

INCORPORATION OF RAJGIRA AND CINNAMON IN SOME INDIAN RECIPES WITH SPECIAL REFERENCE TO DIABETES MELLITUS

Richa Nimeshwari¹, Ankita Gupta² and Neeta Chopra³

¹Nutrition Coach at Dietox Nutrition by Richa Agra, U.P, India

²Department of Food and Nutrition Institute of Home Science Dr Bhimrao Ambedkar University Agra, U.P, India

³Department of Food and Nutrition Institute of Home Science Dr Bhimrao Ambedkar University Agra, U.P, India

Research Article

Received date: 15/12/2020

Accepted date: 28/12/2020

Published date: 26/02/2021

*For Correspondence

Department of Food & Nutrition,
Institute of Home Science,
Dr.B.R.Ambedkar University,
Agra, India.

E-mail:

g.ankita.gupta@gmail.com

Keywords:

Rajgira, Cinnamon, Diabetes Mellitus, Indian Recipes.

ABSTRACT

Rajgira (Amaranth) and Cinnamon (Cinnamomumzeylanicum) are cultivated all over the world. Both are very good source of dietary fiber but rajgira contains all the 9 essential amino acids needed by the body. It's a very heart-healthy grain, containing soluble fibre and unsaturated fatty acids which helps to reduce blood cholesterol levels. Diabetes mellitus (DM) is described in Ayurveda as Madhumeha/Kshaudrameha, which literally means excessive urine with sweet taste like honey. The number of people suffering from Diabetes all over the world is increasing progressively. Ayurveda is oriented toward prevention, health maintenance and treatment of diseases. There are large number of drugs of herbal and mineral origin mentioned in ayurvedic texts, for the treatment of Madhumeha. Some herbal medications showing anti diabetic effects bring into being varying effects on the blood sugar levels with minimal side effects. The present study was conducted on "Incorporation of rajgira and cinnamon in some Indian recipes with special reference to Diabetes Mellitus". In the present study rajgira flour and cinnamon powder was replaced/ incorporate in Pancake, Dosa, Batti, Methi Kabab, Kadhi, Baked Vegetables, Coffee, Paneer Tikka, Matar Chaat and Sprouts & Channa Bhel. A semi trained panel of 15 members was selected through Triangle Test for evaluation of the incorporated recipes. 9 point

Hedonic Rating Scale and Composite Scoring Test was used for evaluation of the incorporated recipes. The data hence collected was coded, tabulated and analysed using various statistical techniques. The statistical measures used were Mean score, Standard Deviation, and Analysis of Variance. On the basis of scores all the rajgira and cinnamon replaced/ incorporated recipes were acceptable and there was no significant difference in all the rajgira and cinnamon incorporated recipes and any of these recipes will be acceptable to diabetic patient.

INTRODUCTION

Rajgira (Amaranth) or Ramdana, as it is popularly known in Northern India is a power house of nutrients. This grain migrated to India from America, and became an important part of our fasting ritual. Rajgira is the only grain which contains Vitamin C. Along with that it also has twice the amount of Calcium as milk, which helps in reducing the risk of osteoporosis, when included in one's daily diet. The presence of amino acids in Rajgira makes it the perfect fasting grain. It is easy to digest and curtails hunger. Consumption of Rajgira during fasts keeps one satiated. The grain has bioactive compounds which make it anti-allergic. Plus, it is also suitable for diabetics because it helps in reducing hyperglycemia. Rajgira acts as a wonder drug too.

Cinnamon (*Cinnamomum zeylanicum*) is a small, tropical, evergreen tree most noted for its bark, which provides the world with the commonly known spice, cinnamon. Sri Lanka is the native country of Cinnamon.

Cinnamon is a powerful spice that has been used medicinally around the world for thousands of years. It is still used daily in many cultures because of its widespread health benefits, not to mention its distinctly sweet, warming taste and ease of use in recipes. (Axe.J, 2017)

Cinnamon is loaded with antioxidants-it contains large amounts of highly potent polyphenol antioxidants which protect the body from oxidative damage caused by free radicals. It has anti-inflammatory properties-the antioxidants in cinnamon have anti-inflammatory effects, which may help lower the risk of disease. It can improve some key risk factors for heart disease, including cholesterol, triglycerides and blood pressure, lowers blood sugar levels and has a powerful anti-diabetic effect and has been shown to reduce fasting blood sugar levels, having a potent anti-diabetic effect at 1 to 6 grams per day.

