ISSN 0974-3618 (Print)
0974-360X (Online)

www.rjptonline.org

RESEARCH ARTICLE

A perceptive study to endorse the Nutritional aspects of Pearl Millet (*Pennisetum glaucum* L) and formulated Recipes

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ABSTRACT:
Objective: Millets the have been cultivated and used for centuries back and their usage is now has been diminished and been portrayed as animals fodder. Pearl Millet has been o ne among the coarse millet been lost its actual value the study is to restore, enhance and infuse pearl millet (*Pennisetum glaucum* L) into commonly consumed recipes. **Method:** It comprises two segments firstly bringing out the view points of the panellist about pearl millet and secondly evaluating the organoleptic qualities and analyzing the nutritious facts of the recipes being developed or infused with pearl millet **Result:** The sensory evaluation and nutritional analysis of the recipes were analyzed exhibiting the mean score for sensory attributes are satisfactorily accepted and the recipes are rich in protein and minerals **Conclusion:** The study concluded that organoleptic acceptance and the healthy point of views of the panelists shows the pearl millet can be considered as a functional ingredient in regular diet. Recommendation of this millet into day to day diet will bring back the healthy generations.

KEYWORDS: Nutrition, Pearl Millet, Recipe, Restore

INTRODUCTION:
Pearl millet is commonly known as millet with maximum yield prospective due to its hybrid heterotic nature. It is more tolerant to sand and calcareous soils being cultivated in the tropical areas of Asia and Africa receiving rainfall less than 20 centimetres annually[1]. Pearl Millet is hard-hulled millet belonging to C4 plant category; they are small seeds about maximum 3mm in length and 0.02 g in weight, spherical and of different colours.[2]

Though the nativity of pearl millet is Sehal, where 50 percentage of population depends on it as a staple food[3], India stands first in production of pearl millet[4]. Productivity of pearl millet has been increased by 130% in African countries and about 44% in India, Rajasthan is the prime producer of this millet.[5]

Received on 16.07.2019 Modified on 12.09.2019
Accepted on 10.10.2019
Research J. Pharm. and Tech 2020; 13(2):.911-914.
DOI: 10.5958/0974-360X.2020.00172.9

Pearl millet is gluten free[6] herby can be consumed by gluten allergist; it is composed with carbohydrates (75%) Protein (11%) and fat (4%). Among the millet varieties pearl millet is the prime source of absorbable iron (fe)[7] ranging about 16.9mg /100g,[8] also a good source of protein with in-vitro protein digestibility rate 75.6%,[9] amino acids[10], and antioxidants such as glycated flavonoids, phenolic acids[11]

The rich nutritious facts and bioactive[12] in it controls body sugar, prevent gall stone formation, reduce constipation and ease obesity rate.[13] Presence of niacin and lignin in the millet helps to fight and prevent against the cardiovascular problems and pre-menopausal and breast cancer issues in women.[14]

Nutritiously pearl millet ranks ahead than wheat or rice but consumption of these coarse cereals are more declined in the urban areas of India. Increase in per capita income; influence of westernization and modernization has reduced the usage of these cereals resulting micronutrient deficiencies in humanbeings.[15]

The study involves in bringing out the idea of the panellist about pearl millet, developing and infusing common recipes and finding out their acceptance and analysing the nutritious facts of the recipes.

MATERIALS AND METHODS:

A total of 30 panellist members randomly selected upon the criteria, their willingness in food tasting and evaluating with no restriction to age or gender. The panellist members include the students and staff from hotel management and bio-chemistry department. There were about 12 female and 18 male panellist age ranging from 20 to 49 years with an average age of 27. 4 years. The study commenced with a detailed awareness lecture about the declining value of coarse millets.

The panelists were issued with the study questionnaire comprising a combination of open and close – ended questions exploring the knowledge, current consumption information, motivational factors to increase the consumption of pearl millet.

Selection and Coding of Recipes:

All time commonly consumable five recipes in southern state of Tamil Nadu (India) were selected to develop and infuse the pearl millet; Recipes were coded as shown in Table 1. There exist no decisive factors in selection of the recipes beside considering the facts the incorporation of millet does not creates any adverse effect nutritiously or in taste.

