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Process standardization and sensory properties of skim milk *Lassi* blended with extract of germinated bio-fortified sorghum (Parbhani shakti)

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Abstract
In the present investigation the attempt was made to standardize the process of *lassi* by using germinated bio-fortified sorghum grains extract with skim milk and its sensory properties also examined. *Lassi* was prepared by blending skim milk with germinated sorghum grains extract at different ratios i.e. T_1 (100:00), T_2 (80:20) and T_3 (70:30) and T_4 (60:40). The object of using germinated sorghum grains extract was to conserve medicinal, nutritional and health beneficial properties of sorghum. Different lots of developed products offered for sensory evaluation. Sensory parameters (flavour, taste, body and texture, colour and appearance, overall acceptability) were analyzed using 9 point hedonic scale. On the basis of results, it was concluded that T_3 with 70 parts of skim milk and 30 part of germinated sorghum extract combination was found to be highly acceptable among the other combinations after sensory evaluation. Thus as per the sensory evaluation overall acceptability of GSL (germinated sorghum extract *lassi*) for treatments T_1, T_2, T_3 and T_4 was 7.77, 7.99, 8.14 and 7.60, respectively.

Keywords: Skim milk, *Lassi*, *dahi*, bio-fortified sorghum

Introduction
Lassi is a popular traditional curd based drink from Indian subcontinent. These traditional beverages are significantly known for their taste and texture, nutritional and therapeutic value. The growing consumer demand for a convenience, combined with healthy diet and preference for natural ingredients has led to a growth in functional food markets specially milk products, which indicates a great opportunity for innovations and improving health benefits of milk and milk products by combining traditional cereals and applying advanced technique for their processing and preservation. Cereals also have potential to incorporate in dairy products formulation because of their richness in fiber, oligosaccharides, free amino acid and certain minerals which promote the health of human beings. Addition of cereals into milk not only richness its mineral value but also supplements fiber (Karche and Chavan 2019) [4].
Sorghum in general is rich source of fiber and B-complex vitamins. It provides dietary fiber by 48 per cent of the recommended daily value (Samarth *et al.* 2018) [14]. Several attempts were made to develop a technology for the manufacture of *Rabadi* like fermented milk beverage using sorghum in which cereal like sorghum and millet used in combination with skim milk and cream as source of milk solids (Pintu, 2007) [12]. The present study was proposed develop delicious and nutritious sorghum based dairy products from the combinations of skim milk and germinated sorghum extract and processing effect of sorghum on sensory attributes of sorghum based skim milk *lassi*.

Material and Methods
Skim milk and Sugar
The clean and fresh buffalo skim milk of Natural Milk Pvt., Ltd., Latur having 0.5 per cent fat and 8.5 per cent SNF and good quality, clean, crystalline, white cane sugar were procured from local market of Latur city.

Microbial culture
The standard mixed *dahi* culture i.e. Standard *dahi*, *NCDC-167* (BD4) contained *streptococcus thermophilus and lactococcus lactis* in this study was procured from the National Collection of Dairy Culture (NCDC), NDRI, Karnal and used during the *lassi* preparation @ 2 per cent. The NCDC-167 (BD4) culture was propagated in 10 ml sterile de Man-Rogosa-Sharpe (MRS)

broth and maintained in litmus milk in refrigerator until use. These were periodically sub-cultured in the same medium once in a week. The culture was activated by sub-culturing before use and purity was always ascertained by Gram's staining. One set of cultures was stored at -80°C in MRS broth containing 20% glycerol as a stock.

Equipments and accessories

Stainless steel vessels of requisite capacity, muslin cloth, standard weight balance, thermometer, gas shegdi, electrical churner, mixture (HERO Mixture, 550 WATTS) and glass rod etc. were used for preparation of *lassi*. Before using this material it was properly cleaned and washed with detergent solution. All the precautionary measures were taken during the conduct of trials to avoid contamination.

Chemicals and Packaging material

Analytical reagents (AR) or guaranteed grade (GR) reagents were used for the chemical analysis and Plastic glasses and glass bottle were purchased from local market, Latur.