It may also have beneficial effects on neurodegenerative diseases as it has been shown to lead to various improvements for Alzheimer's disease and Parkinson's disease in animal studies. Cinnamon extracted from cassia varieties are thought to help fight against HIV-1. (Leech.J, 2016).

Methodology

Material and Method

Rajgira (Amaranth seeds) and Cinnamon sticks were procured from the local market of Agra, India. Rajgira Grains were cleaned and dried properly and made powder by using mixer grinder. Powder was stored in air tight container for future use. Cinnamon was cleaned, dried and roasted properly and made powder by using mixer grinder. Powder was stored in air tight container for further use.

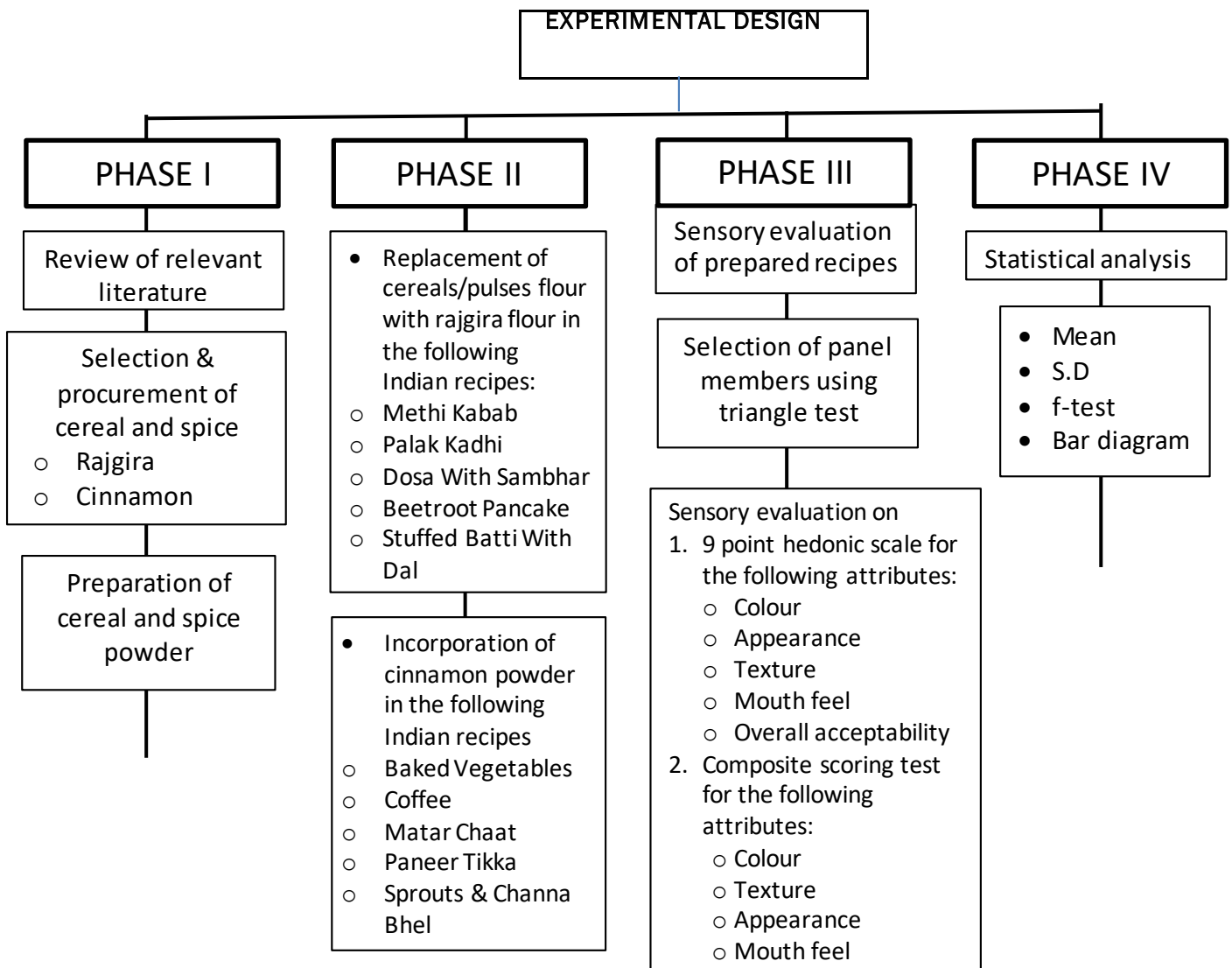


Fig: Flow chart elucidating the experimental design

Recipe selection by initial trials: Initially steamed, boiled, shallow fried and baked recipes were selected. Replacement of cereals in recipes was done with rajgira flour but it was observed that steamed and boiled recipes were not acceptable as compared to baked and shallow fried recipes. Therefore pancake, dosa, batti, methi kabab and kadhi were selected as final recipes for sensory evaluation. Incorporation was also done with cinnamon powder in different recipes. It was observed that baked and shallow fried recipes were more acceptable. Therefore baked vegetables, coffee, paneer tikka, matar chaat and sprouts & channa bhel were selected as final recipes for sensory evaluation.

Recipe Name	Ingredient	Amount
Methi	• Kale Channe (Boiled)	1cup
Kabab	• Dahi	1/2 Cup
<i>Serving size-2 pieces</i>	• Rajgira Flour	1/2cup
