The Pharma Innovation Journal 2019; 8(9): 303-306

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2019; 8(9): 303-306

www.thepharmajournal.com
Received: 13-07-2019
Accepted: 15-08-2019

Chadar UA
M.Sc. Scholar Department of AHDS COA, VNMKV, Parbhani, Maharashtra, India

Londhe GK
Head Department of AHDS COA, VNMKV, Parbhani, Maharashtra, India

Kamble NS
Assistant Professor Department of AHDS COA, VNMKV, Parbhani, Maharashtra, India

Correspondence
Kamble NS
Assistant Professor Department of AHDS COA, VNMKV, Parbhani, Maharashtra, India

Preparation of *kharudi* from germinated Bajara using *chakka* whey as soaking agent

Chadar UA, Londhe GK and Kamble NS

Abstract
In present study bajra groat were soaked in *chakka* whey for different durations 8, 12 and 16 hr. for preparation of *kharudi*. Bajara groat was evaluated for its physico-chemical, and organoleptic parameters of raw *kharudi* and fried *kharudi* was evaluated. Yield of bajra groat prepared using *chakka* whey as a soaking agent was ranged from 261.34 to 258.67 gm. *Bajara* groat prepared had moisture per cent for treatments T_1, T_2, T_3 and T_4 content ranged from 43.6 to 44.46, protein per cent ranged from 11.49 to 12.78, carbohydrate per cent 71.64 to 72.10 and ash per cent from 1.7 to 2.2 respectively. As compared to control (T_1), bajra groat prepared using water as soaking agent soaked for 12 hr. moisture, protein and carbohydrate increased in treatment in T_3. bajra groat prepared using *chakka* whey as soaking agent for 12 hr., pH of bajra groat decreases from T_2 to T_4 (6.06 to 5.36) while titratable acidity increased from T_1 to T_4 (0.37 to 0.89) as the soaking period increases from 8 to 16 hr. Significant change in pH and titratable acidity was observed when *chakka* whey used as soaking agent T_3 instead of water T_1 control for same duration of soaking period. Organoleptic evaluation of raw *kharudi* and fried *kharudi* in respects of overall acceptability scored highest for raw *kharudi* and fried *kharudi* samples prepared from bajra groat using *chakka* whey as soaking agent for 12 hr.

Keywords: *Kharudi*, bajra groat, *chakka*

Introduction
Most of the millets are grown in different regions of the world from east to west. The world total production of millet grain was 762712 metric tonnes and India top ranking with a production of 334500 tonnes in 2010 (FAO, 2012) [3]. Millets are considered as crop of food security because of their sustainability in adverse agro-climatic conditions (Ushakumari *et al*., 2004). These crops have substantive potential in broadening the genetic diversity in the food basket and ensuring improved food and nutrition security (Mal *et al*., 2010) []. Along with nutrition millets offer health benefits in daily diet and help in the management of disorders like diabetes mellitus, obesity, hyperlipidemia, etc. (Veena, 2003) [13]. Millets offer unique advantage for health being rich in micronutrients, particularly minerals and B vitamins as well as nutraceuticals. Millets are also importance as ingredient in multigrain and gluten-free cereal products. In India millet are used to prepare various traditional foods and beverages like idli, dosa, papad, *chakli*, porridges, breads, infant and snack foods (Chandrasekara and Shahidi, 2011). Total world production of whey was approximately 85 million tones in 2008, out of which India contributes approximately 8 million tones of the total global production (Anon, 2009). About 40% of the total global production of whey is disposed as raw whey causing serious problems of environmental pollution due to high organic matter content (Reddy et. al., 1987; Mishra, 2008) [10]. Whey disposal is a serious problem for dairy industry. In order to reduce pollution load, whey should be treated to obtain commercial products (Gupte and Nair, 2010).

Materials and Methods
Pearl Millet (*Pennisetum typhoideum*) cultivar variety PPC-6 (Parbhani Sampadha) was procured from Jowar Research Station, VNMKV, Parbhani and *Chakka* whey was prepared using buffalo milk from Department of AHDS, VNMKV, Parbhani.

Treatment Details
For preparation of *Kharudi* using *chakka* whey as soaking agent was carried out using following treatments
T_1: Bajra groats using water as soaking agent for 12 hr.

T_2: Bajra groats using *chakka* whey as soaking agent for 8 hr.
T_3: Bajra groats using *chakka* whey as soaking agent for 12 hr.
T_4: Bajra groats using *chakka* whey as soaking agent for 16 hr.
The different levels were tried and compared with control (T_1).

