

A COMPARITIVE ANALYTICAL STUDY TO ASSESS THE NUTRITIONAL VALUE OF PALALAM (LADDU) PREPARED INDIVIDUALLY FROM TILA (BLACK SESAME), MUDGA (GREEN GRAM), CANAKA (BENGAL GRAM), MAKUSHTHAKA (MOTH BEAN) & KANGU (FOXTAIL MILLET)

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ABSTRACT

Background: Nutrition has moved from being viewed only as a preventive modality to being recognized as a disease management tool. Incorporating healthy nutrition into daily routine plays a major role in the maintenance of health. As a known fact, nutritional values change from raw food articles to prepared food, due to the processing. Hence, an effort is made here to analyse the nutritive value of *Palalam*. **Objectives:** To evaluate the nutritive value of prepared *Palalam* (Laddu) individually from *Tila* (Black sesame), *Mudga* (Green gram), *Canaka* (Bengal gram), *Makushthaka* (Moth bean) & *Kangu* (Foxtail millet). To evaluate the nutritional value of prepared *Palalam* (Laddu) individually from *Mudga* (Green gram), *Canaka* (Bengal gram), *Makushthaka* (Moth bean) & *Kangu* (Foxtail millet) by adding *Tila* (Black sesame) & *Draksha* (Raisins). To compare the assessed nutritional value of each *Palalam*. **Methods:** The study was conducted in Ganesh Consultancy and Analytical Services, Hebbal Industrial Area, Mysuru. As per *Bhavaprakasha Nighantu's* reference, *Palalam* (*Tila* and *Guda*) was taken for study along with *Anubhuta Yogas* like *Palalam* made of *Mudga*, *Canaka*, *Makushthaka*, and *Kangu* (with and without adjuvants). A total of nine *Palalam* samples were analyzed for their proximate values. Quantification of classical and *Anubhuta Yogas* with nutritive value was done in this study. **Results:** The proximate value difference was appreciated between the samples prepared from *Tila*, *Mudga*, *Canaka*, *Makushthaka* & *Kangu*. Also, the proximate value difference between

the samples prepared out of *Mudga*, *Canaka*, *Makushthaka* & *Kangu*, with and without adjuvants like *Tila* & *Draksha*. Among nine samples, classical *Palalam* prepared out of *Tila*, and *Guda* had high nutritive values than the remaining samples. **Interpretation & Conclusion:** Group A showed higher proximate values of Protein, Carbohydrates, Crude Fibre, Iron, Potassium, Zinc, and Phosphorous. While, Group B showed higher proximate values of Energy, Sugar, Total Fat, Calcium, Sodium, and Magnesium.

Keywords: *Palalam*, *Tila*, *Mudga*, *Canaka*, *Makushthaka*, *Kangu*, Nutrients

INTRODUCTION

Health is the root cause of *Dharma*, *Artha*, *Kama*, and *Moksha* [1]. To achieve health, *Ayurveda* has been given importance to *Ahara*. *Ahara* is one among the *Trayopastambha* [2]. Health is dependent on food [3]. Let food be thy medicine and medicine be thy food [4]. Nutrition is the science that interprets the interaction of nutrients and other substances in food concerning maintenance, growth, reproduction, health, and disease of an organism [5]. The modern age which has made life easier, by providing amenities, has also caused the number of diseases in the individual. In this age of jet-set lifestyle, the need to feed the body with correct foods plays an indispensable part in leading positive lives. So, we should consume healthy food in the right quantity, at the right time to prevent diseases. Elaborate sections of food articles and various food recipes and their properties have been found in the classical texts of *Ayurveda*. The Nutritional value depends on the quantity of food that is digested and absorbed and the amounts of the essential nutrients (proteins, fats, carbohydrates, minerals, and vitamins) which it contains. This value can be affected by soil and growing conditions, handling and storage, and processing [6]. Pulses are very high in protein and fibre and are low in fat [7]. Millet is highly nutritious, non-glutinous, and contains approximately 15% protein, high amount of fibre & minerals [8]. Adjutants are added mainly for palatability and added nutritional benefits. The nutritional value of raw pulses is available. But, as nutritional value varies

in prepared food there is a need to evaluate it. So here is an effort made to evaluate the nutritional value of *Palalam* (Laddu), one of the therapeutic recipes prepared out of *Tila* (Sesame) & *Guda* (Jaggery) mentioned by *Acharya Bhavamishra* [9]. Laddu prepared with *Mudga* (Green gram) being *Nithya Sevaniya Ahara Dravya* [10]. *Canaka* (Bengal gram), *Kangu* (Foxtail millet) & *Makushthaka* (Moth bean) are grown mostly in India [11], [12], [13], are evaluated for its nutritional values.