	• Methi (Finely Chopped)	1/2 Cup
	• Onion	1 small
	• Capsicum	1
	• Green Chillies	2
	• Carrots	1
	• Salt	To Taste
	• Red Chilli Powder	1 t
	• Chaat Masala	1 ½ t
	• Sauf Powder	1 t
	• Cumin Seeds Powder	1t
Palak	• Rajgira Flour	1/2 Cup
Kadhi	• Curd	1cup
<i>Serving Size- 1 bowl</i>	• Palak (Finely Chopped)	1/2 Cup
	• Salt	To Taste
	• Ginger Chilli Paste	1 t
	• Cumin Seeds	1t
	• Curry Leaves	6-7
	• Dry red chilli	1-2
	For Batter	
Dosa	• Urad Dal	1/2 Cup
<i>Serving Size- 1piece</i>	• Rajgira Flour	1/2 Cup
	• Sour Curd	1/2 Cup
	• Ginger Chilli Paste	1 T
	• Salt	To Taste
	For Filling	
	• Paneer	50gm
	• Chopped Onion	1
	• Green Chilli	2
	• Chopped Fresh Coriander	1/2 T
Beetroot	• Rajgira	1/2 Cup

Pancake <i>Serving Size- 1</i>	• Urad Dal	1/2 Cup
	• Curd	1/2 Cup
	• Beetroot (Chhoped)	1/3 Cup
	• Onion Chopped	1
	• Green Chillies	2
	• Carrot	1
	• Salt	To Taste
Stuffed Batti <i>Serving Size- 2</i> <i>pieces</i>	For Dough	
	• Rajgira Flour	1/2 Cup
	• Besan	1/2 Cup
	• Salt	To Taste
	For Stuffing	
	• Matar Boiled	1/2 Cup
	• Methi Chopped	1/3 Cup
	• Onion	1
	• Chilli	2
	• Ginger	1/2
	• Jeera	1/2 t
	• Salt	To Taste
	• Chaat Masala	1t

Table1 Recipes of rajgira flour

Recipe Name	Ingredient	Amount
Baked Vegetables <i>Serving Size- 1 bowl</i>	• Cauliflower	50 gm
	• Peas	30 gm
	• Carrot	1
	• Capsicum	1
	• Beans	20gm
	• Onion	1
	• Hung curd	1cup
	• Paneer	30 gm
	• Salt	To Taste
	• Chaat masala	1 ½ t
Coffee <i>Serving Size- 1 cup</i>	• Milk	1cup
	• Coffee Powder	½ t
	• Cinnamon	4gm
	• Sugar	1 t
Matar Chaat <i>Serving Size- 1 bowl</i>	• Green Matar Boiled	1 cup
	• Onion	1
	• Tomato	1
	• Salt	To Taste
	• Cinnamon	4gm
	• Chaat Masala	1 ½ t
	• Lemon juice	1T

