

Development of Low Glycaemic based Pearl Millet Cookies

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Abstract:- Pearl millet (*Pennisetum glaucum*) is a hardy cereal crop that has gained attention for its nutritional value and gluten-free properties. In recent years, there has been a growing interest in exploring alternative ingredients to enhance the nutritional profile and sensory attributes of baked goods. This study aims to investigate the incorporation of orange peel powder into pearl millet cookies, evaluating its impact on both nutritional content and sensory quality. In this project we prepared 1 control which is 100% of pearl millet flour, and 3 treatments, treatment 1(T1) 90% pearl millet flour and 5% orange peel powder and mix of Flax seeds, Pumpkin seeds and Fenugreek seeds powder 5%, (T2) has 80% pearl millet flour and 10% orange peel powder and mix of Flax seeds, Pumpkin seeds and Fenugreek seeds powder 10%, (T3) has 70% Pearl millet flour and 15% orange peel powder and mix of Flax seeds, Pumpkin seeds and Fenugreek seeds powder 15% the completion of preparing of cookie we did a sensory evaluation of cookies based on the appearance, colour, flavour, texture, taste, and overall acceptability of cookies, after that we packed the cookies in LDPE zip lock covers which can be stored upto 3 months. And remaining like materials and methods, procedure, results, and discussed below in this article. This research highlights the potential of pearl millet cookies incorporated with orange peel powder as a suitable snack option for diabetic patients. By incorporating natural ingredients and controlling the glycemic load, these cookies offer a healthier alternative to traditional high-glycemic snacks. The findings suggest that such cookies can be included in a diabetic diet to provide a satisfying and enjoyable treat while maintaining blood glucose levels. Future studies may focus on long-term glycemic control and investigating the effects of these cookies on other markers of diabetic health.

Keywords:- Pearl Millet, Cookies, Orange Peel Powder, Glycemic, Diabetic.

I. INTRODUCTION

Millets are a group of small-seeded grasses that have been cultivated from thousands of years as a staple food source for world. Millets are highly nutritious and offer a range of health benefits. They are gluten-free, rich in dietary fiber, and contain essential nutrients such as vitamins, minerals, and antioxidants. Millets are also considered to be low glycemic index foods, which means they release sugar into the

bloodstream at a slower rate, making them suitable for managing blood sugar levels.

In addition to their nutritional value, millets are valued for their versatility in the kitchen. They can be used in various forms, including whole grains, flour, flakes, and even as a rice substitute. Millets are commonly used in the preparation of porridges, cakes, biscuits, bread, cookies, pancakes, and various traditional dishes. They have a slightly nutty flavor and can be easily incorporated into both sweet and savory recipes.

Millet is a whole grain that is low in glycemic index, meaning it doesn't cause a rapid increase in blood sugar levels. Here's a simple recipe for millet cookies. Orange peels have been indeed rich in nutrients, bioactive compounds with antioxidants, Vitamin C, Vitamin A, Flavonoids, and calcium.

The cookie formula consists of pearl millet flour, butter, jaggery, orange peel powder and mixture of pumpkin seeds, flaxseeds and fenugreek seeds powder. It is well documented that most of the ingredients used in commercial cookies lack important nutrients. The refined flour lacks in dietary fiber and micronutrients which are important health promoting components. Millets approximately contain about 8% protein and 4% fat. They are rich source of vitamins and minerals. The dietary carbohydrates content of millets is also relatively high. They contain a higher amount of non-starchy polysaccharides (dietary fiber) also. The fats from millets contain a higher fraction of unsaturated fatty acids. Pearl millet or Kodo millet are minor millets have superior nutritional characteristics than the major cereals, but their utilization is limited. The orange peel powder consists of different nutrients like flavonoids, riboflavin, thiamine, pectin and essential oils which are good for health. Pumpkin seeds contain calories 126k cal, fat 5.5g, carbohydrates 15.2g, fibre 5.2g, Magnesium 74.3mg, vit c 0.085mg. Flax seeds contain nutrients like 55 calories, water 7%, sugar 0.2gm, fibre 2.8gm, fat 4.3gm. Fenugreek seeds contain following nutrients protein 2.5gm, fat 0.7gm, carbohydrate 6.5gm, fibre 2.7gm.

