



NUTRI FINE HERBS BREAD ROLL – BITTER AND BETTER FOR DIABETICS

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ABSTRACT

Diabetes is expected to become the world's largest killer by 2030. Nutrition supplement plays an important role for people with diabetes. Mounting evidences of chemical and pharmacological research work, numerous bioactive compounds have been found in functional herbal food ingredients for diabetes. As a result there is a rapidly increasing interest in developing new food formulas which enhance health of diabetics. The aim of the present study is to prepare two different bread rolls with the incorporation of *Aloe vera* (Product A) and *Cissus quadrangularis* (Product B) and to experiment for its acceptance level of the consumers by sensory evaluation method using 9 point hedonic rating scale in the food science laboratory and to calculate the nutritive value of each bread roll using Nutritive value of Indian foods by NIN. The mean sensory score of acceptance test was found lower due to the increased intensity of bitter taste of Product A than Product B. The results conclude that functional and health products with improved sensory quality could be developed by adding *Aloe vera* and *Cissus quadrangularis* to many other bakery products.

KEY WORDS: Diabetics, Bread Roll, Nutri fine herbs, *Aloe vera*, *Cissus quadrangularis*



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INTRODUCTION

Globally, non-communicable diseases such as cancer, hypertension and asthma account for 38 million deaths per year. Of these diseases, diabetes is expected to increase rapidly to become the world's seventh largest killer by 2030.¹ Healthy eating patterns is always considered as one of the key components of diabetes management. For many individuals with diabetes, the most challenging part of the treatment plan is determining what to eat. The American Diabetes Association (ADA) also recognizes the integral role of nutrition therapy in overall diabetes management. Therefore, it is important that diabetes nutrition therapy support its implementation.² To control the escalating diabetes epidemic, primary prevention through promotion of a healthy diet should be a global public policy priority.³ The term functional foods was first introduced in Japan in the mid-1980s and referred to the processed foods which contains ingredients that aid specific body functions in addition to being nutritious.⁴ As a result there is a rapidly increasing interest in formulating and developing new food which helps to enhance human health. Mounting evidences based support of chemical and pharmacological research work, numerous bioactive compounds have been found in functional herbal food ingredients for diabetes. *Aloe vera* and *Cissus quadrangularis* are well known for its nutraceutical potential and is currently being explored as a functional ingredient in a wide array of health foods and drinks. There is growing movement among the diabetic community, who are eating brown wheat. Hence consumption of brown breads enriched with nutraceuticals can be an effective way of promoting a healthy lifestyle for diabetic patients. The aim of the present study is to prepare two different bread rolls with the incorporation of *Aloe vera* (Product A) and *Cissus quadrangularis* (Product B) and to experiment for its acceptance level of the consumers by sensory evaluation method using 9 point hedonic rating scale in the food science laboratory and to calculate the nutritive value of each bread roll using Nutritive value of Indian foods by NIN. Over the years there have been increasing demands for convenience foods by consumers. Amongst such foods, the demand for bread ranks the highest due to its nutritive value, its low price, and the simplicity of using its primary ingredient, the cereals, for culinary purposes.⁵ Many people with diabetes consider bread as one of their functional foods as it helps to manage diabetes. Furthermore it has become a trend to eat bread varieties which is particularly made with brown

