Studies on standardization the process for dahi preparation by using the proper proportion of milk and wheatgrass extract

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Abstract

The study was planned to prepared dahi by optimizing the proportion of milk and wheatgrass extract, stage of addition of wheatgrass extract during dahi preparation, incubation time and culture rate for setting dahi. The incubation period of dahi with 1 percent and 2 percent culture rate requires time were 11.20, 10.20, 10.05, 9.50, 10.90, 10.40, 9.90 hrs and 10.00, 9.30, 9.00, 8.65, 9.07, 9.10, 8.90 hrs for treatments T1, T2, T3, T4, T5, T6, and T7, respectively. The wheatgrass extract was added in buffalo milk at different stages viz. before incubation, during incubation and after incubation. The parameters considered for the optimization stage of wheat grass addition were time of setting dahi. By comparing time required for incubation of dahi with 1 percent and 2 percent culture, addition of 2 percent culture were found less incubation period for each treatment by i.e. 1.20, 0.90, 1.05, 0.85, 1.83, 1.30 and 1.00 hrs for T1, T2, T3, T4, T5, T6, and T7 respectively. It was observed use of wheat grass extract reduce the incubation period as compared to control dahi. Same trend but less effect was observed for one percent culture was used. Therefore, two percent culture rate and nine hours incubation period was found most suitable for the preparation of dahi form buffalo milk mixed with wheat grass extract. The stage of wheat grass extract addition was found suitable after 4 hrs of incubation period.

Keywords: Dahi, raw/pasteurized wheat grass extract, optimize culture rate

1. Introduction

In modern era consumers are very much aware about their health. So, the demand of functional foods is increasing day by day at a global (Singh et al., 2012) [1]. Moreover, milk is consumed by people of all age can act as potent carrier for the herb which can add functional attribute to the product and consumer well being. Nowadays, more and more people are adopting herbal way of life for their health benefits.

There is also a need to find diverse technologies to add value to milk and its by-products (Pugazhenthithi and Jothilingam, 2013) [2]. Dahi has been with associated health benefits since time immemorial. Fermented milk contains all the milk components modified through the process of fermentation by lactic acid bacteria (LAB). Dahi is a very good source of calcium, phosphorus, riboflavin vitamin B2 and iodine. Dahi also is a good source of vitamin B12, panthothenic acid- vitamin B5, zinc, potassium, protein and molybdenum. These ten nutrients alone would make dahi a health supportive food (Deb and Seth 2014) [3]. Dahi is prepared by using mix culture of Streptococcus lactis, S. thermophilus, S. citrophilus, Lactobacillus bulgaricus, and L. plantarum etc. According to FSSAI Rules (2011), “Dahi or Curd” means the product obtained from pasteurized or boiled milk by souring, natural are otherwise by a harmless lactic acids or other bacterial culture. Dahi may contain additional cane sugar. It should have the same percentage of fat and SNF as the milk from which it is prepared. Where dahi, other than skimmed milk dahi, is sold are offered for sale without any indication of the class of milk, the standard prescribed for dahi prepared from buffalo milk shall apply (Chowdhury and Bhattacharyya 2014) [4]. Different types of dahi are available such as sweet dahi, sour dahi and flavored dahi. Its demand is increasing day by day for its multipurpose health benefits such as improves intestinal health, which preventing constipation, diarrhea and dysentery and also prevent gastrointestinal infections (Munzur et al., 2004) [5].

Wheatgrass is a food prepared from the cotyledons of the common wheat plant (Triticum aestivum) belonging to family Gramineae. Wheat grass culms are simple, hollow, or pithy, glabrous, and the leaves are approximately 1.2 m tall, flat, narrow, 20-28 cm long and 1.3 cm
broad. The spikes are long, slender, dorsally compressed and somewhat flattened. Its use in acidity, colitis, kidney malformation, atherosclerosis and swelling has been shown to be beneficial (Sareen et al., 2014) [10]. Wheatgrass is a cost efficient and a source to provide all kind of nutrients like vitamins, proteins, minerals, antioxidants and medicinal benefits for a healthy and rejuvenating body. Wheatgrass has high concentrations of chlorophyll, minerals (calcium, potassium, sodium, iron, magnesium and sulphur), and 17 forms of amino acids, vitamins (A, B, C, E and K) and active enzymes (Murali et al., 2016) [7]. It has some curative properties like anti-cancer activity, anti-ulcer activity, antioxidant activity, anti-arthritic activity, and blood building activity in Thalassemia Major. It has been argued that wheat grass is diseased blood flow, digestion and general detoxification of the body (Runjala and Murthy, 2016) [9]. Hence, by keeping the nutro-functional importance of wheatgrass and dahi in mind the project was designed to decide the proportion of milk and wheatgrass extract for setting dahi and optimized the stage of addition of wheatgrass extract during dahi preparation, incubation time and culture rate for setting dahi.