Preparation of germinated sorghum grain's extract

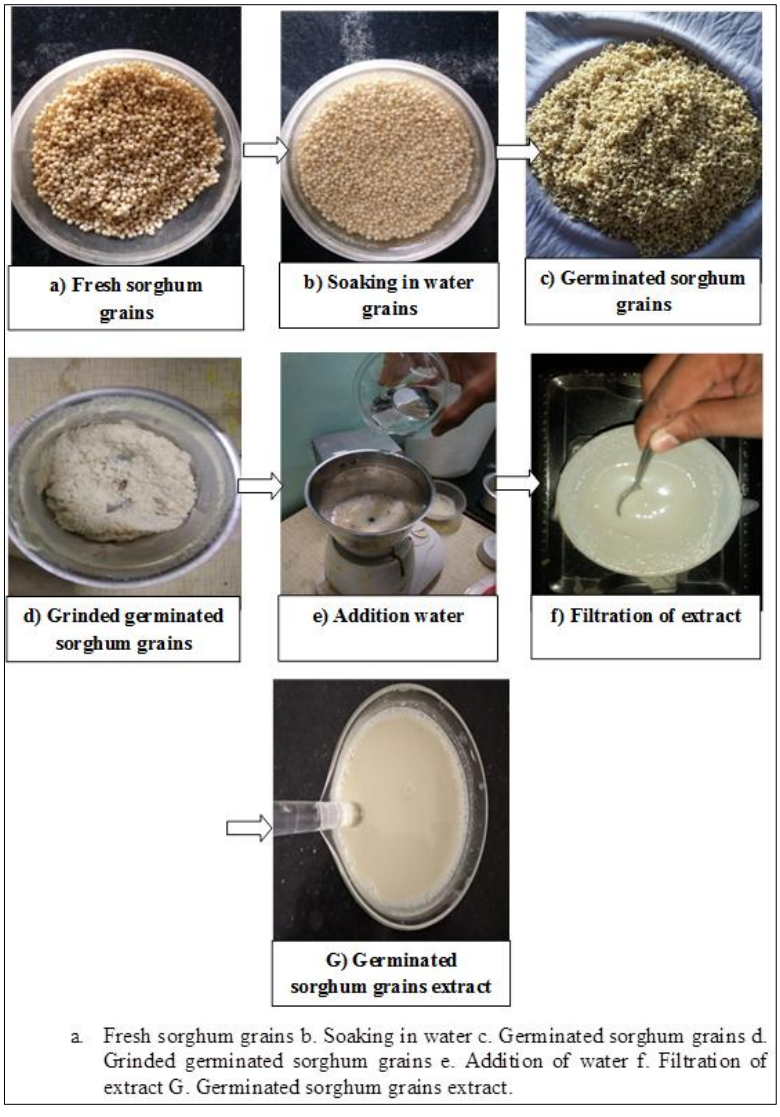
Collected sorghum grains (Parbhani Shakti) were cleaned and used for preparation of sorghum germinated grains extract after washed in clean water.

Sorghum grains (Parbhani Shakti)
↓
Cleaning
↓
Washing
↓
Soaking and Germination (at 37 ^{0}C for 48 hrs)
↓
Grind in mixer (Germinated sorghum grains)
(Add water 1:5)
↓
Filtration through muslin cloth
↓
Collect germinated sorghum grains extract

Diag 1: Preparation of germinated sorghum grains extract

Procedure

The fresh sorghum (Parbhani shakti) grains were collected, cleaned and stored up to final used. Sorghum soaked for 12 hrs at room temperature and after that germinated for 36 hrs at 37 ^{0}C temperature. The germinated sorghum grains were grinded in the mixer for homogenous fine mixture by using 1:5 ratio of grain with water for extraction and filtraed through muslin cloth (As shown in Diagram No.1 and Figure No.1).