In the recent days many people are expecting the good taste and different flavours, so in this research project we used an orange peel powder, pumpkin seed, flax seed, and fenugreek seed powder to enhance the taste, flavour and also nutrient content

II. MATERIALS AND METHODS

A. Materials

➤ *Ingredients:*

The major ingredients used for preparation of cookies

- Pearl millet flour
- Orange peel powder
- Mixture of Pumpkin seeds, flax seeds, fenugreek seeds powder
- Jaggery
- Butter
- Milk
- Baking soda

➤ *Packaging Material:*

Packaging material is used as LDPE zip lock cover [50 microns] which can be stored for 3months.

B. Methods

➤ *Samples Preparation*

- *Preparation of Pearl Millet Flour (PM)*

PM flour is produced by the method described by Rebecca Olajumuke Obafye et al., (2018). Pearl millet grains cleaned, washed with water, and boiled with water (1:1) grain: water there after drain excess water and dried in air for until it dry. Milled in Spice blender and cooled and then sieved to obtain pearl millet flour. Flour is stored in air tight container.



Fig 1: Preparation of Pearl Millet Flour

- *Preparation of Orange Peel Powder (OP)*

Clean the riped orange with water. Then remove peels of orange and dry it for 2days in sun light or 8hours in hot air oven. there after orange peels were dried then keep in spice crusher make it into finepowder.

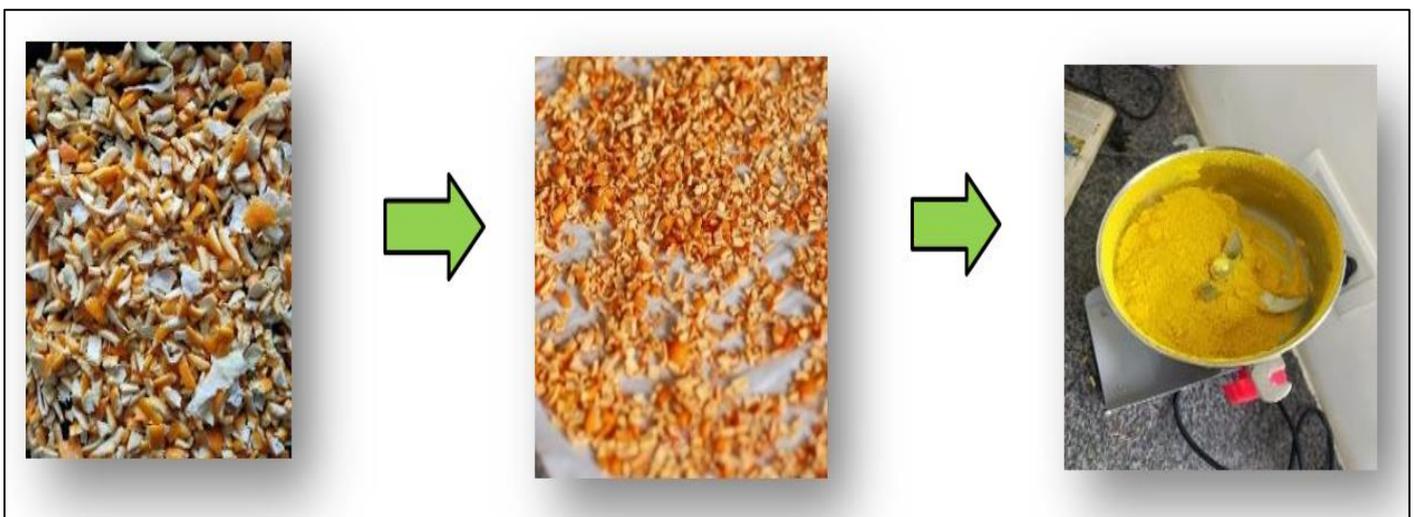


Fig 2: Preparation of Orange Peel Powder

• *Preparation of Mixture of Pumpkin Seeds, Flaxseed and Fenugreek Seed Powder (PFF)*

Take the seeds of pumpkin, flax and fenugreek and dry roast it. And then make into powder.

❖ *Flour blends of PM-OP-PFF*

The flour samples of pearl millet flour (PM) orange peel powder (OP) and F) C was blended at 100:0:0(control), 90:5:5 (T1), 80:10:10 (T2) and 70:15:15 (T3). Respectively, for the cookies production.