2. Material and Methods

The materials used and methods employed during the course of present investigation on preparation of dahi from blends of buffalo milk with (raw/pasteurized) wheat grass extract were as under.

2.1 Collection of buffalo milk

Fresh and standardized buffalo milk for fat 6 percent and SNF 9 percent was procured from Natural Milk Pvt, Ltd, Latur.

2.2 Starter cultures

The standard mixed dahi culture i.e. Standard dahi, contained streptococcus thermophilus and lactococcus lactis NCDC-167(BD4) in this study was procured from the National collection of Dairy culture (NCDC), NDRI, Karnal.

2.3 Methods

Wheatgrass extract was prepared from the wheat grass cultivated in laboratory as shown in flow chart by two ways i.e. without pasteurization and after pasteurization of wheat grass following the steps sorting wheat grass, washing, pasteurization, grinding and filtration. (Kumar et al., 2017) [4].

2.3.1 Preparation of wheat grass (Triticum aestivum) extract

2.3.2 Optimization of method for dahi preparation by using wheatgrass extract

The dahi was prepared from buffalo milk as per the method described De, 2009 [2] in his book Outline of Dairy Technology with slight modification for addition of wheat grass extract. The incubation period and culture rate were optimized on the basis of setting dahi as shown in Figure 2.

![Fig 1: Preparation of wheat grass (Triticum aestivum) extract](image1)

![Fig 2: Optimization method for dahi preparation by using wheatgrass extract](image2)
3. Result and discussion

As the wheat grass extract tried in dahi preparation in different proportion it was necessary to optimized the culture rate and incubation period on the basis of time required for dahi setting, data presented in this respect as follows.

3.3.1 Optimization of culture rate and incubation period (hr.) for setting dahi

As the wheat grass extract tried in dahi preparation in different proportion it was necessary to optimized the culture rate and incubation period on the basis of time required for dahi setting, data presented in this respect as follows.

The selected dahi culture NCDC-167 procured from National Dairy Research Institute, Karnal (Haryana) was tried for preparation of dahi for different treatments and recorded the time required to set dahi. The incubation temperature for fermentation was kept 37°C. For each treatment @1 and 2 percent culture rate was used and results presented in Table No. 1.

The time required to set dahi were observed periodically after 4 hrs. of incubation period at every 30 minutes interval and incubation period was finalized at the time of dahi set in hrs. It is observed from Table no.1 that the time required for setting of dahi with 1 percent and 2 percent culture rate were ranges from 9.50 to 11.20 hrs and 8.65 to 10.00 hrs, respectively. The incubation period of dahi with 1 percent and 2 percent culture rate requires time were 11.20, 10.20, 10.05, 9.50, 10.90, 10.40, 9.90 hrs and 10.00, 9.30, 9.00, 8.65, 9.07, 9.10, 8.90 hrs for treatments T1, T2, T3, T4, T5, T6, and T7, respectively. It seems from the table that as the rate of addition of wheat extract and culture rate increased the incubation period was decreased. For 1 percent culture the minimum time was observed in T4 (9.50) and maximum in T1 (11.20), whereas for 2 percent rate the respective observation goes to T5 (8.65) and maximum in T1 (10.00). By comparing time required for incubation of dahi with 1 percent and 2 percent culture, addition of 2 percent culture were found less incubation period for each treatment by i.e. 1.20, 0.90, 1.05, 0.85, 1.83, 1.30 and 1.00 hrs for T1, T2, T3, T4, T5, T6, and T7, respectively.

For one and two percent culture rate the wheat grass extract added treatments were statistically different from the control treatment. This might be due to the interaction effect of wheat and milk protein, easy denaturation of milk protein due to the protease enzymes of wheat extract, microbial synthesized enzymes and water holding capacity of wheat gluten (Majuriya and Bodla, 2011)[5]. Dahi samples prepared by using two percent culture rate and wheat grass extract were found at par with each other at 5 percent level of significant. It means that use of wheat grass extract reduce the incubation period as compared to control dahi. Same trend but less effect was observed for one percent culture was used. Therefore, two percent culture rate and nine hours incubation period was found most suitable for the preparation of dahi form buffalo milk mixed with wheat grass extract. Hence the rate for cultivating was optimized as two percent and means value for its incubation period was considered as 9.00 hrs and was followed during experiment for preparation of dahi.

3.3.2 Optimization the addition stage of wheat grass extract for setting dahi

The dahi was prepared as per method of De (2009)[2] with slight modification by using culture @ 2 percent and incubated for 9 hrs at 37°C as optimized in section 3.3.1. The wheatgrass extract was added in buffalo milk at different stages viz. before incubation, during incubation and after incubation as per the treatment shown below. The parameters considered for the optimization stage of wheat grass addition were time of setting dahi, whey drainage and sensory score for flavor obtained for dahi and result of it is presented in table no. 2.

