Organoleptic evaluation of cookies development from small millets enriched with peanuts

Nandita Thakur and Priya Mishra

Manav Rachna International Institute of Research and Studies, Faridabad, Haryana, India

ABSTRACT : This work was done to look over the presentation of different types of Millets flour in the preparation of cookies. The controlled cookies and experimental cookies were designed from Wheat flour, different types of Millets flour (Pearl millets, Sorghum millets and Finger millets) and Peanuts. The samples were divided into five groups where T0 was the controlled sample prepared with 100% Refined Wheat flour and the experimental samples were T1 (70% Pearl millet flour, 20% Wheat flour and 10% peanuts), T2 (70% Sorghum millet flour, 20% Wheat flour and 10% Peanuts), T3 (70% Finger millet flour, 20% Wheat flour and 10% Peanuts), T4 (20% Pearl millet flour, 20% Sorghum millet flour, 20% Finger millet flour, 20% Wheat flour and 10% peanuts). The functional properties of all the variations were determined by Sensory evaluation of the cookies on different parameters. There were 9 points hedonic rating scales, composite scoring test and threshold test were performed to regulate the quality of developed cookies. In sensory evaluation the different types of millet flour cookies enriched with peanuts, T1 had the highest value range in color and flavor (18.22 ±3.05 and 18.5 ± 1.44, respectively), T0 had the highest value range in taste and texture (19.00 ± 1.85 and 18.35 ± 3.7 respectively). In all that T1 had the highest value range of overall acceptability (17.59 ± 6.59), so T1 (Bajra cookies) was the most acceptable developed cookies by all the trained and semi-trained panelists of all the variations.

Key Words: Millets, sensory evaluation, chemical composition, peanuts, finger millets.

Millets is the driving force of human body. Its scientific name is *Panicum miliaceum*. It is produced in those areas which experience subtracting rain fall. It grows in semi arid region mostly in Asia and Africa and it is the influential by-product of India, Nigeria and Niger (Jaybhaye *et al*., 2014). The best parts of these small millets are that these are more nutritious than other grain. It is rich in Macronutrients, Micronutrients, anti-oxidants and phytochemicals. It is also 'Gluten-free', so it is more digestible and also protects us from celiac disease. People preferred this because of its economical quality (Sarita and Singh, 2006). India is the first largest producer of Pearl millets and Africa is the second largest producer of Millets. In India it grows in various states like Maharashtra, Madhya Pradesh, Gujarat, Rajasthan, Haryana and Karnataka on large scale. There are mainly four to six types of millets cultivated on a bigger scale. They are Pearl millet, Finger millet, Foxtail millet and Proso millet, Little millets, Kodo millets and Barnyard millets (Pasricha, 2015 : Research Report). While 'Food and Agriculture Organization' (FAO) and 'WHO' attempting to fill the scarcity of food storage by trying to provide jointly, low-priced food sources to stop the chances of undernourishment in straitened peoples. Seeing the same thing millets are the most fortunately grain which we are adding in our research because it is low-priced and high nutritional value. Government of India is promoting millet farming by using advanced techniques. (Changmei and Dorothy, 2014) .

Here with enrichment of peanuts can the value added product in human wellness. Peanuts are mostly grows in many region of Asia and United states. Peanuts or groundnuts are the rich source of Macro and Micronutrients. It is very popular seed because of its nutritive value and its delish taste after roasting. It is very useful to cure many non-communicable diseases and reduce the risk of stroke and prevent malnutrition. (Bonku and Yu, 2020). Peanuts or groundnuts have also the nutrient composition in balanced form. Peanuts are the rich source of Vitamin-B and E, it is also rich in phytochemicals, fibers and MUFA, PUFA in a very protective form and cure heart diseases in many ways. Peanuts are also more nutritive than other nuts and pocket friendly. Because of its affordability, peanuts have been used to prevent malnutrition in many developing countries. Peanuts are the rich source of magnesium, calcium, iron, amino acids and energy (Ebele, 2018). Therefore preparation of cookies using millets with peanuts will be the 'Idiom icing on the cake'.

In this order agriculture intervention with Millets or Millet based foods are the better option to treat Malnutrition and various communicable and non-communicable diseases. Since Millets and peanuts have the good composition of micro and macronutrients. Therefore, peoples of India and other countries adopting Millets based foods in their daily practices, for betterment of their Nutritional index and keeping yourself healthy. There are so many products can prepare with using small Millets. To keep all these things in mind Bakery

Table-1: Standardization Table of cookies.