Objectives

1. To evaluate the nutritive value of prepared *Palalam* (Laddu) individually from *Tila* (Black sesame), *Mudga* (Green gram), *Canaka* (Bengal gram), *Makushthaka* (Moth bean) & *Kangu* (Foxtail millet).
2. To evaluate the nutritional value of prepared *Palalam* (Laddu) individually from *Mudga* (Green gram), *Canaka* (Bengal gram), *Makushthaka* (Moth bean) & *Kangu* (Foxtail millet) by adding *Tila* (Black sesame) & *Draksha* (Raisins).
3. To compare the assessed nutritional value of each *Palalam*.

Methodology

Study Design: Analytical method (by determining the concentration of the chemical composition of the product)

Technique Employed: AOAC (Association of Official Analytical Chemists) method.

Number of Samples: Nine (9), they are as follows

Table 1: Grouping of *Palalam* with abbreviations

Classical	<i>Palalam (Tila +Guda)</i>	S1
Group 1	<i>Mudga laddu</i>	S2
	<i>Canaka laddu</i>	S4
	<i>Makushthaka laddu</i>	S6
	<i>Kangu laddu</i>	S8
Group 2	<i>Mudga laddu (with Tila + Draksha)</i>	S3
	<i>Canaka laddu (with Tila + Draksha)</i>	S5
	<i>Makushthaka laddu (with Tila + Draksha)</i>	S7
	<i>Kangu laddu (with Tila + Draksha)</i>	S9

Source of data:

Literary source: All Classical Books, Authenticated Journals, Websites will be accessed to collect appropriate data.

Source of ingredients: (In the table below)

Table 2: The source of ingredients used in the study

Ingredients	Source
<i>Mudga</i> (Green gram), <i>Canaka</i> (Bengal gram), and <i>Makushthaka</i> (Moth bean)	Raw pulse distributors at Regulated Market of co-operation, Bandipalya, Mysuru, Karnataka
<i>Tila</i> (Black sesame)	Raw oilseeds distributors at Regulated Market of co-operation, Bandipalya, Mysuru, Karnataka
<i>Kangu</i> (Foxtail millet)	Raw millets distributors at Regulated Market of co-operation, Bandipalya, Mysuru, Karnataka
<i>Draksha</i> (Raisin)	Raw dry fruits distributors at Regulated Market of co-operation, Bandipalya, Mysuru, Karnataka
<i>Guda</i> (Organic jaggery)	CFTRI Tested Organic Jaggery
<i>Ghrita</i> (Ghee)	KMF, Mysuru

Quantity of Ingredients:

Table 3: Quantity of Ingredients *Palalam* (Classical Reference)

Ingredients (<i>Dravyas</i>) used	Quantity (<i>Pramana</i>)
<i>Tila</i> (Black sesame)	50gms
<i>Guda</i> (Organic jaggery)	50gms

Table 4: Quantity of Ingredients GROUP 1

Ingredients (<i>Dravyas</i>) used	Quantity (<i>Pramana</i>)
Flour of <i>Mudga</i> (Green gram) / <i>Canaka</i> (Bengal gram) / <i>Makushthaka</i> (Moth bean) / <i>Kangu</i> (Foxtail millet)	100gms
<i>Ghrita</i> (Ghee)	10 ml
<i>Guda</i> (Organic jaggery)	20gms
<i>Jala</i> (Water)	40 ml

Table 5: Quantity of Ingredients GROUP 2

Ingredients (<i>Dravyas</i>) used	Quantity (<i>Pramana</i>)
Flour of <i>Mudga</i> (Green gram) / <i>Canaka</i> (Bengal gram)/ <i>Makushthaka</i> (Moth bean) / <i>Kangu</i> (Foxtail millet)	100gms
<i>Ghrita</i> (Ghee)	10 ml
<i>Guda</i> (Organic jaggery)	20gms
<i>Jala</i> (Water)	40 ml
<i>Draksha</i> (Raisin)	10gms
<i>Tila</i> (Black sesame)	10gms

Method of preparation

Palalam preparation: Palalam (Classical): *Tila* procured from RMC was hand cleaned. Then 50gms of *Tila* and 50gms of *Guda* (Organic Jaggery) were taken and pounded together and made in laddus. It has been taken for nutritional analysis. **Palalam (Anubhutha yoga) Preparation of flour:** *Mudga* (Green gram), *Canaka* (Bengal gram), *Makushthaka* (Moth bean) and *Kangu* (Foxtail millet) were procured from RMC and hand cleaned. *Mudga* (green gram), *Canaka* (Bengal gram), and *Makushthaka* (Moth bean) were fried and made into fine powder in the flour mill. *Kangu* (Foxtail millet) was made into fine powder in the flour mill. Obtained flours were stored separately each in an airtight container.