Paneer		
Tikka		250 gm
<i>Serving Size-</i>	• Paneer	2
<i>4 pieces</i>	• Capsicum	2
	• Tomato	2
	• Onion	2
	• Curd	½ cup
	• Black Pepper	½ t
	• Salt	To Taste
	• Cinnamon	4gm
	• Chaat Masala	1 ½ t
Sprouts & Channa Bhel		
<i>Serving Size-</i>	• Bhuna Channa	½ cup
<i>1 bowl</i>	• Sprouted Moong & Month Dal	½ cup
	• Chopped Onion	1
	• Chopped Tomato	1
	• Chilli	2
	• Salt	To Taste
	• Cinnamon	4gm
	• Jeera Powder	½ t
	• Chaat Masala	1 t
	• Lemon Juice	1 T
	• Chutney	1 T

Table2 Recipes of cinnamon powder

(Marine et al., 1965) has suggested that the person who serves a panellist should be in good health and should not be suffering from conditions that might interfere with normal function of taste and smell. A semi trained panel of 15 members was selected through Triangle Test for evaluation of the incorporated recipes. 9 point Hedonic Rating was used for evaluation and acceptability of the recipes. The collected data was coded, tabulated and analysed using various statistical techniques. The Statistical measures used were Mean, S.D and ANOVA for analysis of acceptability scores.

Result and Discussion

Evaluation of cereal/pulse recipes replaced with Rajgira: The evaluation of the recipes was conducted on a 9 point Hedonic Rating Scale, among the evaluation recipes Rajgira Pancake overall attribute was rated with the highest mean score of 8.8 by the panel members followed by Dosa, kabab, batti and kadhi. The mouth feel was liked very much and scored highest among all the attributes of the recipes.



Pancake



Dosa



Kabab



Batti



Kadhi

Cereal/Pulse replaced with rajgira in selected Indian recipes

Recipes	Colour (Mean±SD)	Appearance (Mean±SD)	Texture (Mean±SD)	Mouthfeel (Mean±SD)	After Taste (Mean±SD)	Overall acceptability (Mean±SD)	Total Mean
Pancake	8.9	8.7	8.7	8.9	8.7	8.8	8.8
Dosa	8.8	8.5	8.0	8.8	8.7	8.8	8.6
Kabab	8.6	8.4	8.5	8	7.6	8.4	8.2
Batti	8.4	8.5	8.1	8.1	8.0	8.4	8.2
Kadhi	8.0	8	8.1	7.6	7.6	8.2	7.9

Table 3: organoleptic evaluation of selected Indian recipes prepared by replacement with Rajgira

Table 4 shows the calculated value of F as 1.9 which is less than the table value of 5.63 at 5% level with degree of freedom (d.f.) being V1 = 4 and V2 = 70 and hence could have arisen due to chance. This analysis supports the null-hypothesis of no difference in means. Therefore it can be concluded that there is no difference between the rajgira incorporated recipes and any of them can be consumed by patients suffering from diabetes.

Source of variation	Sum of square (SS)	Degree of freedom (DF)	Mean square (MS)	f- ratio	Critical value of F (At 5%)
Between Sample	376.8	(5-1) = 4	94.2	94.2/22 = 4.2 ^{NS}	F(70.4)= 5.63
Within sample	1542.9	(75-5)= 70	22.0		
Total	1919.7				

NS = insignificant at 5% level

Table 4: Variance table for selected Indian recipes prepared by replacement with Rajgira

Table 5 Shows the nutritive values of Rajgira replaced recipes. Kabab has the highest energy with 384.5 kcal calories per serving followed by Dosa, Pancake, Batti and kadhi. Kabab had highest protein 21.1 gm per serving.