Samples	Wheat flour (%)	Pearl millet flour (%)	Sorghum millet flour (%)	Finger millet flour (%)	Peanuts
T0	100	0	0	0	0
T1	20	70	0	0	10
T2	20	0	70	0	10
T3	20	0	0	70	10
T4	30	20	20	20	10

Source: - Self Prepared

Where –

T0- Wheat flour 100 % with sugar, fat and milk without any value added product.

T1- Pearl millet flour 70%, wheat flour 20%, peanuts 10% with sugar, fat and milk.

T2- Sorghum flour 70%, wheat flour 20%, peanuts 10 % with sugar, fat and milk.

T3- Finger millet flour 70%, wheat flour 20%, peanuts 10 % with sugar, fat and milk.

T4- Wheat flour 30%, Pearl millet 20%, Sorghum millet flour 20%, Finger millet flour 20%, peanuts 10% with sugar, fat and milk.

   No. of treatment = 5   No. of Replication = 4   No. of trial = 20

made products may be a good way to have Millets in some tasty, healthy and delicious form. Bakery products like cookies and cakes prepared with Millets are the best option for people in developing countries. The most importantly the shelf lives of these cookies are more than 3-4 weeks at room temperature as tested. This is most likely bakery product by children, Adults and old aged peoples. It is a good appetizer, easy-to-carry and easy-to-store product (Phanghal and Khatkar, 2018). Millets are also a cheaper in prize than other grains. Therefore this can be one of the good solutions for prevent Malnutrition and boost the Nutritional Status of people in India and other developing countries.

The main purpose of this study was to developed nutrients and digestibility in cookies. To keep all these things in mind cookies prepared with different types of small millets in the place of refined wheat flour enriched with peanuts. These are the better option for people who are worried about their health. This research work assessed the nutritive quality of cookies prepared by using multi small millets enriched with peanuts.
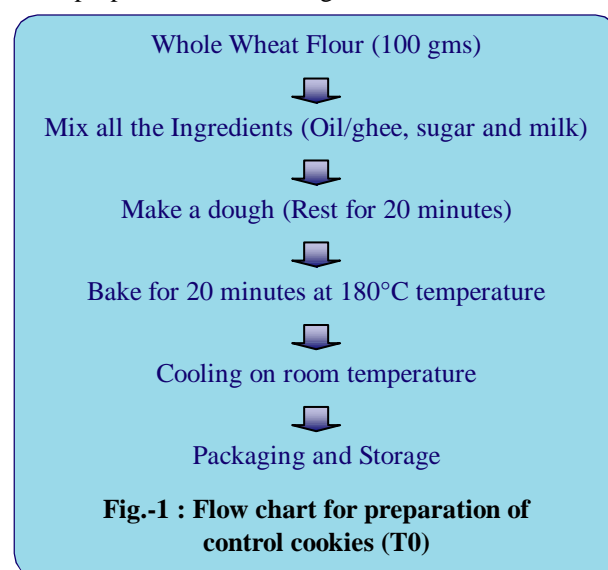
Materials and Methods

The methodology done in three phases. The first phase was collection of ingredients and standardization of recipe. The second phase was development of product and its evaluation (sensory and nutritional). And in the third phase is statistical analysis and result and discussion.

Phase-1

Collection of ingredients and standardization of recipe: In this phase raw ingredients were collected from the local market of Faridabad, Haryana, India, like different types of millets such as Bajra, jowar, ragi, maize and also add sugar, oil/ghee, milk and wheat flour.

Standardization of Recipe

Preparation of Product in different variations by the use of different millets : Four types of millets i.e. Bajra, Jowar, Ragi and Combination of three millets were used for making cookies. There will be four variations prepared for including all three millets i.e. T1

Whole Wheat Flour (100 gms)

⬇

Mix all the Ingredients (Oil/ghee, sugar and milk)

⬇

Make a dough (Rest for 20 minutes)

⬇

Bake for 20 minutes at 180°C temperature

⬇

Cooling on room temperature

⬇

Packaging and Storage

Fig.-1 : Flow chart for preparation of control cookies (T0)