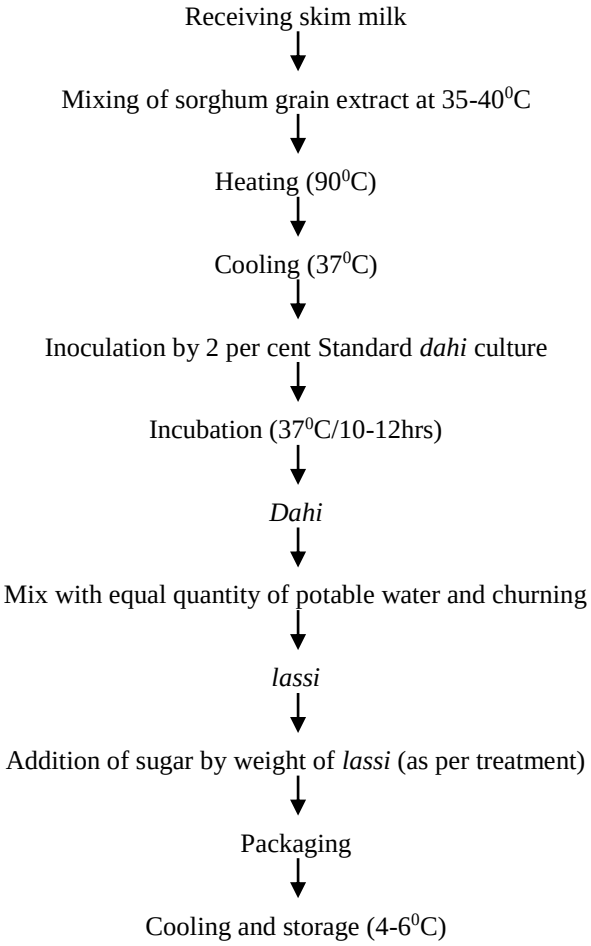


a. Fresh sorghum grains b. Soaking in water c. Germinated sorghum grains d. Grinded germinated sorghum grains e. Addition of water f. Filtration of extract G. Germinated sorghum grains extract.

Fig 1: Preparation germinated sorghum grains extract

Preparation of skim milk *lassi* blended with germinated sorghum grains extract

Germinated sorghum grains added *lassi* was prepared as per the method of Hussain *et al*, (2012) [2] with slight modification.



Diag 2: Preparation skim milk *lassi* blended with germinated sorghum grains extract.

Procedure

For preparation skim milk *lassi* blended with germinated sorghum grains extract. The skim milk mixed with germinated sorghum extract at 35 to 40^{0}C temperature. Then germinated sorghum grains extract added skim milk was heated up to 90^{0}C. Then it was cooled up to temperature 37^{0}C. After cooling the standard culture was added in milk @ 2 per cent and incubated at 37^{0}C for 10-12 hrs. After *dahi* obtained the equal quantity of portable water was added and churned it by using electric churner. Then 15 per cent sugar was mixed in it. The prepared *lassi* was packed in glass bottle and storage at 5^{0}C. (As shown in Diagram No.2 and Figure No.2).

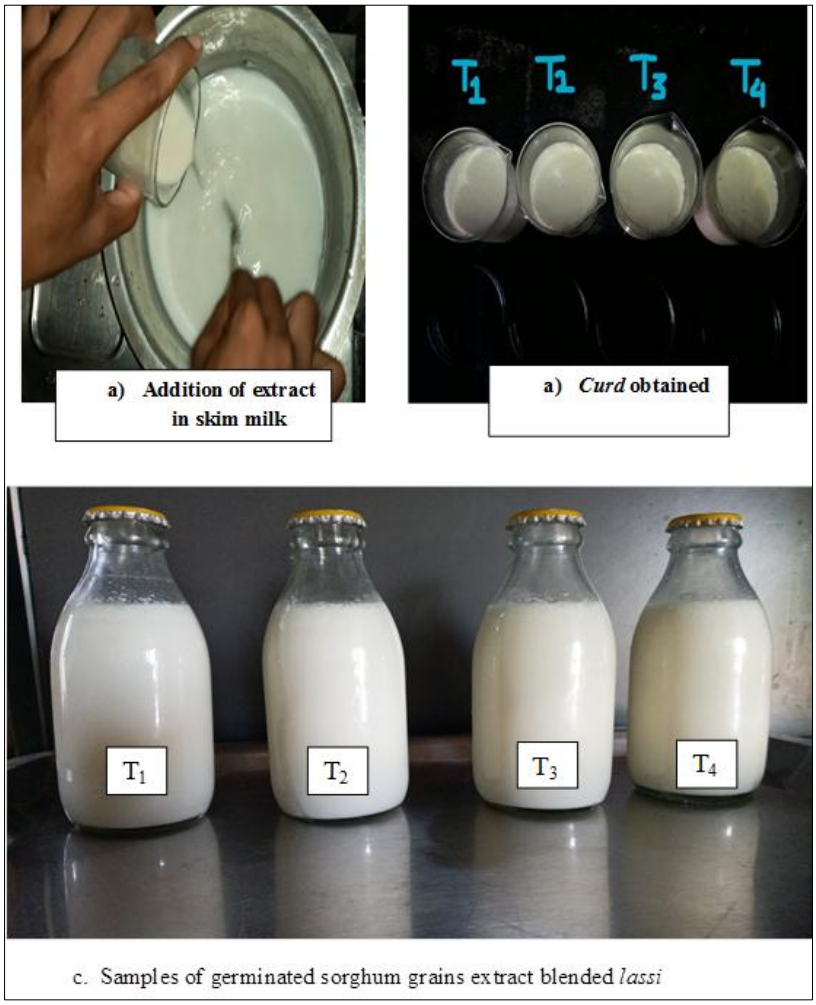


Fig 2: Preparation of skim milk *lassi* blended with germinated sorghum extract

Sensory evaluation of the product

Various treatment combinations of the finished product were subjected to sensory evaluation by panel of judges using 9-point Hedonic scale (Gupta, 1976) [1].