Recipe	Energy (kcal)	Protein (gm)	Carbs (gm)	Fat (gm)	Fiber (gm)	Ca (mg)	Fe (mg)	Vit A (ug)	Vit B1 (mg)	Vit B2 (mg)	Vit B3 (mg)	Vit B9 (mcg)	Vit C (gm)
Kabab	384.5	21.1	67.9	5.3	3.9	853.2	6.17	1416.5	0.33	0.37	2.24	37.15	29
Kadhi	279	13.55	29.4	12.5	2.6	935.5	3.74	5657.5	0.23	0.2	1.59	22	3
Dosa	336.7	17.7	45.5	10.9	3.3	604	4.43	430.3	0.29	0.29	0.82	31.02	8
Pancake	334.7	13.3	61.3	4.9	4.8	391	7.6	115.2	0.42	0.89	1.59	33.8	4.5
Batti	312	16.8	28.7	2.05	5.45	451.7	11.1	701	0.62	0.38	2.79	11	32.5

Table 5: Nutritive value of Rajgira replaced recipes

Evaluation of the incorporated recipes of cinnamon: The evaluation of the recipes was conducted on a 9 point Hedonic Rating Scale and it was seen that the Matar Chaat was extremely liked in all the attributes with a score of 8.7 followed by Baked Vegetables, Paneer Tikka, Sprouts & chana bhel and coffee. Baked Vegetables has the highest score in overall acceptability.



Sprouts & Channa Bhel



Paneer Tikka



Baked Vegetables



Matar Chaat



Coffee

Recipes	Colour (Mean±SD)	Appearance (Mean±SD)	Texture (Mean±SD)	Mouthfeel (Mean±SD)	After Taste (Mean±SD)	Overall acceptability (Mean±SD)	Total Mean
Matar Chaat	8.9±0.24	8.9±0.24	8.8±0.34	8.3±0.67	8.8±0.4	8.8±0.34	8.7
Baked Vegetables	8.4±0.87	8.2±1.06	8.4±1.08	8.6±0.8	8.5±0.50	8.6±0.60	8.4
Paneer Tikka	8.4±0.8	7.9±0.85	7.9±1	8.5±0.5	8.4±0.61	8.5±0.5	8.3
Sprouts & channa Bhel	8.4±0.61	8.4±0.8	8.2±1.34	8.2±1.51	8±1.09	8.4±1.53	8.2
Coffee	8.4±0.80	8.2±1.04	8.4±0.8	7.8±1.46	7.7±1.47	8.2±0.70	8.1

Table 6: organoleptic evaluation of cinnamon incorporated in common Indian recipes

Table 7 shows the calculated value of F as 1.9 which is less than the table value of %6.3 at 5% level with degree of freedom (d.f.) being V1= 4 and V2 = 70 and hence could have arisen due to chance. This analysis supports the null-hypothesis of no difference in means. Therefore it can be conclude that there is no difference between the rajgira incorporated recipes and any of them can be consumed by patients suffering from diabetes mellitus

Source of variation	Sum of square (SS)	Degree of freedom (DF)	Mean square (MS)	f- ratio	Critical value of F (At 5%)
Between Sample	376.8	(5-1) = 4	94.2	94.2/22 = 4.2 ^{NS}	F(70.4)= 5.63
Within sample	1542.9	(75-5)= 70	22.0		
Total	1919.7				

NS = insignificant at 5% level

Table 7: Variance table for cinnamon incorporated in selected Indian recipes

Table 8 shows the nutritive values of cinnamon incorporated recipes. Paneer Tikka is highest in calories with score 961 of kcal and 4.61 gm dietary fiber per serving followed by sprouts & channa bhel, baked vegetables, matar chaat and coffee, whereas, coffee scores least in all the attributes of the recipes

Recipe	Energy (kcal)	Protein (gm)	Carbs (gm)	Fat (gm)	Fiber (gm)	Ca (mg)	Fe (mg)	Vit A (ug)	Vit B1 (mg)	Vit B2 (mg)	Vit B3 (mg)	Vit B9 (mcg)	Vit C (gm)
Matar Chaat	137.8	8.52	26.79	0.21	7.76	77.7	2.4	97	0.29	0.9	1.1	-	10.2
Baked Vegetables	355	21.29	39.76	17.1	6.34	1031	5.20	913.5	0.12	0.79	1.4	8.3	18.4
Paneer Tikka	961	68.76	51.9	68.86	4.61	426.8	4.6	5476	0.28	0.21	1.35	3.3	6.2
Sprouts & channa Bhel	377.4	30.63	68.89	0.93	8.93	486	7.72	87.2	1.7	0.487	0.19	1.94	-
Coffee	41.84	2.71	8.79	0.16	2.76	172.1	0.2	-	-	-	0.1	-	0.2

