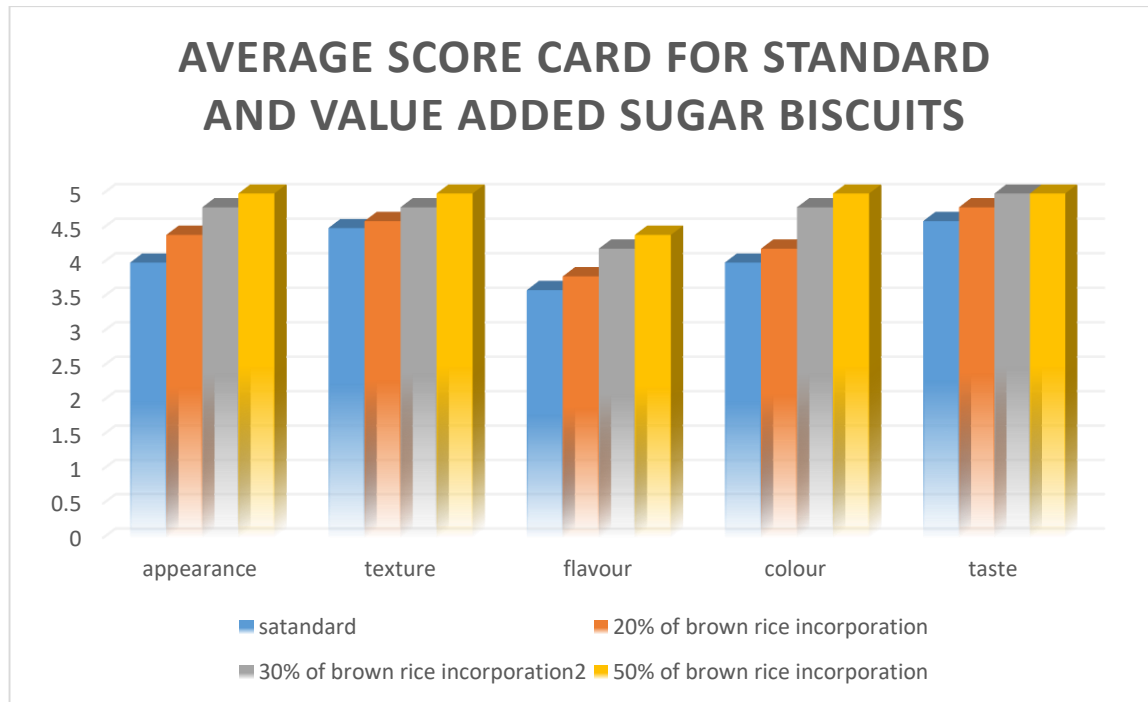
From the above figure it was clear that, appearance, colour, texture, taste, of the 50% brown rice flour incorporated sugar biscuits was higher than compared with the average scores of standard sugar biscuits, 20% and 30% brown rice flour incorporated sugar biscuits. Upto 50% of incorporation of brown rice flour instead of Maida and corn flour for preparing sugar biscuits was highly acceptable by semi- trained panel members.

4.Conlcusion

The present study concludes that when compared with rice and maida based recipes the nutritive value of the brown rice flour incorporated recipe was enriched. These recipes are highly advisable for all age groups.Cereal contains all essential nutrients which provide good health to the people. This cereal help in the treatment of various diseases like diabetes, cholesterol, ulcer, obesity, cancer, etc. Economically it is suitable for every individual. In this study the recipes were prepared by steam and baking as a cooking medium. So it is extremely suitable for all age groups from the children to old age people.

5. Bibliography

Anderson J