The data analyzed statically by using Completely Randomized Design (CRD) as per Panse and Sukhatme (1985) [10]. The significance of result was evaluated o the basis of critical difference.

Result and Discussion

Chemical composition of buffalo skim milk

The buffalo milk of natural dairy Ltd. Latur was procured and used in this study, having the chemical composition as fat 0.5 per cent, SNF 8.5 per cent, protein 3.5 per cent, lactose 5.0 per cent, total solid 15.00 per cent and moisture 85.00 per cent.

Chemical composition of sorghum (Parbhani Shakti)

The sorghum grains extract was prepared by sorghum (Parbhani Shakti) grains and were found 10 ppm iron, 7 ppm zinc, and 2 mg/100gm protein (Table 1) which was less with the findings of Kumar *et al*. 2018 [7], mentioned that biofortification by genetic means increased the micronutrient density of Fe and Zn as well as protein content in sorghum variety 'Parbhani Shakti'. The observed values were less as compared to Kumar *et al*. 2018 [7] might be due to water used for extraction of germinated sorghum grain and soaking of grains.

Table 1: Chemical composition of sorghum (Parbhani shakti)

Components	Observed values	Value (Kumar *et al*. 2018) [7]
Iron	10 ± 0.5 ppm	45 ppm
Zinc	7 ± 0.4 ppm	32 ppm
Protein	2 ± 0.3 mg/100g	11.9 mg/100g
Phaytes	---	4.14 mg/100g

Values are the average of three replications.

Preparation of skim milk *lassi* blended with germinated sorghum grains extract

The skim milk *lassi* was prepared by blending the different levels of extract of germinated sorghum grains in skim milk at the time of heating skim milk. The amount of sugar kept constant for all treatments as recommended in methodology for this research.

Firstly sorghum grains was washed in clean water and injured was removed and then soaked in water for 12 hrs at room temperature and tied in muslin cloth for 36 hrs at 37^0C room temperature for germination. The germinated sorghum grains were grinded in the mixer for homogenous fine mixture of 1:5 ratio of water for extract and filtration through muslin cloth. The germinated sorghum extract recovery was obtained 61.30 per cent from 100 gms of grain. (Table 2)

Table 2: Quantity of germinated sorghum extract obtained from sorghum grains

Replication No.	Quantity of sorghum grains (gm.)	Weight of germinated seed (gm)	Water used For extraction (lit.)	Extract obtained (lit.)	Per cent recovery of extract
1.	100	130	0.650	0.600	61.3
2.	100	140	0.700	0.655	
3.	100	140	0.700	0.640	
4.	100	120	0.600	0.560	
Average			0.662	0.613	
S.E. ± 0.2320					

Optimization the level of sorghum grains extract for *lassi* preparation

The germinated sorghum grains extract added *lassi* was prepared by using clean, fresh buffalo skim milk having 0.5 per cent fat and 8.5 per cent SNF and germinated sorghum grains extract. Germinated sorghum extract was added on the basis of weight of skim milk, as recommended in methodology at the time of heating skim milk used for preparation of *dahi*. *Dahi* was prepared by using starter culture (NCDC-167) @ 2 per cent and incubated for 12 hours at 37^0C.

For this purpose, treatment combinations considered to optimize the level of germinated sorghum grains extract with skim milk were as follows:

T_1 - 100 Parts of skim milk

T_2 - 80 Parts of skim milk + 20 Parts of germinated sorghum grains extract

T_3 - 70 Parts of skim milk + 30 Parts of germinated sorghum grains extract

T_4 - 60 Parts of skim milk + 40 Parts of germinated sorghum grains extract

Yield of *lassi* obtained from different treatment combinations

It was revealed from Table 3 that the yield of *lassi* obtained from various treatment combinations were 1150, 1152, 1155 and 1154 ml for treatment T_1, T_2, T_3 and T_4 respectively. The per cent recovery of *lassi* from treatment T_1, T_2, T_3 and T_4 was 115.00, 115.2, 115.5 and 115.4, respectively.