❖ *Production of PM-OP-PFF cookies*

Cookies samples were processed from doughs containing 5,10,15% OP-PFF. It was produced to the method described by Rebecca Olajumoke Obafaye and Olufunmilayo Sade Omoba et al., (2018) with slight modification. We are adding additional ingredients like mixture of pumpkin seeds, flaxseed and fenugreek seed powder (PFF). After baking cookies are cooled at room temperature packed in LDPE zip lock cover [50 microns] which can be stored for 3months.

C. *Treatment Details*

Table 1: The above Table Indicates the Different Treatments of Cookies

TREATMENT	PEARL MILLET FLOUR(PM)	ORANGE PEEL POWDER(OP) %	MIXTURE OF PUMKINSEEDS, FLAX SEEDS, FENUGREEK SEEDS POWDER(PFF) %
Control (T0)	100	0	0
T1	90	5	5
T2	80	10	10
T3	70	15	15



Fig 3: Different Treatments of Cookies

Table 2: Different Treatments % of Flour Taken to Cookies

CONTROL	T1	T2	T3
100% PM flour	90% PM flour	80% PM flour	70% PM flour
-	5% OP Powder	10% OP powder	15% OP powder
-	5% PFF Powder	10% PFF powder	15% PFF powder

D. Procedure

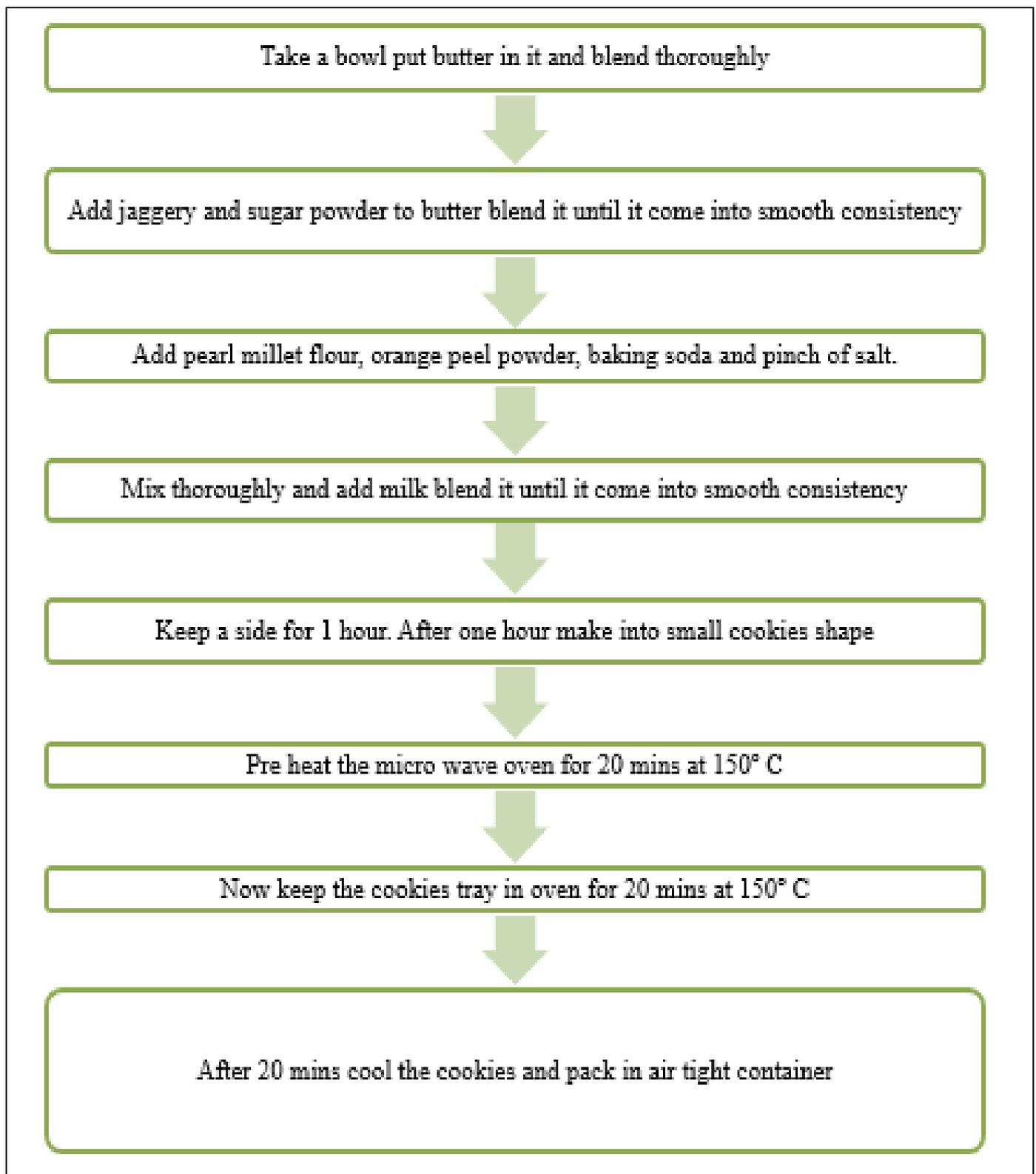


Plate 1: Flow Chart of Preparation of Cookies

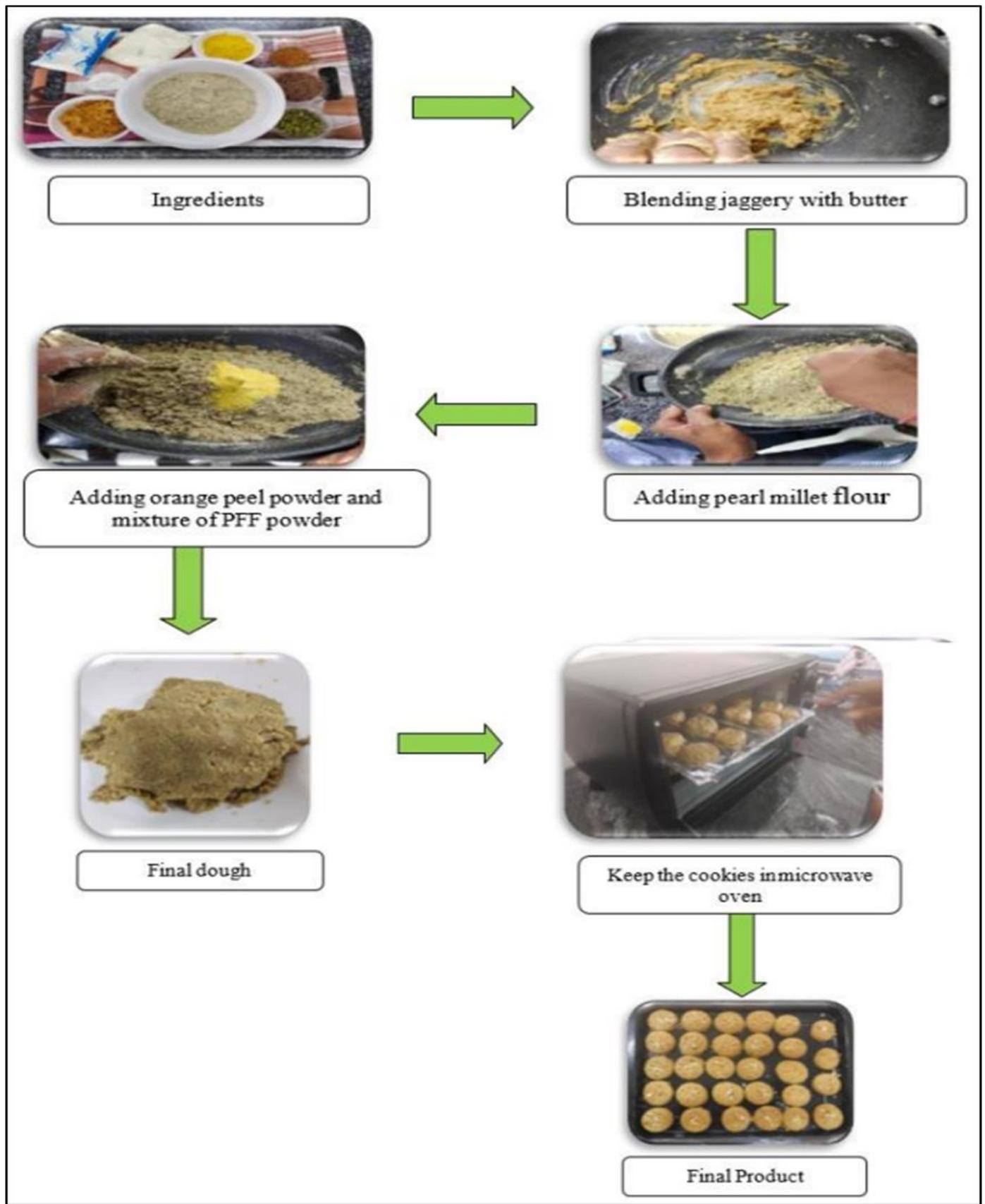


Plate 2: Flow Chart for Preparation of Pearl Millet Cookies

III. RESULTS

A. Organoleptic Evaluation of Pearl Millet Cookies

Organoleptic evaluation refers to the assessment of sensory properties of a substance or product using human senses such as taste, smell, sight, touch, and sometimes hearing.

After the completion of preparing cookies we did a

organoleptic evaluation based on certain characters like appearance, colour, flavour, texture, taste, and overall acceptability of cookies. We have given cookies to different persons to taste the cookies, based on their opinion we given in this result.