Ingredient:

The ingredients required for the study are carefully with regard to quality from the organic shops at Chennai. Masalas used in recipes like chicken masala and rasam masala are purely home made to get a good result for the organoleptic qualities. The Mise en place is done appropriately made with the procured ingredients for the preparation of recipes.

Table 1. Recipes with Code and Prime ingredients.

S. No	Name of the Recipe	Code	Prime Ingredients
1	Kambupaalpayasam	R1	Pearl Millet (100g) Milk(500ml) Jaggery (150g) Cashew nut & Sultanas (to garnish)
2	Kambu Kari Dosai	R2	Pearl Millet (150g) Urud dhal (100g) Rice (20g) Fenugreek (5g) Chicken (100g) Chicken masala (15g) Salt and pepper (to taste). Olive oil (as required)
3	KambuRasam	R3	Pearl millet stock water (150 ml) tamarind paste(15g) tomato (20g) Rasam Masala (10g) salt and pepper (to taste) Oil (as required)
4	Kambu tomato rice	R4	Pearl Millet (150g) tomato (50g) Onion (50g) chilli powder (10g) Garlic (10g) Salt(to taste) Oil (as required)
5	KambuVellamittai	R5	Pearl Millet (150g) Jaggery (150g) grated cashew nut (to garnish)

Table 2. Sensory Evaluation Score card for the recipes:

SAMPLE – HE DONIC SCORE CARD RATING

DATE: PANELIST NAME:

RECIPE CODE: PANELIST No.:

Please taste the given coded recipe and mark (√) how much you like or dislike it on the point in the scale which best describes your opinion.

S. No.	HEDONIC SCORE	ORGANOLEPTIC QUALITIES			
		APPEARANCE	AROMA	TEXTURE	ACCEPTANCE
1	DISLIKE EXTREMELY				
2	DISLIKE VERY MUCH				
3	DISLIKE MODERATELY				
4	DISLIKE SLIGHTLY				
5	NEITHER LIKE NOR DISLIKE				
6	LIKE SLIGHTLY				
7	LIKE MODERATELY				
8	LIKE VERY MUCH				
9	LIKE EXTREMELY				

Nutritional analysis and sensory evaluation of the recipes:

Millets are always a desirable option than other cereals, Pearl Millet hold is more preferred due to its easy availability, exotic odour and trouble-free cooking prospects.[16] It holds the prime value of importance among all urban or rural citizen for its eventual nutritive value, the nutritive abundance in Pearl Millet enriches the recipes formulated.[17] The recipes were analyzed for their nutritional composition using the secondary sources like internet and the book "Nutritive value of Indian Foods" published by National Institute of Nutrition (ICMR).

The sensory evaluation exhibiting the characteristics and quality parameters of food[18] was carried out constituting the organoleptic parameters like appearance, aroma, texture and overall acceptance. The evaluation was done based on the nine point hedonic scale sheet (Table 2) that ranges from extremely dislike to extremely like[19]. The panellists were served with 30 to 50 gm of each recipe in organic areca leaf cups as per the recipe's serving temperature.

Table 2. Sensory Evaluation Score card for the recipes:

SAMPLE – HE DONIC SCORE CARD RATING
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7	LIKE MODERATELY				
8	LIKE VERY MUCH				
9	LIKE EXTREMELY				

Statistical Analysis of Data:

All data from the questionnaire and hedonic score card are separately entered in excel sheets and then fed in SPSS and analysed. Both the qualitative data and quantitative data of the study were explored with various test like one-way annova, t- test and Friedman's test to exhibit the recipes overall acceptance and the awareness about pearl millet among the panellist members.

RESULTS AND DISCUSSION:

The principal endeavour of the study is to exhibit the familiarity of Pearl Millet among the panellist members. The analysis of data with regard to the familiarity, awareness and knowledge about the pearl millet among the panellist has shown that 68% of the panels' members are well known and have a good knowledge of pearl millet. The internet source (83%) plays a vital role among the youngsters in creating awareness about the pearl millets and other coarse millet varieties. Among the panel member (91%) of them including the adolescents accepted the healthy and nutritious facts about pearl millet but only (57%) of the members have been consumed the recipes made from pearl millet whereas the rest tasted the millet for first time.

