

PREPARATION AND SENSORY EVALUATION OF LADOO DEVELOPED BY USING KUTKI AND HONEY FROM MELGHAT

Kshitij Navinprakash Shah*

Ph.D. Scholar, Shri JIT University, Jhunjhunu, Rajasthan

Ph. 9421940237

Email: knsascc@gmail.com

* Assistant Professor in Food Science,
Arts, Science and Commerce College,
Chikhaldara, Dist. Amravati (Maharashtra)

ABSTRACT: *Melghat* is a tribal region of Amravati district of Maharashtra and it is suffering from the problem of malnutrition among the children. Kutki (little millet) is a kind of millet that is cultivated in the region *Melghat*. Wild honey also produced at a large amount there. Both materials are superior in their nutritional potential. In the current study, a novel recipe for the making of laddoo from the kutki flour was developed. Honey was also used as an additional sweetening agent and for value-addition. The products were tested for their quality by using the techniques of sensory evaluation. As a result, it was found that the products were liked by the judges to a greater extent and the results have shown the success of the novel recipe. The nutritional laddoo prepared by using kutki and honey may be proved as a useful supplementary food to fight against the problem of malnutrition.

KEY WORDS: INTRODUCTION Kutki, Honey, Laddoo, Malnutrition, *Melghat*

Melghat is a tribal region located in the laps of *Satpuda* hills. It is a combined area of Sanctuary of *Wan* and *Melghat* as well as *Gugamal* National Park. These sanctuaries and parks are the part of two tehsils, *Chikhaldara* and *Dharni* of Amravati district. Malnutrition among the children is the most rigorous problem in this region. Many children have died and at rest dying because of undernourishment. Poverty and consumption of a diet with low nutritional value are some of the grounds for the malnutrition. While choosing food, nutritional status is the most important parameter. Health and the physical maintenance of humans are precisely dependent on the quality of his diet. The problem of malnutrition can only be overcome by the choice of the right food (Melghattiger.gov.in; Singh R 2008). Some agricultural crops are excellent in nutrition but not used much by the people due to the lack of awareness. Millets, the oldest crops cultivated by humanity, are such types of food. Due to the tremendous nutritional potential, they are known as the Nutri-cereals.

KUTKI :- Non-gluten cereals are becoming popular nowadays. The use of millets can be an economic and nutritional choice for the better health. Among most of the researches about millets only popular millets found predominantly. Kutki is a Hindi/local name of the minor millet that is extensively grown in *Melghat* province. It is a native Indian millet with English name little millet (*Panicum Sumatrense*). Minor millets are the group of varied species with a capacity to grow in adverse environmental situations which may not be suitable for other major cereals. It is a cheap source of protein, B vitamins, fibers, energy, and minerals especially iron (Hemalatha M et al., 2006). It is also termed as the bioenergy crop because of its short duration as well as the high yield of biomass produced (Dayakar Rao et al. 2017; Wikipedia).

HONEY:- Honey is one of the most important forest products of the *Melghat*. Most of the honey from the forest is created by the wild honey bees (Honey mission 2018). Due to the fabulous bio-diversity of the *Melghat* forest, it provides an amazing natural

atmosphere for the nurture of honey bees (KVIC 2019). In all time of year, there are ample flowers available in the *Melghat* forest (Deshmukh, 2012).

In the current study kutki and honey were used for the preparation of *ladoo*. The product is delicious, popular, nutritious, and can be made from the local ingredients. Kutki flour was used for the preparation of *ladoo* instead of wheat flour and honey was used as a supplementary sweetener with sugar. The quality of the *ladoo* for their acceptance was determined by the sensory evaluation technique.

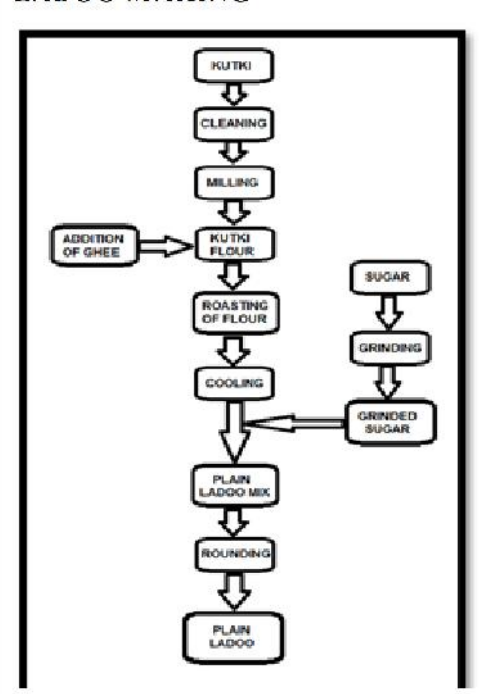
MATERIALS AND METHODS:-Structural research was carried out during the present study. For making the nutritional *ladoo*, kutki was collected from the local market. Four kinds of honey samples were collected from the four different locations of the *Melghat*.