Preparation of Gudapaaka: 20gms of *Guda* (Organic jaggery) was taken along with 40 ml of water. And heated till it attains *Paaka* (approximately 25 ml).

Preparation of laddu: 100gms of flour were taken and divided into five halves (i.e. 20gms each). Then mixed with 2 ml of *Ghrita* and 5 ml of *Gudapaaka* without forming any lumps and made into laddu. Likewise, laddu samples were prepared and have been taken for nutritional analysis.

Preparation of laddu (with adjuvants): 100gms of flour were taken and divided into five halves (i.e. 20gms each). Then mixed with 2 ml of *Ghrita* and 5 ml of *Gudapaaka* along with 2gms of *Tila* and 2gms of *Draksha* without forming any lumps and made into laddu. Likewise, laddu samples were prepared and it has been taken for nutritional analysis.

Table 6: Test and its method

Test	Test Method
Energy Kcal/100g TOTAL CARBOHYDRATES % Sugar % Crude fiber %	FSSAI Manual Method
Protein %	IS: 7219-1973
Total fat %	GCAS/FC/SOP-09-Fat
Cholesterol mg/100g	GCAS/FC/SOP-09-Fat
Sodium as Na mg/100g	GCAS/FC/SOP-10-Na
Potassium as K mg/100g	GCAS/FC/SOP-10-K
Calcium as Ca mg/100g Potassium as K mg/100g Zinc as Zn mg/100g Magnesium as Mg mg/100g Phosphorous as P mg/100g	GCAS/FC/SOP-21-M

Observation and Results

Energy: Palalam S1: Total energy in S1 was 485.49 Kcal/100g.

Table 7: Energy (Kcal) in both the Groups

GROUP	Palalam	Values	Mean	SD	SE	MD	SIG	REMARKS
A	S2	382.42	384.0675	2.68960	1.34480	-16.27250	0.96	Non- significant
	S4	384.74						
	S6	381.55						
	S8	387.56						
B	S3	407.33	400.3400	16.28228	8.14114			
	S5	375.97						
	S7	409.91						
	S9	408.15						

Group A: Total energy was more in S8 (387.56 Kcal) than in S4 (384.74 Kcal), S2 (382.42 Kcal), and S6 (381.55 Kcal).

Group B: Total energy was more in S7 (409.91 Kcal) than in S9 (408.15 Kcal), S3 (407.33 Kcal), and S5 (375.97 Kcal).

Between Group A and Group B: Higher mean energy was found in Group B compared to Group A. And the mean difference in energy between the two groups was statistically non-significant by unpaired T-test.

Carbohydrates: Palalam S1: Carbohydrates in S1 was 54.34 %.

Table 8: Carbohydrates (%) in both the Groups

GROUP	Palalam	Values	Mean	SD	SE	MD	SIG	REMARKS
A	S2	59.4	61.1050	2.16709	1.08355	5.35000	0.007	Highly significant
	S4	59.13						
	S6	63.45						
	S8	62.44						
B	S3	54.18	55.7550	1.48518	0.74259			
	S5	56.91						
	S7	54.8						
	S9	57.13						

Group A: Carbohydrates content was more in S6 (63.45%) than in S8 (62.44%), S2 (59.4%), and S4 (59.13%).

Group B: Carbohydrates content was more in S9 (57.13%) than in S5 (56.91%), S7 (54.8%), and S3 (54.18%).

Between Group A and Group B: Higher mean Carbohydrates was found in Group A compared to Group B. And the mean difference in carbohydrates between the two groups was statistically highly significant by unpaired T-test.

Protein: Palalam S1: Protein in S1 was 10.31 %.