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┌─────────────────┐   ┌─────────────────┐   ┌─────────────────┐   ┌──────────────────────┐
│ T1-             │   │ T2-             │   │ T3-             │   │ T4-                  │
│ Bajra Flour-70%,│   │ Jowar flour- 70%│   │ Ragi flour- 70% │   │ Mixed flour (Bajra flour-20%, │
│ Wheat flour- 10%,│  │ Wheat flour-10% │   │ Wheat flour-10% │   │ Jowar flour-20%, Ragi flour- │
│ Peanut – 10%    │   │ Peanuts - 10%   │   │ Peanuts - 10%   │   │ 20%, Wheat flour-20%), │
│ Oil/ghee- 5%,   │   │ Oil/ghee-5%     │   │ Sugar- 10% & milk.│ │ Peanuts -10%         │
│ Sugar- 10% & milk.│ │ Sugar-10% & milk.│  │                 │   │ Oil/ghee-5%          │
│                 │   │                 │   │                 │   │ Sugar-10% & milk     │
└─────────────────┘   └─────────────────┘   └─────────────────┘   └──────────────────────┘
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Mix all the ingredients separately

Make a dough (Rest for 20 minutes)

Bake 20 minutes at 180°C temperature

Cooling on room temperature
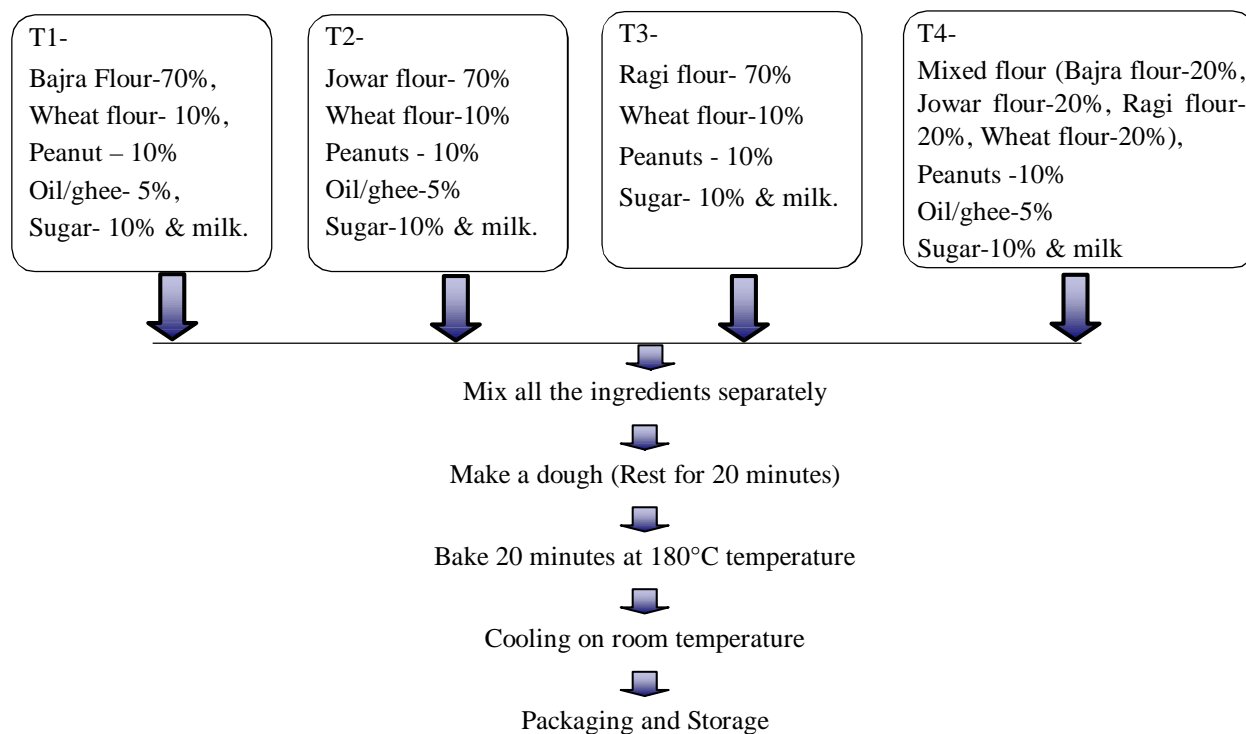
Packaging and Storage

Fig.- 2 : Flow chart for preparation of Experimental cookies

(Bajra cookies), T2 (Jowar cookies), T3 (Ragi cookies) and T4 (combination of all three millets) respectively.