wheat among diabetics. Breads enriched with nutraceuticals can be the key to managing diabetes. In this study *Aloe vera* and *Cissus quadrangularis* were incorporated for the preparation of two different bread rolls. *Aloe vera* and *Cissus quadrangularis* are well known for its nutraceutical potential and is currently being explored as a functional ingredient in a wide array of health foods and drinks. *Aloe vera*, commonly known as Barbados or Curaçao Aloe, is an herbal medicine with a long tradition of use by a variety of cultures. *Cissus quadrangularis* is a perennial plant of the grape family. It is also known as Veldt Grape, Devil's Backbone, Adamant, Creeper, Asthisamharaka, Hadjod and Pirandai. There are some evidences to suggest *Aloe vera* and *Cissus quadrangularis* have a positive effect on blood sugar levels, meaning it can be useful for treating diabetes. *Aloe vera* gel has a long-term blood glucose level control effect and would be useful for the treatment of diabetes mellitus.⁶⁻⁷ Since Aloe and Veldt Grape are always bitter in taste, herbs are used to flavour the bread roll. Herbs should not dominate but just enhance the taste. With increased interest in healthy supplementary diet for diabetics, the whole wheat bread roll was prepared by additions of fine herbs such as oregano and thyme along with Aloe and Veldt Grape. Oregano has a stronger taste which was incorporated into this roll before baking. According to Allyson, oregano is packed with healthful compounds and contains diabetes-fighting compound.⁸ Garden thyme, a perennial, was also used in the preparation to flavour bread rolls.⁹

MATERIALS AND METHODS

Work plan includes the standardization of the bread rolls incorporated with *Aloe Vera* and *Cissus quadrangularis* which has low-carbohydrate, high-fibre, renowned for its nutraceutical contents. Aloe and veldt grape bread roll were made with whole wheat flour which has high fibre content and considered as ideal supplement for diabetes. Along with it, thyme and oregano herbs were added to make the bread roll delicious.

Standardization of nutri fine herbs bread roll

A standardized recipe is a recipe that has been carefully adapted and tested to ensure that it will produce a consistent product every time when it is prepared¹⁰. The recipes of two bread rolls with the incorporation of *Aloe Vera* and *Cissus quadrangularis* were developed with specific ingredients.

Table 1

Ingredient	Product A (Aloe Bread Roll)	Product B Veldt Grape Bread Roll
Whole Wheat Flour	100 gm	100gm
Aloe Vera Gel	3 ml	
Cissus Quadrangularis		5gm
Sugar	4 gm	4 gm
Salt	0.5 gm	0.5 gm
Olive Oil	10 ml	10 ml
Water	50 ml	50 ml
Yeast	3.5gm	3.5gm
Oregano	0.5 gm	0.5 gm
Thyme	0.5 gm	0.5 gm

The recipe standardization process of the two nutri bread rolls was done in three phases: recipe verification, product evaluation, and quantity adjustment. Recipe verification was performed by reviewing the recipe in detail, preparing it, verifying its yield, and recording changes. Product evaluation was focused on determining the acceptability of the product produced from the recipe. Changing the recipe yield and ingredient amounts was done in the quantity adjustment phase. A recipe went through all these phases several times before becoming standardized at the necessary quantity for an operation. Faculty and students of School of Hotel and Catering Management, Vels University, Chennai, India worked together on the recipe standardization process. Input from students and other panel members were critical during the evaluation phase.

Preparation of Bread Roll

Aloe Vera leaves were peeled and gel was extracted as per quantities specified for Product A in Table 1. All other ingredients were mixed well except olive oil. The dough was kneaded till gluten developed. Olive oil was added and the dough was kneaded gently. First proving was done by portioning the dough round and kept aside for 30 minutes. The dough was shaped into various rolls and it was left aside for second proving for about 20 minutes. Egg wash was given on top of shaped rolls. All the bread rolls were baked at 200°C for about 15-20 minutes. Glazing was done on the bread rolls with melted butter and olive oil. The Product B bread roll was prepared using with Veldt Grape (*Cissus quadrangularis*) instead of *Aloe Vera* gel as specified in Table 1. The dried stems of the Veldt Grape were grounded and sieved. The rest of the preparation was followed as same as Product A.