Receiving Bajra Grains
↓
Soaking grain in water (10 hr.)
↓
Tie in moist muslin cloth and put in clean and dry place (48 hr.)
↓
Sprinkling water (after every 12 hr.)
↓
Drying grains in sunlight (for 2 hr.)
↓
Remove plumule and radicale
↓
Coarse grinding
↓
Soaking in *chakka* whey → ↓
Tempering
(Edible oil, Garlic paste, Cumin, Chilli powder, Common salt)
↓
Add water and boil
↓
Add soaked groats in boiled water
↓
Add sesamum with stirring
↓
Cooking
↓
Excruding through mould
↓
Sundrying
↓
Kharudi
↓
Storage

Flow diagram for preparation of *Kharudi* using *chakka* whey

Sensory Evaluation
Sensory evaluation of *Kharudi* using *chakka* whey was carried out by a panel of judges comprising "9 point Hedonic scale".

Analysis
The samples of finished product from various treatment combinations were chemically analyzed for acidity was determined as per the method described in BIS (1981); Moisture content of soaked bajra groat was determined by standard procedure as described by (Anonymous, 1959); Protein content of bajra graot was determined by the Micro-kjeldhal method as described in (BIS, 1981); lipid content was calculated (AOAC, 1990); The total ash content of soaked bajra groats sample was determined by method given by ISI: (1981) [6].

Result and Discussion
Chemical Composition
The mean pH of fermented *Bajara* groat prepared using water and *chakka* whey as a soaking agent for different treatments given in table no.1 ranged between 5.56 to 6.06; Maximum pH was observed for T_1 prepared using water as soaking agent for 12 hr. (6.06) and minimum for T_4 prepared using *chakka* as soaking agent for 16 hr. (5.56) (Table 1.). It was observed that pH of *Bajara* groat prepared using *chakka* whey as soaking agent decreases as soaking period (fermentation) increases from 8 to 16 Hr.
Titratable acidity of *Bajara* groat prepared using water and *Chakka* whey as soaking agent was ranged between 0.37 percent to 0.89 percent (Table 1). Titratable acidity were observed by Ghosh and Chattopadhyay (2010) they reported that in *idli* batter preparation per cent titratable acidity of *idli* batter ranged 0.44 to 0.91, seemed to be in increasing order as the fermentation time extended. Surve *et al.* (2014) [11] also reported that the acids produced during fermentation lowers pH of batter thereby increasing activity of micro-organisms resulted in increased acidity of wheat batter.
The average carbohydrates of *Bajara* groat prepared using water and *Chakka* whey as soaking agent for different treatments is was ranged between 71.64 per cent to 72.10 per cent Maximum carbohydrate was observed for treatment T4 prepared using *Chakka* whey as soaking agent for 16 hr. (72.10 per cent) and minimum for T1 prepared using water as soaking agent for 12 hr. (71.64 per cent) (Table 1);
The average moisture percentage of *Bajara* groat prepared using water and *Chakka* whey as soaking agent under different treatments is Maximum moisture content was noted for treatment T4 prepared using *Chakka* whey as soaking agent for 16 hr. (44.46 per cent) and minimum for T2 prepared using whey as soaking agent for 8 hr. (43.4 per cent) (Table 1). Similar finding were reported by Myrene (2013) [9] in which they studied legume fermentation. They observed that, legumes rapidly take up water from the surroundings to commence the metabolic process. The increase in water uptake with time is due to increasing number of cells within the seeds becoming hydrated.
The mean protein per cent of *Bajara* groat prepared using water and *Chakka* whey as soaking agent for different treatments is *Bajara* groat prepared using water and *Chakka* whey as a soaking agent for different period was ranged from 11.49 per cent to 12.78 per cent (Table 1). Result were in accordance with results reported by shukla and Dubey (2014) reported increase in protein per cent during preparation of *idli* using whey based *dhal*-rice blend.
The average fat percentage of *Bajara* groat prepared using water and *Chakka* whey as a soaking agent at different durations is fat percentage of *Bajara* groat prepared using water and *Chakka* whey as a soaking agent for different durations was ranged from 2.26 per cent to 2.84 per cent; The mean fat per cent of *Bajara* groat for treatment T_2 was significantly ($P \geq 0.05$) higher over T_3, T_1 and T_4. Moreover T_3, T_1 and T_4 are at par with each other (Table 1). The above results were in accordance with results reported by Shukla and Dubey (2014) in which the fat per cent of *idli* prepared using whey based *dhal* rice blend was increased from 0.58 per cent (control) to 0.62 percent. Changade *et al.* (2012) [1] also reported the increase in fat per cent of *mungwadi* prepared using *chakka* whey as compared to the *mungwadi* without *chakka* whey.
The average ash content of *Bajara* groat prepared using water and *Chakka* whey as soaking agent for different treatments is for different durations was ranged from 1.7 per cent to 2.2 per cent (Table 1). The above results were in accordance with

results reported by Changade *et al.* (2012) [1] in which the ash per cent of *mungwadi* prepared using *Chakka* whey increased as compared to *mungwadi* prepared without *Chakka* whey. Myrene *et al*. (2013) [9].