Table 3: Yield of *lassi* obtained from different treatment combinations

Treatment	Weight of skim milk used (gm)	Weight of extract (gm)	Curd obtained (gm)	Quantity of water used (ml)	Weight of sugar added (gm)	*Lassi* obtained (gm)
T_1	500	0	500	500	150.00	1150.00
T_2	400	100	500	500	150.00	1152.00
T_3	350	150	500	500	150.00	1155.00
T_4	300	200	500	500	150.00	1154.00

Sensory evaluation of blended *lassi*

Sensory evaluation is defined as a scientific method used to analyze and interpret those responses to products as perceived through the senses of sight, smell, touch, taste, and hearing. The experimental *lassi* samples were served to a panel of semi trained judges for sensory evaluation such as, colour and appearance, flavour, taste, body and texture and overall acceptability using "9 point hedonic scale". The numerical score given by judges for individual attribute was computed to obtain mean and these means were subjected to statistical analysis.

Colour and appearance score for blended *lassi*

The most important attribute of any product's sensory is appearance and its colour, especially when it is directly associated with food quality attributes. The average scores for colour and appearance are presented in table no. 4.

Table 4: Colour and appearance score for germinated sorghum grains extract blended skim milk *lassi*

Replication/Treatment	R_1	R_2	R_3	R_4	Mean
T_1	8.60	8.50	8.10	8.50	8.43^a
T_2	8.60	8.50	8.50	8.50	8.53^a
T_3	8.50	8.30	8.50	8.10	8.35^a
T_4	8.10	7.60	7.60	8.00	7.83^b
S.E.= ± 0.099216 C.D. at 5% = 0.31					

The values with different small letters superscripts row wise differ significantly at 5 per cent level of significance.

The table 4 showed the mean score of colour and appearance for the treatments T_1, T_2, T_3 and T_4 were 8.43, 8.53, 8.35 and 7.83, respectively. The highest score for colour and appearance was recorded for treatment T_2 (8.53 per cent). The lowest colour was recorded for treatment T_4. This indicates that as the increased in proportion of germinated sorghum grains extract in the blend increased score up to certain limit and then decreased the slightly may be due to the pale yellow colour and appearance of further treatments of *lassi*. The means scores of T_1, T_2. T_3 treatments were acceptable and secured score more than 8 indicating product liked very much and T_4 like moderately on "9 point Hedonic" scale for colour and appearance. The treatments T_1, T_2 and T_3 were at par with each other with no such significant difference and treatment T_4 were significantly differ from all other T_1, T_2 and T_3 treatments. The results for developed *lassi* were comparable with some other research works as similar results were observed in following research works.

Swarnima *et al.* (2017) [15], recorded scores for colour and appearance for cereal based fermented functional milk were 8.00, 8.55, 8.65 and 8.39 for treatments T_1, T_2, T_3 and T_4, respectively which concludes that the scores for colour and appearance were first increased and then shown some decline.

Monika *et al.* (2018) [8], studied on processing effect pearl millet on sensory attributes of whey- pearl millet based fermented beverage (*lassi*). They preferred colour and appearance of whey soaked pearl millet *lassi* at par with whey germinated pearl millet based *lassi* and panel list scored germinated whey- millet *lassi* significantly higher than soaked whey millet *lassi*.

Kiruthika *et al*. (2018) [5], studied the sensory properties of buttermilk based pearl millet beverage. The ratio pearl millet flour blended with buttermilk was 10:90, 20:80, 30:70 and 50:50 as for treatments T_1, T_2, T_3 and T_4, respectively. The scores for treatments T_1, T_2, T_3 and T_5 for colour and appearance were 8.3, 8.5, 8.3 and 7.8, respectively. The scores for both colour and appearance of pearl millet flour

added buttermilk beverage were first increased and then shown some decline.

Kakade *et al*. (2019) [3], studied on sensory properties of wheat grass extract added *lassi*. The score for colour and appearance were 7.50, 7.63, 7.19 and 6.88 for the treatments T_1, T_2, T_3 and T_4 respectively. The score for colour and appearance wheat grass extract added *lassi* were first increased then shown some decline.

Flavour score of germinated sorghum grains extract blended skim milk *lassi*

Flavour has a major role in determining the acceptability of foods and beverages. It is a dynamic sense which includes smell and taste of the product. The average score for flavour for developed *lassi* are presented in table no.5.

Table 5: Flavour score for blended *lassi*

Replication/ Treatment	R_1	R_2	R_3	R_4	Mean
T_1	7.50	7.60	7.60	7.30	7.50^a
T_2	8.10	7.80	7.80	8.00	7.93^b
T_3	8.50	8.10	8.	7.80	8.10^b
T_4	8.10	8.10	8.00	7.60	7.95^b
S.E. = ± 0.107771 C.D. at 5% = 0.33202					

The values with different small letters superscripts row wise differ significantly at 5 per cent level of significance.