PREPARATION OF LADOO:- Kutki flour (500g), sugar (200g), ghee (75g), and honey (at different amounts) were the ingredients used for the preparation of *ladoo*. Honey is used for the purpose of value addition, nutritional improvement, and promotion of the local product. Total 21 kinds of *ladoo* were prepared. The amount of sugar was adjusted as per the quantity of honey. Plain or control *ladoo* were made by using kutki flour, sugar, and ghee only. No honey was added in the control *ladoo* sample. The *ladoo* were prepared by using the traditional wheat flour *ladoo* recipe. Plain *ladoo* mix was prepared by roasting the kutki flour with ghee. Powdered sugar and honey were added at last and the *ladoo* were made. Figure 1 is showing the flow diagram. The formulation of *ladoo* and their code names are given in table 1

TABLE 1: CODE NAMES OF LADOO

Honey amount	Code Names				
	Honey Samples Added				No Honey
	H ₁	H ₂	H ₃	H ₄	
2 %	LH ₁ a	LH ₂ a	LH ₃ a	LH ₄ 4a	L _B
4 %	LH ₁ b	LH ₂ b	LH ₃ b	LH ₄ 4b	
6%	LH ₁ c	LH ₂ c	LH ₃ c	LH ₄ 4c	
8%	LH ₁ d	LH ₂ d	LH ₃ d	LH ₄ 4d	
10 %	LH ₁ e	LH ₂ e	LH ₃ e	LH ₄ 4e	
Total Ladoo Samples Prepared= 21					

FIGURE 1: FLOW DIAGRAM OF LADOO MAKING



SENSORY EVALUATION

Sensory evaluation of any food product is one of the devices used to evaluate its quality. The response of the end-user towards any eatable product is strongly

dependent on its quality. Here in the current study, the value-added product, laddoo were subjected to the sensory evaluation for the determination of its quality. A nine-point hedonic scale from extremely like to extremely dislike was formulated for the determination. The evaluation was done by the panel of five semi-trained judges on the basis of their pleasurable and un-pleasurable experiences (Shariff M et al., 2017; Ranganna, 2007).

RESULTS AND DISCUSSION:-The results of the sensory evaluation tests were given in the table 2, 3, 4, and 5.

DISCUSSION:- It was found that the laddoo prepared from honey sample 1 with the amount of 4% (LH_{1b}) got the highest position with a total score of 40. The blank sample (L_{blank}) i.e. the laddoo prepared without honey were at the second position (score 39) and laddoo with honey 2% (LH_{1a}) were third (score 38) in the table. The scores for these three laddoo samples were very close to each other. But it was decreasing significantly as the amount of honey was increasing i.e. 36 for 6%, and 32 for each 8% and 10% honey. The laddoo samples with the amount of honey above 4% were not liked by the judges in each category. As all the honey samples were somewhat darker in color, the color of laddoo was not accepted by the judges up to that extent as well as the texture was slightly tended towards less liked side due to stickiness of laddoo. The texture was at the higher side as the overall score towards the parameter 'appearance' for all the laddoo samples was highest i.e. 38. The overall acceptability was significantly good as the differences in the score were not in considerable amounts.

Similar kinds of scores were obtained for the laddoo samples prepared by using the honey sample 2 i.e. H₂. The scores showed that the acceptability of these laddoo samples was on a little bit higher side than the laddoo samples prepared from honey 1. The highest total score was 41 again for the laddoo with honey added

Table 2: Sensory Evaluation of laddoo with honey H₁

Sensory Attribute	LADOO SAMPLES H ₁					L _B
	LH _{1a}	LH _{1b}	LH _{1c}	LH _{1d}	LH _{1e}	
Color	7	7	8	6	6	7
Texture	7	8	6	5	7	8
Taste	7	9	8	6	6	7
App.	9	8	7	8	6	9
O A	8	8	7	7	7	8
T S	38	40	36	32	32	39
Mean	7.6	8.0	7.2	6.4	6.4	7.8