The average moisture percentage of *Bajara* kharudi prepared using water and *Chakka* whey under different treatments ranged from 6.21 to 8.13 per cent (Table 2). Ikuomola *et al*. (2013) also reported the similar trends in the moisture content of soy-snack.

The average protein per cent of *Bajara* kharudi for different treatments is the protein content of *Bajara* kharudi was ranged from 12.95 to 13.09 per cent. Maximum protein content was observed for the Treatment T_4 and minimum in T_1 (Table 2). Dudhate (2017) [2] revealed that the chemical evaluation of *Kharodi* prepared from AHB 1200 showed that protein content was found to be in 13.17 (T_0) to 12.14 (T_4) and due to decrease in pearl millet content. It was observed that protein content of *Bajara* kharudi increases from T_1 to T_4.

The average fat percentage of *Bajara kharudi* at different treatment is fat percentage of *Bajara kharudi* for different treatment was ranged from 14.12 to 16.31 per cent (Table 2). Similar results were observed by Dudhate (2017) [2] studied on nutritional composition of *Kharodi* prepared from Local variety of pearl millet and reported that fibre content of kharudi was from 1.79 to 2.43 per cent.

The average ash content of *Bajara* kharudi for different treatments ranged from 2.17 to 2.19 per cent. Maximum ash percentage was noted for treatment T_1 and minimum for T_4 (Table 2).

Table 1: Effect of soaking period on different constituents of *Bajara* groat

Chemical constituents (%)	Moisture	Fat	Protein	pH	Carbohydrate	Ash
T_1	43.60	2.67	11.49	6.06	71.64	2.20
T_2	43.40	2.84	12.21	5.93	71.70	2.06
T_3	44.06	2.72	12.52	5.80	71.84	2.00
T_4	44.46	2.26	12.78	5.36	72.10	1.7

Table 2: Effect of different treatments on chemical composition of kharudi

Chemical constituents (%)	Moisture	Fat	Protein	Crude fibre	Carbohydrate	Ash
T_1	6.22	16.31	12.95	2.31	62.33	2.19
T_2	7.21	15.02	13.09	2.31	62.49	2.18
T_3	7.42	14.39	13.21	2.25	62.81	2.17
T_4	8.19	14.12	13.48	2.23	62.03	2.17

Sensory Properties

The sensory parameters chosen to assess the quality of *Kharudi* prepared using water and *Chakka* whey as soaking agent- are flavour, colour and appearance, body and texture and overall acceptability.

The flavour score of raw *Kharudi* and fried *Kharudi* samples of different treatments influenced by soaking period (fermentation) prepared from *Bajara* groat for different treatments was ranged from 6.7 to 8.13 and 6.5 to 8.2 respectively (Table 3). The flavour score of raw *Kharudi* is higher than the fried *Kharudi*. Present results are in agreement with Kamat and Yenagi *et al.* (2012) [7] in the preparation of *NereHappala* of cereals and millets.

The colour and appearance score of raw and fried *Kharudi* samples prepared from *Bajara* groat for different treatments was ranged from 5.93 to8.53 and 6.86 to 8.2 respectively (Table 3). The maximum score was given to raw and fried *Kharudi* samples prepared from *Bajara* groat for treatment T_3 8.53 and 8.2 respectively using *Chakka* whey as soaking agent for 12 hr. and minimum for raw *Kharudi* T_1(Table 3). The present results are in good accordance with the results reported by Kamat and Yenagi *et al.* (2012) [7] in preparation of *NereHappala* of cereals and millets.

The Body and texture score of raw and fried *Kharudi* samples prepared from *Bajara* groat for different treatments was ranged from 7.2 to 8.93 and 6.83 to 8.3 respectively (Table 3). The present findings were in accordance with results reported by Kamat and Yenagi *et al.* (2012) [7] in the preparation of *NereHappala.*

Overall acceptability score of raw and fried *Kharudi* samples prepared from *Bajara* groat of different treatments was ranged from 6.33 to 8.53 and 6.5 to 8.36 respectively (Table 3). The present results are in agreement with results reported by Kamat and Yenagi (2012) [7] in preparation of *Nere Happala* from cereals & millets.