Table 8: Nutritive value of cinnamon incorporated recipes

Summary and Conclusion

India has today become the diabetic capital of the world with over 20 million diabetics and this number is likely to increase to 57 million by 2025. Change in eating habits, increasing weight and decreased physical activity are major factors leading to increased incidence of type 2 diabetes. Herbal therapy for diabetes has been followed all over the world successfully. Herbs are used to manage type I and type II diabetes and their complications. Rajgira and Cinnamon are good source of calcium, protein and dietary fiber. Also it contains antioxidants, hence good for diabetic patients.

In the present study, an attempt was made to prepare rajgira and cinnamon recipes for Diabetic patients. In this study, cereal/ pulse flour was replaced with rajgira flour and cinnamon powder was incorporated in commonly consumed Indian recipes Mean score, Standard Deviation and ANOVA were used for evaluation of the scores of acceptability trials of the recipes.

On the basis of overall acceptability scores of all Rajgira replaced recipes Pancake was the most accepted recipe among all the recipes followed by Dosa and Kabab. Least accepted recipe was kadhi. The range of mean score for all the attributes was 8.8 to 7.9.

The calculated value of f (ANOVA) was 4.2 which is less than the tabulated value of 5.63 at 5% level of significance. This analysis supports the null hypothesis of no difference in sample means. Therefore, the difference in sensory attributes of Rajgira recipes was insignificant and any of them will be acceptable to diabetic patient.

On the basis of overall acceptability scores of all cinnamon incorporated recipes matar chaat and baked vegetables were most accepted recipes among all the recipes followed by paneer tikka and sprouts & channa bhel. Least accepted recipe was coffee. The range of mean score for all the attributes was 8.7 to 8.1.

The calculated value of f (ANOVA) was 2.2 which was less than the tabulated value of 5.63 at 5% level of significance. This analysis supports the null hypothesis of no difference in sample means. Therefore, the difference in sensory attributes of Cinnamon recipes was insignificant and any of them will be acceptable by diabetic patient. It was concluded that Rajgira and Cinnamon can be successfully incorporated in selected Indian recipes as a very good source of dietary fiber and all the 9 essential amino acids, thus proving beneficial for Diabetic patients.

REFERENCES

1. Antony,Q., Kourlas,H., David,Q. Cinnamon Supplementation In Patients With Type 2 Diabetes Mellitus; *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy*,2007;27(4), 1875-9114.
2. Axe,J. Health Benefits of Cinnamon & Nutrition Facts,2017.
3. Baker,W.L., Gutierrez,G., White,C.M., Kluger,J., et al. Effect of cinnamon on Glucose Control and Lipid Parameters; *Journal of Diabetes Care*, 2008;31(1), 41-3.
4. Berger,A., Germaud,G., Baumgartner,M., Rein,D., et al. Cholesterol-Lowering Properties of Amaranth Grain and Oil in Hamsters; *International Journal for Vitamin and Nutrition Research*,2013;73, 39-47.
5. Cole,J.N. (1979). Amaranth: from the past, for the future, Rodale Press, Emaus, PA, USA. 1979.
6. Coles,T. Benefits of amaranth: 14 reasons to get into this grain; source:
7. Leech,J. 10 Evidence-Based Health Benefits of Cinnamon, 2016.
8. Lewis,B. Health Benefits of Rajgira/Amaranth; 2014.
9. Marine,M., Pangborn,R.M., & Roessler,E.B. Principles of Sensory Evaluation of Food; New York and London: Academic Press,1965;602.
10. Naturopathy Treatment for Diabetes. (2015).
11. Pedersen,B., Kalinowski,L.S., Eggum,B.O. (1987). The Nutritive Value Of Amaranth Grain (*Amaranthus Caudatus*); *Plant Foods for Human Nutrition*. 1987;36(4), 309–324.
12. Gupta,S.P. Statistical Methods; Sultan Chand and Sons; 2008;180:282-283,911.