Table 3: Sensory Evaluation of laddoo with honey H₂

Sensory Attribute	LADOO SAMPLES H ₂					L _B
	LH _{2a}	LH _{2b}	LH _{2c}	LH _{2d}	LH _{2e}	
Color	8	8	7	6	6	7
Texture	9	9	7	7	6	8
Taste	7	8	7	6	7	7
App.	8	8	9	7	7	9
O A	6	8	8	7	8	8
T S	38	41	38	33	34	39
Mean	7.6	8.2	7.6	6.6	6.8	7.8

at the amount of 4% (sample LH_{2b}) followed by laddoo with honey 2% (sample LH_{2a}) and 6% (sample LH_{2c}) with total score 38 and then the laddoo with honey 10% (sample LH_{2e}) (score 34) and lastly with 8% honey (sample LH_{2d}) (score 34). The color of the honey sample two (H₂) was a little lighter than that of sample one (H₁) this might be one of the reasons for more acceptability of laddoo with honey sample two.

The score for the texture of these laddoo samples was considerably higher than the previous one. On the other hand, the overall score of taste was found inferior. The amount of fructose might also affect the taste of honey, added laddoo as fructose is a very sweet sugar among all the sugars present in honey. But not any considerable trend found in the amount of fructose and the sensory acceptability of laddoo. The overall total score for all categories was 184 with mean 36.8, which was the highest among all the laddoo samples. The total overall mean score was found less than that of the blank.

Laddoo with sample three were less acceptable than laddoo with honey samples one and two. The highest score 39 was found for the laddoo sample with honey 2% (LH_{3a}). The laddoo with honey at the level of 4% (LH_{3b}) were at the second position with the total score 37 followed by laddoo with honey 6% (sample LH_{3c}) (score 36), 8% (sample LH_{3d}) (score 33), and 10% (sample LH_{3e}) (score 31). Here the gradual decrease in the total scores was observed with the increase in the amount of honey. Texture and appearance were the top-scoring parameters in this category, while color was the comparatively less scoring parameter. The overall score for all categories was 176 with mean 35.2. Thus these laddoo samples were at the third place after laddoo with honey samples two and one.

The laddoo prepared by using the honey sample from location four (H₄) were the least acceptable products. The color of these honey samples was darkest among all the honey samples. The highest score was obtained for the laddoo prepared by using 4% of honey (sample LH_{4b}) i.e. 38 while laddoo prepared with 10% honey (LH_{4e}) were at the bottom of the table. Laddoo with 6% honey (LH_{4c}) were at second position with score 37, followed by samples prepared with 2% (LH_{4a}) (score 36), and 8% (LH_{4d})

Table 4: Sensory Evaluation of laddoo with honey H₃

Sensory Attribute	LADOO SAMPLES H ₃					L _B
	LH _{3a}	LH _{3b}	LH _{3c}	LH _{3d}	LH _{3e}	
Color	7	7	7	6	7	7
Texture	8	8	7	7	6	8
Taste	8	7	7	7	6	7
App.	9	8	8	6	5	9
O A	7	7	7	7	7	8
T S	39	37	36	33	31	39

Table 5: Sensory Evaluation of laddoo with honey H₄

Sensory Attribute	LADOO SAMPLES H ₄					L _B
	LH _{4a}	LH _{4b}	LH _{4c}	LH _{4d}	LH _{4e}	
Color	7	7	7	6	6	7
Texture	7	8	8	7	7	8
Taste	8	8	7	7	6	7
App.	7	8	7	5	5	9
O A	7	7	8	6	6	8
T S	36	38	37	31	30	39

(score 31) honey. The textures of these laddoo samples were the top scoring parameter with a total score of 37 (average 7.4). The judges gave a bigger score for the texture of these laddoo than the laddoo samples with honey one and three. The appearance and color were the least scoring parameters. This might happened due to the darkest color of these honey samples. The overall score for these laddoo was 172 with the mean value 34.4.

The combined data is arranged in table 6 for the comparison. Here the total score of the sensory evaluation is mentioned only. The graphical presentation is given in figure 2.