Table 9: Protein (%) in both the Groups

GROUP	Palalam	Values	Mean	SD	SE	MD	SIG	REMARKS
A	S2	16.27	13.5625	2.06929	1.03463	1.81250	0.214	Non-significant
	S4	13.42						
	S6	13.33						
	S8	11.23						
B	S3	13.25	11.7500	1.59125	0.79562			
	S5	12.94						
	S7	10.8						
	S9	10.01						

Group A: Protein content was more in S2 (16.27%) than in S4 (13.42%), S6 (13.33%), and S8 (11.23%).

Group B: Protein content was more in S3 (13.25%) than in S5 (12.94%), S7 (10.8%), and S9 (10.01%).

Between Group A and Group B: Higher mean Protein was found in Group A compared to Group B. And

the mean difference in carbohydrates between the two groups was statistically non-significant by unpaired T-test.

Sugar: Palalam S1: Sugar in S1 was 44.61 %.

Table 10: Sugar (%) in both the Groups

GROUP	Palalam	Values	Mean	SD	SE	MD	SIG	REMARKS
A	S2	12.51	12.8725	0.51552	0.25776	-6.78000	0.000	Highly significant
	S4	13.1						
	S6	13.49						
	S8	12.39						
B	S3	20.88	19.6525	1.76128	0.88064			
	S5	21.43						
	S7	18.4						
	S9	17.9						

Group A: Sugar content was more in S6 (13.49%) than in S4 (13.1%), S2 (12.51%), and S8 (12.39%).

Group B: Sugar content was more in S5 (21.43%) than in S3 (20.88%), S7 (18.4%), and S9 (17.9%).

Between Group A and Group B: Higher mean Sugar was found in Group B compared to Group A. And the

mean difference in sugar between the two groups was statistically highly significant by unpaired T-test.

Crude fiber: Palalam S1: Crude fiber in S1 was 3.11 %.

Table 11: Crude fiber (%) in both the Groups

GROUP	Palalam	Values	Mean	SD	SE	MD	SIG	REMARKS
A	S2	0.99	1.0950	0.62271	0.31135	-0.62000	0.105	Non-significant
	S4	1.99						
	S6	0.84						
	S8	0.56						
B	S3	1.94	1.7150	0.18412	0.09206			
	S5	1.7						
	S7	1.49						
	S9	1.73						

Group A: Crude fiber content was more in S4 (1.99%) than in S2 (0.99%), S6 (0.56%), and S8 (0.56%).

Group B: Crude fiber content was more in S3 (1.94%) than in S9 (1.73%), S5 (1.7%), and S7 (1.49%).

Between Group A and Group B: Higher mean Crude fiber was found in Group B compared to Group A. And

the mean difference in crude fiber between the two groups was statistically highly significant by unpaired T-test.

Total fat: *Palalam* S1: Total fat in S1 was 25.21 %.

Table 12: Total fat (%) in both the Groups

GROUP	<i>Palalam</i>	Values	Mean	SD	SE	MD	SIG	REMARKS
A	S2	8.86	9.4900	1.09766	0.54883	-4.99000	0.011	Significant
	S4	10.51						
	S6	8.27						
	S8	10.32						
B	S3	15.29	14.4800	2.54477	1.272339			
	S5	10.73						
	S7	16.39						
	S9	15.51						

Group A: Total fat content was more in S4 (10.51%) than in S8 (10.32%), S2 (8.86%), and S6 (8.27%).

Group B: Total fat content was more in S7 (16.39%) than in S9 (15.51%), S3 (15.23%), and S5 (10.73%).

Between Group A and Group B: Higher mean total fat was found in Group B compared to Group A. And

the mean difference in total fat between the two groups was statistically significant by unpaired T-test.

Calcium: *Palalam* S1: Calcium content in S1 was 782.29 mg/100g.

Table 13: Calcium (mg/100g) in both the Groups

GROUP	<i>Palalam</i>	Values	Mean	SD	SE	MD	SIG	REMARKS
A	S2	42.18	75.6425	31.07336	15.53668	-70.08500	0.013	Significant
	S4	109.63						
	S6	93.01						
	S8	57.75						
B	S3	130.93	145.7275	24.94644	12.47322			
	S5	164.68						
	S7	168.95						
	S9	118.35						

Group A: Calcium content was more in S4 (109.63mg/100g) than in S6 (93.01mg/100g), S8 (57.75mg/100g), and S2 (42.18mg/100g).

Group B: Calcium content was more in S7 (168.95mg/100g) than in S5 (164.68mg/100g), S3 (130.93mg/100g) and S9 (118.35mg/100g).

Between Group A and Group B: Higher mean Calcium was found in Group B compared to Group A. And the mean difference in Calcium between the two groups was statistically significant by unpaired T-test.