From table no. 5 it is revealed that, the scores for flavour for developed *lassi* went on increasing over control for all treatments. The treatment T_3 had shown the highest score i.e. 8.10 for the flavour of developed *lassi*. This may be due to extract heated /cooked with skim milk. The average scores of flavour for developed *lassi* for treatments T_1, T_2, T_3 and T_4 were 7.50, 7.93, 8.10 and 7.95, respectively. The means of all treatments of germinated sorghum grains extract added *lassi* were acceptable and secured score more than 7 indicating product liked moderately on "9 point Hedonic" scale for flavour. The treatments T_2, T_3 and T_4 were at par with each other. The treatment T_1 was significantly differed from all other treatments. The results for flavour of added *lassi* were comparable with some following discussed researchers.

Pradhi *et al*. (2014) [13], noticed that flavour score for finger millet *lassi* T_0, T_1, T_3 and T_4 was 7.23, 7.30, 7.56 and 7.31 respectively which is similar to our findings with slightly changes. Das and Kumar (2015) [6], observed that as the concentration of sorghum flour increased the flavour score of prepared beverage was first increased and then shown some decline and flavour score for sorghum beverage between 8.26 to 7.88. Monika *et al.* (2018) [8], recorded flavour score of whey germinated pearl millet based *lassi* was preferred over whey soaked pearl millet *lassi* by panel list scoring but rate at par like moderately.

Taste score for germinated sorghum grains extract blended skim milk *lassi*

The taste is the main parameter as far as the consumer liking is concerned. The score recorded for developed product is shown in Table 6.

Table 6: Taste score for blended *lassi*

Replication/ Treatment	R_1	R_2	R_3	R_4	Mean
T_1	7.50	7.50	7.60	7.60	7.55^a
T_2	7.50	7.80	7.80	7.50	7.65^a
T_3	8.10	8.10	8.00	8.30	8.13^b
T_4	7.00	7.10	7.30	7.00	7.10^{bcd}
S.E. = ± 0.065749 C.D. at 5%= 0.202592					

The values with different small letters superscripts row wise differ significantly at 5 per cent level of significance.

From table no. 6 it is revealed that, the average scores for taste of developed *lassi* were gone on increasing up to treatment T3 and then decreased in T4. The highest score for taste of developed *lassi* was for treatment T3 which was 8.13. The all mean scores for taste of developed *lassi* were 7.55, 7.65, 8.12 and 7.10 for treatments T1, T2, T3 and T4, respectively. The means of all treatments of germinated sorghum extract blended *lassi* were acceptable and secured score more than 7 indicating product liked moderately on "9 point Hedonic" scale for taste. In above all treatments the treatments T1 and T2 were not significantly differed from each other. The treatment T3 and T_4 were significant difference. From results, it was observed that the blended *lassi* with germinated sorghum extract by 20 (T_2) and 30 parts (T_3) improved the score significantly over control (T_1). However, score decreased significantly at higher level of blended *lassi* with germinated sorghum extract (T_4) due to the starchy feeling in taste.

The results recorded in present investigation for taste score were comparable with Kumar and Das (2015) [6], who observed that the taste scores of sorghum based beverage from 8.26, 7.90, 8.68 and 7.88 for treatment T_0, T_1, T_2 and T_3, respectively and showed that the increase in proportion of sorghum flour there was significantly increase in taste score of *lassi* up to treatment T_2 and then decrease in T_3.

Body and texture score for blended *lassi*

From table no. 7 it is revealed that, the average scores for taste of developed *lassi* were gone on increasing and then went on decreasing. The treatment T_3 had shown highest and the treatment T_4 had shown the lowest score for body and texture among all treatments. The proportion of extract affected in skim milk was affected on body and texture of developed *lassi*. The average mean scores for body and texture of developed *lassi* were 7.60, 7.85, 7.98 and 7.53 for treatment T_1, T_2, T_3 and T_4, respectively. Among all the treatments, the treatments T_2, T_3 and T_4 at par with each other whereas T_1 and T_4 also at par with each other. The treatment T_1 had shown significant difference from all other treatments.

Table 7: Body and texture score for blended *lassi*

Replication/ Treatment	R_1	R_2	R_3	R_4	Mean
T_1	7.50	7.50	7.60	7.80	7.60^a
T_2	7.60	8.00	8.00	7.80	7.85^b
T_3	7.80	8.00	8.10	8.00	7.98^b
T_4	7.60	7.60	7.60	7.30	7.53^{abc}
S.E. = ± 0.077055 C.D. at 5% = 0.237431					

The values with different small letters superscripts row wise differ significantly at 5 per cent level of significance.