Sensory evaluation of products

Since innovation is regarded as a major source of competitive advantage, companies today integrate sensory science and methodology in both their R&D and Marketing departments, to contribute to the improvement of such innovation practices and successful business performance. Consumer tests oriented for marketing and product development play a major role in food industry.¹¹ Sensory evaluation has been defined as a scientific method used to evoke, measure, analyze and interpret those responses to products as perceived through the senses of sight, smell, touch, taste, and hearing.¹² The prepared bread rolls were subjected to sensory analysis based on 9-point hedonic rating scale for taste, texture, appearance, aroma and after-taste. The hedonic scale method is flexible. Its use seems feasible in a broad range of situations and with any problem where we might want to evaluate on the criterion of human preference. It has been used most often in laboratory studies where the objective is to obtain information about probable acceptance as a guide to further development work.¹³ A panel of 28 untrained members was chosen for the study. The untrained members were students of Hotel and Catering Management and other departments, Vels University, India. Panel members were advised to use the sensory evaluation sheet. The scores were based on the following criteria: Like extremely: 9; Like very much: 8; Like moderately: 7; like slightly: 6; Neither like nor dislike: 5; Dislike: 4; Dislike moderately 3; Dislike verymuch:2; and dislike extremely: 1. Sensory tests were carried out in a sensory evaluation room, with white light, controlled ventilation, and away from distractions noise, odors and the preparation room.

Score Card- Hedonic Rating Scale					
Date:	Name-----				
Product Code:	Panelist No:				
Taste the given coded sample and tick (✓) how much you like or dislike it on the point in the scale which best describes your feeling. You can taste the sample more than one.					
Score*	Taste	Texture	Appearance	Aroma	Overall Acceptance
(9) Like Extremely					
(8) Like verymuch					
(7) Like moderately					
(6) Likes lightly					
(5) Neither like nor dislike					
(4) Dislike slightly					
(3) Dislike Moderately					
(2) Dislike very much					
(1)Dislike extremely					

Figure 1
Scorecard Used for Hedonic Rating Test for Nutri-Fine Herb Bread Rolls

Nutritive value calculation

The nutritive value of each bread roll was calculated using Nutritive value of Indian foods by NIN¹⁴ in order to

help consumers make decisions that will be positive for the health of people with diabetes.

Statistical analysis

The data was analysed statistically. The mean scores of the two different bread roll were found as tested by untrained panellists. The 't' test was used to reveal if means of the two sample bread rolls are statistically different for its acceptance level. Statistical calculations were carried out using the commercially available packages.

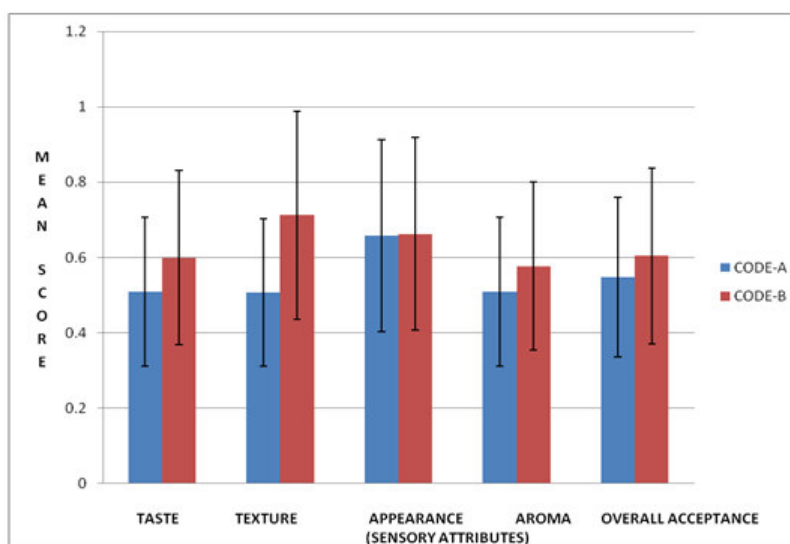
RESULTS**Sensory evaluation**

Mean scores of hedonic rating test done on bread rolls - Product A and Product B were tabulated in Table 3. In this acceptance test validity was considered as a primary issue as it is predictive of market place success.