Table 3: Organoleptic quality of raw *Kharudi*

Organoleptic parameters	Flavour	Colour & Appearance	Body & Texture	Overall Acceptability
T_1	6.70	5.93	7.20	6.33
T_2	7.63	7.70	7.36	6.63
T_3	8.13	8.53	8.93	8.50
T_4	7.20	7.86	7.83	8.03

Table 4: Organoleptic quality of Fried *Kharudi*

Organoleptic parameters	Flavour	Colour & Appearance	Consistency	Overall Acceptability
T_1	7.80	8.20	7.80	7.93
T_2	8.10	8.05	8.00	8.05
T_3	8.25	7.90	8.10	8.08
T_4	7.65	7.80	7.67	7.00

Conclusions

1. Soaking period of bajra groat in *chakka* whey medium increased yield of bajra groat at optimum hydration level i.e. for 12 hr. soaking period, colour characteristic also varied as the maximum brightness was observed for the bajra groat prepared using *chakka* whey as soaking agent for 12 hr.
2. Soaking period of bajra groat for different durations affected chemical characteristic of bajra groat as moisture percentage increases for 16 hr. and ash percentage decreases as the soaking period increases from 8 to 16 hr., variation in protein content was also observed. Significant increase in moisture, protein, carbohydrate and ash per cent was observed.
3. Soaking period of bajra groat for different durations affected colour characteristic of bajra groat, yellowness increased as the soaking period increased from 8 to 12 hr. and highest redness observed for 12 hr. soaked bajra groat in *chakka* whey.
4. Expansion ratio and oil absorption also affected in fried *kharudi* samples as the soaking period different for various treatments. Expansion ratio decreased as the soaking period increases from 12 to 16 hr. and oil absorption variation due to varied moisture content in dried *kharudi* sample.
5. Soaking period affected organoleptic evaluation of raw and fried *kharudi* prepared from bajra groat. *Kharudi* samples prepared from 12 hr. soaked in *chakka* whey scored high for overall acceptability.

References

1. Changade SP, Shendurse AM, Mishra SK, Bhandari PN. Utilization of Paneer Whey for Preparation of Whey based Mungwadi. Indian Journal of Diary science. 2012; 65(1):23-28.
2. Dudhate AK. Studies on physico-chemical and nutritional properties of millets and it's utilization in Indian heritage food- Kharodi. M.Tech (Food Technology) Thesis submitted to Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (MS) India, 2017.
3. FAO. Food and Agriculture Organization. Economic and Social Department: The Statistical Division. Statistics Division 2012. Available from FAO http://faostat.fao.org /site/567/Desktop Default. aspx? PageID=567. Posted September 29, 2012.
4. IS: 1479 (Part 1). Bacteriological Analysis of Milk. Bureau of Indian Standard, New Delhi, 1960.
5. IS: 5402 ISI. Indian Standard Method for Plate Count of bacteria in Food Stuffs. Manak Bhavan, New Delhi.vi, 1969.
6. ISI. Hand Book of Food Analysis. XI Indian Standard Institution. Manak Bhavan, New Delhi, 1981.
7. Kamat S, Yenagi N. Evaluation of Indigenous Technology of Preparation of Papad with Special Reference to Cereals and Millets. Indian journal of traditional Knowledge. 2012; 11(1):123-133.
8. Mal B, Padulosi S, Ravi SB. Minor Millets in South Asia: Learnings from IFAD-NUS Project in India and Nepal. Maccarese, Rome, Italy: Bioversity Intl., and Chennai, India: M.S. Swaminathan Research Foundation, 2010, 1-185.
9. Myrene RD. Effect of Traditional Processing Method on Nutritional Quality of Field Bean. Advance in Bioresearch. 2013; 4(3):29-33.
10. Reddy GL, Rao BVR, Reddy KSR, Venkayya D. Development of a whey beverage. Indian Journal of Dairy Science. 1987; 40(4):445-450.
11. Surve VD, Kadam PS, Mhaske ST, Annapure US. Studies in Rheological Properties of Wheat Batter Prepared from Wheat Grains Fermented at Different Temperatures Used to Prepare Kurdi-A Traditional Indian Food. International food Research Journal. 2014; 21(5):1877-1885.
12. Usha kumari SR, Shrikantan L, Malleshi NG. The functional properties of popped, flaked, extruded and roller dried foxtail millet (*Setaria italica*). International Journal of Food Science and Technology. 2004; 39:907-915.
13. Veena B. Nutritional, functional and utilization studies on barnyard millet. M. Sc. Thesis, University of Agricultural Sciences, Dharwad (Karnataka), India, 2003.