The results recorded for body and texture score in present investigation were comparable with Pardhi *et al*. (2014), noticed that the score for body and texture of finger millet *lassi* were 7.11, 7.49, 8.02 and 7.60 for treatments T_0 (control), T_1, T_2 and T_3 respectively which is similar with our findings with slightly changes.

Mule *et al*. (2017), reported that the mean score of body and texture of lemon grass extract added *lassi* from 7.36, 7.61, 7.66, 7.43 and 7.34 for treatments T_0, T_1, T_2, T_3 and T_4 respectively.

Overall acceptability score for germinated sorghum grains extract blended *lassi*

Overall acceptability is the mean average for all the sensory scores for the product. Overall acceptability can be considered

as a complex characteristic of food that determines its value or acceptability to consumer. The average scores for overall acceptability of developed *lassi* are presented in table no. 8.

Table 8: Overall acceptability score for germinated sorghum grains extract blended skim milk *lassi*

Replication/ Treatment	R_1	R_2	R_3	R_4	Mean
T_1	8.43	7.50	7.55	7.60	7.77[a]
T_2	8.53	7.92	7.65	7.85	7.99[a]
T_3	8.35	8.10	8.13	7.98	8.14[a]
T_4	7.83	7.95	7.10	7.53	7.60[a]
S.E. = ± 0.178451 C.D. at 5% = 0.549863					

The values with different small letters superscripts row wise differ significantly at 5 per cent level of significance.

The table 8 showed that the mean overall score of acceptability of *lassi* for treatment T_1, T_2, T_3 and T_4 were 7.77, 7.99, 8.14 and 7.60, respectively. The highest overall acceptability score was recorded for treatment T_3 (8.14 per cent) and the lowest overall acceptability score was recorded for treatment T_4 (7.60 per cent). It was observed that the overall acceptability was found to be in increasing order from T_1 to T_3 and then declined in T_4. As the proportion of germinated sorghum extract in the blend increased there was significantly increased in overall acceptability except T_4. It was observed that all treatment were at par to each other for overall acceptability. From the result of overall acceptability scores of *lassi*, indicates that *lassi* prepared by blending 70:30 parts of skim milk and extract is superior over rest of treatment. The higher level of germinated sorghum extract showed reduction in overall acceptability in T_4 but all treatments were score more than 7 indicating product liked moderately on "9 point Hedonic" scale.

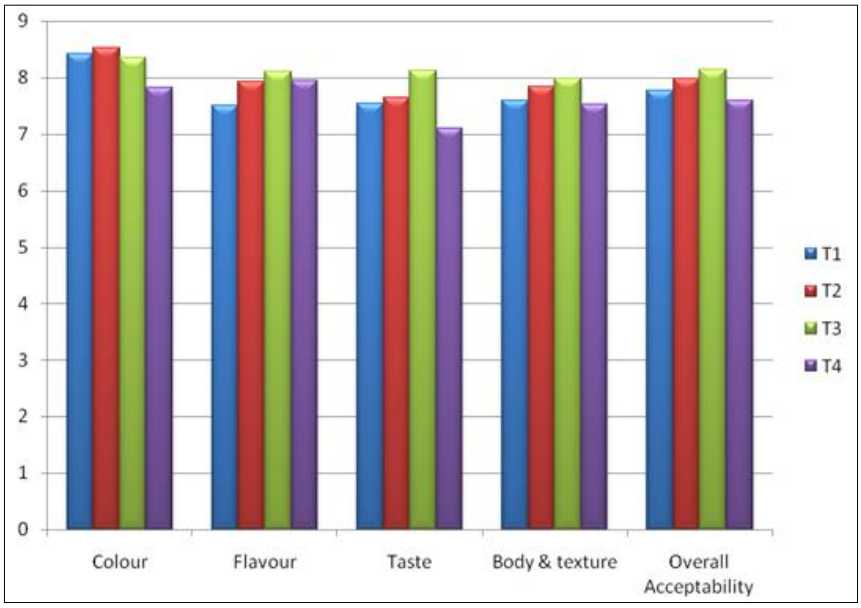


Fig 1: Graphical representation for sensory evaluation of germinated sorghum grains extract blended *lassi*