Table 2
Mean Scores of Sensory Evaluation of
Nutri-Fine Herbs Bread Roll

Sensory Attributes	Mean Scores of Product A- (Aloe Bread Roll)	Mean Scores of Product B- (Veldt Grape Bread Roll)
Taste	5.5	6.5
Texture	6	6.9
Appearance	5.7	6.3
Aroma	5.5	6.7
Overall Acceptance	5.4	7.2

Graph 1
Hedonic Rating Test Taken from Respondents



Value = mean \pm SD; n = 28. *Statistically significant at $P < 0.05$

Table 2 and Graph 1- The results of trained and untrained panelists have been compared with sensory evaluation for its acceptance level of the consumer. The mean score of the Product A Bread roll obtained the highest score of 6.5 comparatively with Product B bread roll of 5.5. The texture mean score of the Product B bread roll was slightly higher (i.e.) 6.9 than Product A bread roll which the mean score was 6. Similarly the appearance and aroma of the herbs bread roll showed the slight difference only. The appearance of the Product B bread roll was 6.3 and Product A bread roll was 5.7. Also it has not showed much difference between both the bread rolls. Highest mean of 6.7 obtained for Veldt bread roll for its aroma whereas only 5.56 was the mean score obtained for Aloe bread roll. Over all the Product B was highly accepted as shown

with a mean score of 7.2 whereas the Product A was less accepted by the respondents as it was depicted with the mean score of 5.4. The 't'- test was conducted to find out the significant difference between the two herb breads – Aloe and Veldt Grape. The 't' value is -5.56126 and 'p' value is 0.000534 and the result is significant at $p < 0.05$. Hence there was a significant difference between Aloe and Veldt Grape bread rolls.

Nutritive value calculation

Calculating nutrition information for standard recipes is very important. Our results show that our system could match all of the ingredients and generated nutritional values within a 10% error bound from human assessors for calorie, protein and carbohydrate values.

Table 3
Nutritive Information of Bread Rolls

SL.NO	NUTRIENTS	Product A (<i>Aloe Bread Roll</i>) VALUE(PER 100 GM)	Product A (<i>Veldt Grape Bread Roll</i>) VALUE(PER 100 GM)
1	Moisture (gm)	14.56	14.561
2	Protein (gm)	14.89	15.084
3	Fat (gm)	12.01	12.034
4	Minerals (gm)	1.7	1.708
5	Crude fibre (gm)	1.36	3.593
6	Carbohydrates (gm)	86.78	88.7
7	Energy (k.cal)	510.73	519.27
8	Calcium (mg)	48.26	47.192
9	Phosphorous (mg)	347.98	347.76
10	Iron (mg)	9.86	6.176

Source: ICMR, NIN

DISCUSSION

Diabetes is on the rise, yet most cases are preventable with healthy lifestyle changes. Healthy eating for people with diabetes is no different to that which is recommended for everyone. There is need to substitute their meals by other varieties which has high nutritive and medicinal value. It is also evident that breads that have a low glycaemic index and high fibre content produce a slower rise in blood glucose level. Health-conscious people with diabetes are increasingly seeking functional foods in an effort to control or lower their blood sugar level. According to current research, *Aloe Vera* and *Cissus quadrangularis* may be among the most beneficial foods for diabetics looking to regulate blood sugar levels naturally. Fine herbs bread roll would be one of the better choices and a supplementary food for diabetics. Nutri Aloe and fine herbs bread roll is a product which can be eaten by all individuals. The management of diabetes without any side effects is still a challenge and has increased the demand for research on natural food products with anti-diabetic activity. These modified bread rolls were prepared keeping diabetic patients in mind and the aim was highly fulfilled.