One – Way Annova Test:

The test was done between the demographic factor age and gender of the panellist with regard to the awareness and knowledge about the pearl millet. The test proves that the age of the panellist members have a significant impact on knowing about the pearl millet with F-value 7.041 and significant at 0.011 levels. The test proves that the elderly panel members have more knowledge pearl millet. Beside the gender have no significant impact on the knowledge about the millet with F- value 6.083 and significant at 0.05 levels.

Pearson Correlation:

Correlation test was conducted between the nativity of the panellist members and the knowledge about the millet with regard to the taste. The test results with a correlation r value (r = 0.562) significant at p- value 0.002 shows that most of the nativity of the members have an impact as most of the panel members belongs to the urban areas.

Pearson Correlation Test		
Variables		Knowledge of millet (Tasting)
Nativity of Panellist	Pearson Correlation	0.562**
	Sig(2-tailed)	0.002
	N	29

** Correlation is significant at 0.01 levels (2-tailed)

Chi-Square Test:

The chi-square test was conducted for the variable whether the panellist will recommend the pearl millet recipes for their friends (χ - value 17.09) and also add the millet and recipes into their daily food pattern (χ - value 16.333) the result of the chi square test shows that the acceptance among the panellist was good and positive with higher chi values and significant at (0.00) levels.

Mean Score of Sensory evaluation of the recipes:

The sensory evaluation was done with the parameters like appearance, aroma, texture and their overall acceptance. The panellist have been provided with the score card and 30g to 50g of the recipes and asked to score their feedback in the sheet. Table 4 shows the average score of all dishes exhibiting that all five recipes are more acceptable among the panellist members.

Table 4. Mean Score of Sensory evaluation of recipes

Organoleptic Parameters	Mean Scores And Standard Deviation Of Pearl Millet Recipes				
	R 1	R2	R3	R4	R5
Appearance	8.1	7.6	6.9	7.3	8.2
Aroma	6.8	6.9	8.9	6.1	6.8
Texture	7.2	6.3	6.4	7.5	7.5
Overall Acceptance	8.1	7.6	7.2	7.1	8.3

Table 5. Correlation between the acceptance of recipes and age of the panellists

Variable	Coefficient Values	Overall Acceptance Of Recipes				
		R1	R2	R3	R4	R5
Age of Panellist	r - Value	0.603	0.483	0.358	0.268	0.183
	p- Value	0.001	0.05	0.006	0.002	0.05

Table 6: Nutrition Analysis of recipes:

Recipe	Protein	Fat	Calcium	Phosphorus	Iron	Vitamins (mg)		
	(g)	(g)	(mg)	(mg)	(mg)	C	K	E
R1	89.21	19.57	210.3	48.24	12.91	15.57	16.95	1.64
R2	191.07	87.61	19.89	7.92	17.43	19.01	30.62	9.41
R3	72.76	16.54	173.3	75.01	21.213	79.2	34.1	41.9
R4	81.41	20.05	1701.64	476.9	23.45	81.44	61.08	20.3
R5	47.83	26.87	281.5	328.6	14.73	88.32	144.09	19.66

Correlation between the acceptance of recipes and age of the panelists:

The correlation between the variables age and the overall acceptance of the dishes was done using the SPSS software the result (Table. 5) shows that there exist a positive correlation between the variables revealing, the dishes has been accepted and the age of the panellist has no significant effect on the acceptance of the dishes.

Nutrition Analysis of the recipes:

The analysis for nutritional values of the recipes (Table 6) shows the nutrient composition proving that the recipes are nutritiously rich with protein, iron, vitamins and other micronutrients.

CONCLUSION:

Pearl millet is a composite of nutritional benefits, the study reveals the knowledge, acceptance and attitude towards these coarse millets and the recipes formulated. The organoleptic quality of the pearl millet recipes are accepted among the panellist members with no regard to any demographic factors. The study creates and recommends awareness about the nutritional and health benefits of these coarse millets and they have to be restored and infused in the daily food pattern to create a healthy generation.

CONFLICT OF INTEREST:

Nil.

ACKNOWLEDGEMENT:

The author exerts a heartfelt thanks to the panellist members participated in the research work and making the study successful.

FUNDING SOURCE:

Vels Institute of Science, Technology & Advanced Studies, Chennai has sponsored by providing grant to publish this article.

ETHICAL CLEARANCE:

Nil.

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