Iron: *Palalam* S1: Iron content in S1 was 4.05 mg/100g.

Table 14: Iron (mg/100g) in both the Groups

GROUP	Palalam	Values	Mean	SD		MD	SIG	REMARKS
A	S2	5.51	5.2550	0.91933	0.45966	-0.04250	0.963	Non-significant
	S4	4.95						
	S6	6.37						
	S8	4.19						
B	S3	6.99	5.2975	1.48336	0.74168			
	S5	5.85						
	S7	4.85						
	S9	3.5						

Group A: Iron content was more in S6 (6.37mg/100g) than in S2 (5.51mg/100g), S4 (4.95mg/100g), and S8 (4.19mg/100g).

Group B: Iron content was more in S3 (6.99mg/100g) than in S5 (5.85mg/100g), S7 (4.85mg/100g) and S9 (3.5mg/100g).

Between Group A and Group B: Higher mean Iron was found in Group B compared to Group A. And the mean difference in Iron between the two groups was statistically non-significant by unpaired T-test.

Sodium: Palalam S1: Sodium content in S1 was 26.03 mg/100g.

Table 15: Sodium (mg/100g) in both the Groups

GROUP	Palalam	Values	Mean	SD	SE	MD	SIG	REMARKS
A	S2	14.87	16.6050	1.84198	0.92099	-1.38750	0.683	Non-significant
	S4	19.19						
	S6	15.93						
	S8	16.43						
B	S3	14.7	17.9925	6.19488	3.09744			
	S5	27.28						
	S7	14.82						
	S9	15.17						

Group A: Sodium content was more in S4 (19.19mg/100g) than in S8 (16.43mg/100g), S6 (15.93mg/100g), and S2 (14.87mg/100g).

Group B: Sodium content was more in S5 (27.28mg/100g) than in S9 (15.17mg/100g), S7 (14.82mg/100g) and S3 (14.7mg/100g).

Between Group A and Group B: Higher mean Sodium was found in Group B compared to Group A. And the mean difference in Sodium between the two groups was statistically non-significant by unpaired T-test.

Potassium: Palalam S1: Potassium content in S1 was 376.31mg/100g.

Table 16: Potassium (mg/100g) in both the Groups

GROUP	Palalam	Values	Mean	SD	SE	MD	SIG	REMARKS
A	S2	868.22	621.7600	218.10678	109.05339	56.16000	0.684	Non-significant
	S4	699.11						
	S6	568.39						
	S8	351.32						
B	S3	711.02	565.6000	146.33864	73.16932			
	S5	635.54						
	S7	544.57						
	S9	371.27						

Group A: Potassium content was more in S2 (868.22mg/100g) than in S4 (699.11mg/100g), S6 (568.39mg/100g), and S8 (351.32mg/100g).

Group B: Potassium content was more in S3 (711.02mg/100g) than in S5 (635.54mg/100g), S7 (544.57mg/100g) and S9 (371.27mg/100g).

Between Group A and Group B: Higher mean Potassium was found in Group A compared to Group B. And the mean difference in Potassium between the two groups was statistically non-significant by unpaired T-test.

Zinc: *Palalam* S1: Zinc content in S1 was 2.28mg/100g.

Table 17: Zinc (mg/100g) in both the Groups

GROUP	Palalam	Values	Mean	SD	SE	MD	SIG	REMARKS
A	S2	2.15	2.0475	0.65025	0.32512	0.38500	0.371	Non-significant
	S4	2.25						
	S6	1.13						
	S8	2.66						
B	S3	1.38	1.6625	0.45995	0.22998			
	S5	1.83						
	S7	1.21						
	S9	2.23						

Group A: Zinc content was more in S8 (2.66mg/100g) than in S4 (2.25mg/100g), S2 (2.15mg/100g), and S6 (1.13mg/100g).

Group B: Zinc content was more in S9 (2.23mg/100g) than in S5 (1.83mg/100g), S3 (1.38mg/100g) and S7 (1.83mg/100g).

Between Group A and Group B: Higher mean Zinc was found in Group A compared to Group B. And the mean difference in Zinc between the two groups was statistically non-significant by unpaired T-test.

Magnesium: *Palalam* S1: Magnesium content in S1 was 194.47mg/100g.