The results recorded in present investigation for overall acceptability score were comparable with Pardhi *et al*. (2014), recorded overall acceptability score for finger millet *lassi* from 7.30, 7.41, 7.54 and 7.37 for treatments T_0, T_1, T_2 and T_3, respectively which is similar with our findings. Kumar and Das (2015) [6], reported that the overall acceptability of sorghum based beverage (*lassi)* was increased with increased in the concentration sorghum flour except treatment T_4. The mean overall acceptability score of sorghum beverage was 7.80, 7.84, 8.04 and 7.68 for treatment T_1, T_2, T_3 and T_4, respectively. It indicates that mean score was increased up to T_3 and then declined in T_4 due to increased in the proportion of sorghum flour. Kakade *et al*. (2018), reported that the overall acceptability of wheat grass extract *lassi* for treatments T_1, T_2, T_3 and T_4 were 7.10, 7.41, 7.53 and 7.47, respectively. The overall acceptability scores of wheat grass extract *lassi* first increased then some decline. Pintu and Verma (2019) [11], reported that raw sorghum flour, flour, FGG-24 and flour of 48 hrs germinated sorghum grains, flour of 24 hrs germinated grains when added to milk solids before fermentation was found better than other forms and stage of addition with average overall acceptability score of 7.37 on 9-point hedonic scale.

All treatments secured more than 7 point out of 9 point of hedonic scale which indicated that these treatments were appreciated by the judges and accepted on the sensory parameters.

Conclusion

Current trends increasing awareness for nutritional, health and quality foods consciousness of consumers. The changing consumer needs indicated a great opportunity for developing nutritional foods. Germinated sorghum grains extract can be very well utilized for preparation of palatable and nutritional sorghum *lassi.* The overall score of acceptability of *lassi* for treatment T_1, T_2, T_3 and T_4 were 7.77, 7.99, 8.14 and 7.60, respectively. So, from this study it can be concluded that 30 per cent level of germinated sorghum extract in combination with 70 per cent level of skim milk showed highest overall acceptability.

References

1. Gupta SA. Sensory Evolution in Food Industry. Indian dairyman 1976;28(8):293-295.
2. Hussain SA, Garg FC, Pal D. Effect of Different Preservative Treatments on the Self–life of Sorghum Malt Based Fermented Bevarage. Journal of Food Science Technology 2014;51(8):1582-1587.
3. Kakade AG, Shingare JD, Shinde SP. Studies of Sensory Evaluation of *Lassi* Prepared with Optimized Level of

Wheat Grass (*Triticum aestivum).* The Pharma Innovation Journal 2019;8(10):30-33.
4. Karche RV, Chavan KD. Stdies on Chemical Quality of Finger Millet (*Eleusinecoracana*) Based Fermented Drink. International Journal of Chemical Studies 2019;7(3):195-201
5. Kriuthika D, Geeta PS, Mashewari TU, Sundadri SK, Pusphan KV. Development and Quality Evaluation of Buttermilk Based Pearl millet Beverage. International Journal of Chemical Studies 2018;6(3):3453-3457.
6. Kumar A, Anamika D. Quality Evaluation of Sorghum Based Milk Beverage. The Pharma Innovation Journal 2015;4(6):83-86.
7. Kumar S, Rai DC, Kumar HR. To Study the Sensory Characteristics of Herbal Honey *Lassi.* International Journal of Chemical Studies 2018;6(4):2183-2187.
8. Monika R, Dabur RS, Priyanka. Selection of Suitable from of Processing of Cereals (Pearl millet and Moth bean) For Preparation of Whey – Cereal Based Using Fermented Beverage (*Lassi*) Prepared by Using NCDC-167 Culture and Fat Content. The Pharma Innovation J 2018;7(7):790-795.
9. Mule SM, Kadam SS, Jadhav SR, Dandekar VS, Ramod SS. Studies on Sensory Evolution of Low Fat *Lassi* Prepared by Incorporation of Lemon grass (*Cymbopogan citrates* L.) Extract. International Journal of Chemical Studies 2018;6(1):1299-1302.
10. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. Second Edn. ICAR, New Delhi, 1985.
11. Pintu, Verma. Optimization of Rabadi-like Sorghum-based Fermented Milk Beverage. Journal of AgriSearch 2019;6(4):194-198.
12. Pintu RK. Development of Fermented Beverage from Sorghum and Milk Solid. Mtech *Thesis* National Dairy Research Institute, Karnal India, 2007.
13. Pradhi PS, Desale R, Mule P. Studies on Finger Millet *Lassi.* Asian Journal Dairy and Food Research 2014;33(4):255-258.
14. Samarth AG, More DR, Hashmi I. Studies on Physico-chemical Proerties and Nutritional Profile of Sweet Sorghum. International Journal of Chemical Studies 2018; 6(2):2826-2828.
15. Swarnima D, David J, Bhole S, Khushal K. Studies on Sensory Attributes of Cereals Based Fermented Functional Milk. Journal of Phrarmacognosy and Phytochemistry 2017;6(4):2008-2010.