Treatment Combination : The different combination used in the experiments is represented as follow in Table-1.

Preparation of Experimental and Controlled cookies : To prepared cookies first we mixed fat and sugar together and whisk it for two minutes to make a fine creamy paste. After that we added different types of millets flour, wheat flour, peanuts, milk and other bakery products separately to make five variations (T0, T1, T2, T3 and T4). The cookie dough kneaded manually to make sure its uniformity. The dough was transferred in a clean and greasy tray and rolled it gently. The dough was cut down in square shapes by biscuit cutter. Greased a tray and place all the cookies in pre-heat oven for 40 minutes on 180°C temperature. The baked cookies were packaged after cooling (Christiana *et al.*, 2018). In the same manner experimental cookies were prepared using different types of millets enriched with peanuts.

Phase-2

Organoleptic evaluation of Product : The product developed was subjected to sensory evaluation judge's attributes of Color, Flavor, Body and texture, taste and of overall acceptability by a semi trained panel of 5 Judges using 9 point hedonic, for composite score test and threshold tests by trained panel (Shrilakshmi, 2003). Sensory evaluation is a scientific practice that is used to measure and analyze food properties. This procedure was carried out by Screening of panelists and sensory analysis. Staff members, Research scholars and Post graduate students of the Department of Nutrition and Dietetics, Manav Rachna International Institutes of Research and Studies, Faridabad, India, were selected as a panel members. The cookies samples were given to the trained and semi-trained panelists with an evaluation form. They were allowed to evaluate the quality of cookies and record their responses and opinions on the given form (Shrilakshmi, 2003).

Phase-3

Determination of Statistical Analysis : The complete experiment and the data was analyzed and sensory evaluation were figured out and expressed as Mean ± SD (Standard Deviation) by appropriate data analysis tool on descriptive analysis of cookies, while the hedonic rating scale of the cookies quality were used for evaluating consumers preference on taste, color, texture and overall acceptability. (Steel R.G.D. and Toorrie, 1980). The statistical analysis of different types of varied cookies is presented in Table-2.

Results and Discussion

The result shows that there are very big difference between controlled cookies (T0) and developed cookies

Table-2: Sensory scores of Cookies by Mean and Standard Deviation.

Variations	Color	Flavor	Taste	Texture	Overall acceptability
	Mean ± S.D	Mean ±S.D	Mean ± S.D	Mean ± S.D	Mean ± S.D
T0	18.15 ± 2.95	17.00 ± 2.65	19.00 ± 1.85	18.35± 3.7	17.20 ± 6.48
T1	18.22 ± 3.05	18.5 ± 1.44	18.6 ± 1.79	18.22 ± 3.2	17.59 ± 6.59
T2	16.98 ± 2.43	17.04 ± 2.75	17.2 ± 2.55	16.98 ± 2.33	14.28 ± 6.10
T3	16.32 ± 2.96	16.42 ± 2.93	16.66 ± 2.72	16.4 ± 2.78	14.14 ± 5.36
T4	16.34 ± 2.62	16.87 ± 2.62	16.16 ± 2.86	17.36 ± 2.74	15.82 ± 5.39

by different types of millets with value added product like peanuts (T1, T2, T3 and T4). The nutritional composition is higher in experimental cookies than controlled cookies. This result may be conceivable due to the fact that millets are the rich in macronutrients and micronutrients. These are very effective protection for heart, cure diabetes, obesity and cancer, and prevent from under nutrition. The result of sensory evaluation of cookies shown in Table-2.

This table shows that the variation T1 had the highest score range in color (18.22 ± 3.05) and in flavor (18.5 ± 1.44). Variation T0 or controlled cookies had highest score range in taste (19.00 ±1.85) and in texture (18.35 ± 3.7). There was a significant deference between controlled cookies (T0) and experimental cookies (T1, T2, T3 and T4). With reference to general acceptability sample T1 had the highest score (17.59 ± 6.59) and was the most acceptable by trained and semi-trained panelists.

Sample was mostly accepted in all the scale of sensory attributes. Among the sample T1 (Pearl millet flour 70%, Wheat flour 20% and peanuts 10%) was the mostly acceptable in reference of overall acceptability. These cookies developed with pearl millet flour, which are highly nutritive in term of protein, vitamins and minerals, and wheat flour enriched with value added product like peanuts which is rich in protein and fat.