Table 18: Magnesium (mg/100g) in both the Groups

GROUP	Palalam	Values	Mean	SD	SE	MD	SIG	REMARKS
A	S2	87.61	97.2525	10.78034	5.39017	-5.56000	0.520	Non-significant
	S4	105.94						
	S6	88.25						
	S8	107.21						
B	S3	95.53	102.8125	12.18901	6.09450			
	S5	102.96						
	S7	119.93						
	S9	92.83						

Group A: Magnesium content was more in S8 (107.21mg/100g) than in S4 (105.94mg/100g), S6 (88.25mg/100g), and S2 (87.61mg/100g).

Group B: Magnesium content was more in S7 (119.93mg/100g) than in S5 (102.96mg/100g), S3 (95.53mg/100g) and S9 (92.83mg/100g).

Between Group A and Group B: Higher mean Magnesium was found in Group B compared to Group A. And the mean difference in Magnesium between the two groups was statistically non-significant by unpaired T-test.

Phosphorous: *Palalam* S1: Phosphorous content in S1 was 165.47 mg/100g.

Table 19: Phosphorous (mg/100g) in both the Groups

GROUP	Palalam	Values	Mean	SD	SE	MD	SIG	REMARKS
A	S2	182.31	171.2400	15.62308	7.81154	13.01000	0.185	Non-significant
	S4	181.98						
	S6	149.01						
	S8	171.66						
B	S3	162.69	158.2300	7.64916	3.82458			
	S5	164.61						
	S7	147.51						
	S9	158.11						

Group A: Phosphorous content was more in S2 (182.31 mg/100g) than in S4 (181.98 mg/100g), S8 (171.66 mg/100g), and S6 (149.01 mg/100g).

Group B: Phosphorous content was more in S5 (164.61 mg/100g) than in S3 (162.69 mg/100g), S9 (158.11 mg/100g) and S7 (147.51 mg/100g).

Between Group A and Group B: Higher mean Phosphorous was found in Group A compared to Group B. And the mean difference in Phosphorous between the two groups was statistically non-significant by unpaired T-test.

DISCUSSION

When compared among nine samples, Classical Palalam (S1) prepared with Tila and Guda showed higher values of Sugar- As the amount of Guda was used more in this sample; Energy- As the sugar content is higher than other samples; Crude fiber- According to Acharya, one of the Guna Karma of Palalam is Malakrud, hence it is proved that, it is due to the higher Crude fiber content which increases the bulk in the intestine; Total fat- As Tila is an oilseed, Total fat was higher than other samples; Calcium- As Tila has a higher content of calcium than other four main ingredients; Magnesium- Tila had lower Magnesium content than Makushthaka before Samskara. But, showed higher Magnesium content after Samskara.

*Palalam (S2) Prepared with Mudga showed higher proximate values of Protein & Potassium - Among the five main ingredients taken for study Mudga had higher values both before and after Samskara; Phosphorous- Mudga had lower phosphorous content than Tila &

Makushthaka before Samskara. But, showed higher phosphorous content after Samskara.

*Palalam (S3) prepared with Mudga with Tila and Draksha showed higher value of Iron- Mudga had lower Iron content than Tila and Makushthaka before Samskara. But, showed higher Iron content after Samskara.

*Palalam (S5) prepared with Canaka with Tila and Draksha showed a higher value of Sodium- Canaka had lower Sodium content than Tila and Makushthaka before Samskara. But, showed higher Sodium content after Samskara.

*Palalam (S6) prepared with Makushthaka showed a higher value of Carbohydrates- Makushthaka had lower carbohydrates content than Mudga and Kangu before Samskara. But, showed higher carbohydrates content after Samskara.

*Palalam (S8) prepared with Kangu showed a higher value of Zinc- Though Kangu had lower Zinc content before Samskara than Tila, Mudga, and Makushthaka, it showed higher Zinc content after Samskara.

CONCLUSION

From the above results, it can be concluded that Classical Palalam (S1) had higher values of Energy, Sugar, Crude Fiber; Macro-nutrient- Total fat; Micronutrients like Calcium and Magnesium. Mudga Palalam (S2) had higher proximate values of Macronutrient - Protein, and Micronutrients like Potassium and Phosphorous. Mudga Palalam with Tila & Draksha (S3) had a higher value of Micronutrient- Iron. Canaka Palalam with Tila & Draksha (S5) had a higher value of Micronutrient- Sodium. Makushthaka Palalam (S6) had

higher proximate values of Macronutrient – Carbohydrates. *Kangu Palalam* (S6) had higher values of Micronutrient- Zinc. Thus, it can be said that proximate values do vary after *Samskara* (processing).

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