By the above organoleptic evaluation of the cookies. we will know the which treat of cookies is the most acceptable treatment of cookies.

Table 3: Organoleptic Evaluation of Pearl Millet Cookies

S.no	Appearance	Colour	Flavour	Texture	Taste	Overall Acceptability
T ₀	9	9	9	8.5	9	9
T ₁	9	9	8	8.5	9	8.5
T ₂	9	9	8	9	8	8
T ₃	9	9	9	9	9	9

Table 4: Different Treatments of Cookies

Like extremely	9
Like very much	8
Like moderately	7
Like slightly	6
Neither like or dislike	5
Dislike slightly	4
Dislike moderately	3
Dislike very much	2
Dislike extremely	1

Table 5: Indicates the 9 points of hedonic scale

Like extremely	9
Like very much	8
Like moderately	7
Like slightly	6
Neither like or dislike	5
Dislike slightly	4
Dislike moderately	3
Dislike very much	2
Dislike extremely	1

Table 6: Average Points of the Cookies during the Organoleptic Evaluation

Parameters	Average points
Appearance	9
Color	9
Flavor	8.6
Texture	8.8
Taste	8.8
Overall acceptability	8.7

IV. DISCUSSIONS

Ade-Omowaye, Adegbite, Adetunji, and Oladunmoye et al., (2009) reported that the moisture content of cookies was less than 10% this encourages that longer life of cookies and against microbial spoilage. Ajila et al., (2010) reported that the crude fibre increased with an increase of orange peel powder. Gbago, Huaiyuan, Erasto, Mohamed, & Yuanda (2014) said that cookies are good source of calcium. Dutta Narayan, Mandal, & Sharma, (2008) said that pearl millet is higher

nutrient than other cereal.