Millets are the gold mine of minerals, vitamins and phytochemicals. Millets and peanuts are full of all the essential amino acids and abundant source of minerals like calcium, zinc, magnesium, potassium and iron. Because of this quality it protects us from many diseases like diabetes, CVD, CHD, cancer and under nutrition. Due to its 'Gluten-free' quality it prevent from celiac disease and gluten allergy. These are also good source of nutraceuticals which cures from degenerative diseases like cancer. Millet based food products are very popular and highly acceptable by people. Millets and peanuts both are the pocket friendly food products because of which they have been used to treat malnutri-

tion in developing countries. Cookies were prepared from the different types of millets like Pearl millet, Sorghum millets, and Finger millets. They were enriched with peanuts. There were four variations of cookies were prepared T1, T2, T3 and T4. Cookies qualities like taste, texture, color, flavor and odour were conditioned by different parameters of sensory evaluation. The experimental cookies T1 (Pearl millet flour 70%, Wheat flour 20% and peanuts 10%) had the highest overall acceptability than other types of cookies. These are also highly nutritive as pearl millets are the rich source of minerals and vitamins. T1 was the most acceptable cookies sample in term of general acceptability. Enrichment of cookies with value added product like peanuts can improve its nutritional quality and overall rightness.

References

Bonku, Rabiatu and Yu, Jiamei 2020. Health aspects of Peanuts as an outcomes of its chemical composition, *Food Science and Human Wellness*, **9**(1): 21-30.

Changmei, Shadang and Dorothy, Jaganathan, 2014. Millet-the Frugal Grain, *International journal of Scientific Research and Review*, **3**(4) : 75-90.

Chugh, Bhawna; Singh, Gurumukh and Kumbhar, B.K., 2013. Development of Low Fat Soft Dough Biscuits Using Carbohydrate-Based Fat Replacers, *International Journal of Food Science*, **2013** : Article ID 576153.

Dayakar Rao, B. and Bhargavi, G., 2017. Technology Involved in Quality of Biscuits: Influence of Factors and Impact on Processing- A Critical Review, *International Journal of Pure and Applied Biosciences*, **5**(4) : 532-542.

FAO, The State of Food Insecurity in the World, 2015. Food and Agricultural Organization of the United Nations; 2015. http://www.fao.org/ worldfoodsituation/csdb/en/. Accessed 15 Mar 2017.

Gopalan, C.; Rama Sastri, B.V. and Balasubramanian, S.C., 2010. Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, India.

IFPRI. Global Nutrition Report: Malnutrition Becoming the

"New Normal" Across the Globe; 2016. https://www.ifpri.org/news-release/ global-nutrition-report-malnutrition-becoming-%E2%80%9Cnewnormal%E2%80%9D-across-globe. Accessed 24 Mar 2018.

Jaybhaye, R.V. and Perdeshi, I.L. and Vengaiah, P.C. and Shrivatav, P.P., 2014. Processing and Technology for millet based food products. *Journal of Ready to Eat Food*, **1**(2): 32-48.

Millet Network of India-Deccan development society-FIAN, 2009. National Forum for Policy Dialogues, India.

Okoye, Ebele Christiana and Onyekwelu, Chinyere Nkemakonam, 2018. Production and Quality Evaluation of Enriched Cookies from Wheat, African Yam Bean and Carrot Composite Flours, *Annals, Food Science and Technology*, **19**(1).

Pasricha, Ramji K., 2015. The Millet Project, Research Report.

Phanghal, Anil; Chhikara, Navnidhi and Khatkar, B.S., 2018.

Effect of Processing parameters and principal ingredients on quality of sugar snap cookies: A response surface approach, *Journal of Food Science and Technology*, **55**(8): 3127-3134.

Sarita and Singh, Ekta, 2006. Potential of millets: Nutrients, composition and health benefits. *Journal of Scientific and Innovative Research*, **5**(2) : 46-50.

Shanmugam, Shobana; Krishnaswamy, K.; Vasudevan, Sudha and Nagappa, G. Malleshi, 2014. Finger millets : A review of its general properties, processing and health benefits, *International Journal of Scientific Research and Review*, **3**(4) : 75-90.

Shrilakshmi, B.¸ 2003. Food *Science,* Evaluation of Food Quality, Third edition, Chennai, New Age International (P) Limited, Publisher : 292-295.

Steel, R.G.D. and Toorrie, J.H., 1980. Principles and procedures of statistics", McGraw Hill, International Singapore : 1-8.