REFERENCES

1. Dr. Poonam Khetrpal Singh. WHO Regional Director for South-East Asia. How to Beat the Diabetes Epidemic. (updated; 2016 April 07; cited; 2016 April 15). Available Form: <http://www.bangkokpost.com/opinion/opinion/924161/how-to-beat-the-diabetes-epidemic>
2. Alison B. Evert, Jackie L. Boucher, Marjorie Cypress, Stephanie A. Dunbar, Marion J. Franz, Elizabeth J. Mayer-Davis, Joshua J. Neumiller, Robin Nwankwo, Cassandra L. Verdi, Patti Urbanski, and William S. Yancy Jr. Nutrition Therapy Recommendations for the Management of Adults with Diabetes. *BMJ Open Diabetes Research & Care*. American Diabetes Association. 2014; 37; 120-143. Available from: <http://care.diabetesjournals.org/>
3. Hu FB. Globalization of Diabetes: The Role of Diet, Life Style, and Genes. *Diabetes Care*. US National Library of Medicine. 2011; 34(6): 1249-57. PubMed: PMC3114340
4. Clare M. Hasler, Executive Director. Functional Foods: Their Role in Disease Prevention and Health Promotion. *Food Technology magazine*. The Institute of Food Technologists Publications. 1998;52[11]: 63-70; 24. Available from: http://www.ift.org/~media/Knowledge%20Center/Science%20Reports/Scientific%20Status%20Summaries/funcfood_1198.pdf
5. Ochuko L. Erukainure, Jane N.C. Okafor, Akinyele Ogunji1, Happiness Ukazu, Ebele N. Okafor & Ijeoma L. Eboagwu. Bambara-wheat composite flour: rheological behavior of dough and functionality in bread. *Wiley Periodicals, Inc*. 2016;1-6
6. Tanaka M, Misawa E, Ito Y, Habara N, Nomaguchi K, Yamada M, Toida T, Hayasawa H, Takase M, Inagaki M, Higuchi R. Identification of five phytosterols from *Aloe vera* gel as anti-diabetic compounds. *Biol Pharm Bull*. 2006; 29(7): 1418-22. PubMed: 16819181

CONCLUSION

The results from sensory evaluation test conducted for these nutri fine herbs bread roll indicated that functional and health products with improved sensory quality could be developed by adding *Aloe vera* and *Cissus quadrangularis* to many bakery products. To make the *Aloe vera* and *Cissus quadrangularis* bread rolls more palatable a higher proportion of fine herbs may be incorporated. The nutritional information of these products was found at satisfactory level to meet the dietary requirements of the diabetes.

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CONFLICT OF INTEREST

Conflict of interest declared none.

7. Lekshmi RK, Divya BT, Mini S. Cissus quadrangularis extract attenuates hyperglycaemia-mediated oxidative stress in streptozotocin-induced diabetic rats. *Redox Rep.* 2014;19(5):214-20. PubMed: 24946070
8. Allyson M. Bower, Luis M. Real Hernandez, Mark A. Berhow, Elvira Gonzalez de Mejia. Bioactive Compounds from Culinary Herbs Inhibit a Molecular Target for Type 2 Diabetes Management, Dipeptidyl Peptidase IV. *Journal of Agriculture and Food Chemistry.* 2014;62 (26):6147–6158
9. Amber Royer. Baking Herbs Breads. (updated 2013 July05; cited 2016 April 10). Available From: <http://davesgarden.com/guides/articles/view/4297#b>
10. National Food Service Management Institute. Growing your professional skills: Competencies, knowledge, and skills for successful school nutrition assistants. The University of Mississippi. 2008
11. Dimple Singh-Ackbarali, Rohanie Maharaj. Sensory Evaluation as a Tool in Determining Acceptability of Innovative Products Developed by Undergraduate Students in Food Science and Technology at The University of Trinidad and Tobago. *Journal of Curriculum and Teaching.* 2014;3(1): 10-27
12. Stone H, Sidel J.L. The role of sensory evaluation in the food industry. *Food Quality & Preference.* California: 4: 65-73. Academic Press.1993
13. David R. Peryam, Francis J. Pilgrim. Hedonic Scale Method of Measuring Food Preferences. Quatermaster Food and Container Institute for the Armed Forces. Chicago 9, Illinois. 1957
14. C-Gopalan, B.V. Rama Sastri, S.C. Balasubramanian. Nutritive value of Indian Foods. Indian Recommended Dietary Allowance. NIN. ICMR. 1989.