Subbalakshmi and D Malathi et al., said that High acceptability for pearl millet cooking in a similar study was Reported [1] where depigmentation of barnyard millet was carried out. Results showed that native or pigmented barnyard millet cookies were rated Slightly less for the stated sensory attributes compared to depigmented Variety of cookies. However, in the present study, it was found that dark Color of the pearl millet cookies did not adversely affect the acceptability of the samples. Instead, it provided an interesting visual appeal.

Salunke, UD Chavan, PM Kotecha and SB Lande et al., stated that on the basis of organoleptic evaluation properties (colour, taste, flavour, texture, appearance and overall acceptability) the followed that wheat and barnyard millet for making cookies.

In our project work the most overall accepted treatments are control, T1 and T2. T1 which has 90% PM flour, 5% OP powder and 5% PFF powder. T2 consists of 80% PM flour, 10% OP powder and 10% PFF powder is used. T3 is bitter in taste because we added 15% of OP powder and 15% of PFF powder is used in it.

V. CONCLUSION

From the above project we concluded that control is sweet in taste and T1 is slightly sweet in taste, T2 is little bit bitter in taste because 10% of orange peel powder in it. And T3 is bitter in taste because we added 15% of orange peel powder. Though it is bitter in taste it is good for health especially for diabetic patients it reduces sugar levels in diabetic patients. And the ingredients we used for cookies are like millet flour, orange peel powder, jaggery, pumpkin seed, flaxseeds and fenugreek seeds are rich in nutrients, carbohydrates, proteins, vitamin C. The 100gram cookies contains a 514.96 Kcal energy obtained

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