It was observed from the data that the *laddoo* with honey sample two (LH₂) were mostly liked by the judges. The total score for the *laddoo* with honey sample two was 181 that was the highest score secured by any other honey sample. The *laddoo* with honey sample two were on the top position in three categories i.e. *laddoo* with 4% honey, 8% honey, and 10% honey (LH_{2b}, LH_{2d}, and LH_{2e}), while it was on the second position in rest of the categories i.e. *laddoo* with 2% and 6% honey (LH_{2a} and LH_{2c}). Thus it was observed that the honey sample from location two was mostly liked by the judges for the addition in the *laddoo* prepared from the *Kutki* flour.

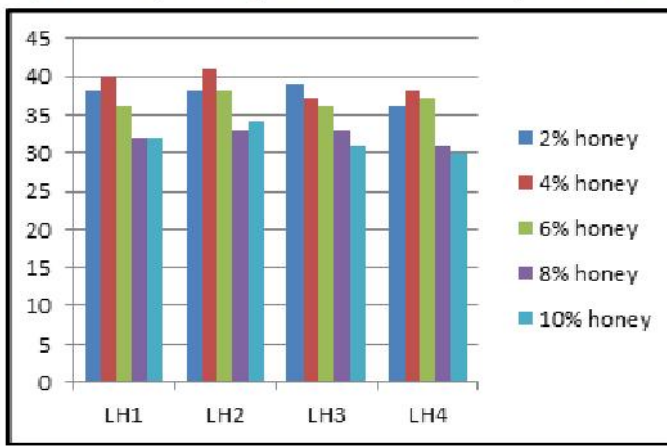
The *laddoo* with honey sample one was on the second position with an overall total score of 178. *Laddoo* with honey sample three were at the third position with score 176 followed by the *laddoo* with honey sample four with score 172.

On the other hand, it was found that the *laddoo* prepared by adding 4% honey were having the highest mean score i.e. 39, and hence mostly accepted by the panel of judges. It can be concluded that the *laddoo* with honey sample two were mostly accepted by the judges and the addition of honey at the rate of 4% is most suitable.

Table 6: Combined Data of Sensory Evaluation of Laddoo

Laddoo Sample	Total Scores With Varying Amount of Honey						Total	Mean
	2%	4%	6%	8%	10%			
LH ₁	38	40	36	32	32	178	35.6	
LH ₂	38	41	38	33	34	181	36.2	
LH ₃	39	37	36	33	31	176	35.2	
LH ₄	36	38	37	31	30	175	35.0	

Figure 2: Graphical representation of sensory evaluation



CONCLUSION

The following are the findings that are drawn

- Kutki flour was found suitable for the preparation of nutritional laddoo
- Incorporation of honey as an additional sweetener was liked by the judges significantly
- Addition of honey at the rate of 4% was found most suitable
- Honey from location 2 (H₂) was liked at the most in laddoo preparation
- The honey at a higher amount was not accepted to that extent as it gives stickiness and a typical flavor to the laddoo.

Thus the laddoo prepared by using the nutritional potent raw materials such as kutki and honey might be helpful for maintaining the good health of the children of the *Melghat* and can be work towards the solving of the problem of malnutrition. Still, more work is needed for the study of honey and kutki of *Melghat* and for the preparation of more value-added products to build the brand *Melghat*.

BIBLIOGRAPHY

- Dayakar Rao et al., "Nutritional and Health benefits of Millets", ICAR_Indian Institute of Millets Research (IIMR), 2017
- https://en.wikipedia.org/wiki/Panicum_sumatrense
- <http://melghattiger.gov.in/documents/biodiv.pdf>
- Hemalatha G et al., "Development of Little Millet (*Panicum sumatrense*) Substituted Biscuits and Characterization of Packaging Requirements," Tropical Agricultural Research, 18, 2006
- Directorate of Forest Based Industry, KVIC, "Honey Mission: Scheme and Guidelines", Govt. of India, 2018
- KVIC, "News Bulletin: Honey Mission", Bee Inspired, 2019, <http://www.kvic.org.in>
- Deshmukh R A, "Status of Honey Bee Flora In East Melghat Forest", Research Analysis And Evaluation, 2012, page 25-26
- Singh R & Singh P, "A Study on High Mortality of Children in Melghat Region of Amravati (Maharashtra)", Studies of Tribes and Tribals, 2008, page 35-40
- Sharif M et al., "Chapter 14- Sensory Evaluation and Consumer Acceptability", Research Gate, 2017, <https://www.researchgate.net/publication/320466080>
- Ranganna S, "Handbook of Analysis and Quality Control for Fruit and Vegetable Products", Tata McGraw-Hill Publication, 2007