From the table no. 2 it is observed that all treatments having flavor score more than 7.00 ranges between like very much to like moderately. But most of the extract added treatments secured score less than control treatments except treatment T5 (5 percent raw wheatgrass extract added) for wheatgrass extract added during and after incubation and T5 (5 percent pasteurized wheatgrass extract added) for wheatgrass extract added during and after incubation were 8.20, 8.10 and 8.40. It is revived from table no. 2 that dahi prepared by added extract during fermentation secured more score as compared to the stage of extract addition before and after fermentation. Then it is also observed that the flavor score of pasteurized extract more than the raw extract.

Table 1: Optimization of culture rate and incubation period (hr.) for setting dahi (in hrs)

<table>
<thead>
<tr>
<th>Replication/Treatments</th>
<th>R – I</th>
<th>R – II</th>
<th>R – III</th>
<th>R – IV</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1%</td>
<td>2%</td>
<td>1%</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>T1</td>
<td>11.30</td>
<td>10.00</td>
<td>11.00</td>
<td>9.60</td>
<td>11.30</td>
</tr>
<tr>
<td>T2</td>
<td>10.30</td>
<td>9.00</td>
<td>10.00</td>
<td>9.90</td>
<td>10.20</td>
</tr>
<tr>
<td>T3</td>
<td>10.20</td>
<td>9.10</td>
<td>10.00</td>
<td>9.20</td>
<td>10.10</td>
</tr>
<tr>
<td>T4</td>
<td>9.50</td>
<td>8.70</td>
<td>9.00</td>
<td>8.50</td>
<td>10.00</td>
</tr>
<tr>
<td>T5</td>
<td>11.30</td>
<td>9.00</td>
<td>11.00</td>
<td>9.40</td>
<td>10.30</td>
</tr>
<tr>
<td>T6</td>
<td>10.00</td>
<td>8.90</td>
<td>10.50</td>
<td>9.00</td>
<td>11.00</td>
</tr>
<tr>
<td>T7</td>
<td>10.00</td>
<td>8.90</td>
<td>10.00</td>
<td>9.00</td>
<td>9.90</td>
</tr>
</tbody>
</table>

For 1% S.E. ± 0.14 C.D. at 5% 0.43
For 2% S.E. ± 0.12 C.D. at 5% 0.49
Table 2: Optimization the stage of addition of wheat grass extract for setting dahi

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Before Incubation</th>
<th>During Incubation After 4 hrs</th>
<th>After Incubation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time</td>
<td>Whey drainage (%)</td>
<td>Flavor Score</td>
</tr>
<tr>
<td>T1</td>
<td>11.00</td>
<td>0.42</td>
<td>8.00</td>
</tr>
<tr>
<td>T2</td>
<td>10.20</td>
<td>0.40</td>
<td>7.40</td>
</tr>
<tr>
<td>T3</td>
<td>10.00</td>
<td>0.43</td>
<td>7.20</td>
</tr>
<tr>
<td>T4</td>
<td>9.40</td>
<td>0.45</td>
<td>7.00</td>
</tr>
<tr>
<td>T5</td>
<td>10.00</td>
<td>0.39</td>
<td>7.50</td>
</tr>
<tr>
<td>T6</td>
<td>9.50</td>
<td>0.43</td>
<td>7.30</td>
</tr>
<tr>
<td>T7</td>
<td>9.20</td>
<td>0.44</td>
<td>7.10</td>
</tr>
</tbody>
</table>

It was found creditable about whey drainage, the maximum whey drainage was observed in dahi in which extract was added before and after incubation, whereas minimum whey drainage observed during incubation in which whey was added after 4 hrs of incubation period it might be due to the over fermentation and incomplete fermentation occurred respectively during these two condition. The addition of extract during fermentation also supportive for minimum whey drainage. The ideal condition for addition of wheat grass extract for dahi preparation by using buffalo milk and wheat grass extract was found during fermentation at the mid time of fermentation in which more flavor score, less whey drainage and optimum incubation period (9hr) were observed. The stage of addition of wheat grass extract optimized in present study agreed and supported by the (Thammana et al. 2016)\[12\]. In their review paper, it or mentioned that to get the beneficial effect of wheatgrass extract it should be consumed within 15 minutes of preparation, oxidized rapidly soon after squeezing and supplement only 2 percent benefits in dried powder form as compared to fresh one. The process of dahi preparation after optimization of culture rate, incubation period and stage for wheat grass extract addition was finalized as shown below in figure no. 3.

![Fig 3: Preparation of wheat grass (Triticum aestivum) extract added dahi](image)

4. Conclusion
Wheatgrass extract added dahi could prepared by adding extract during fermentation more beneficial as compared to other types. It would like to mention here that the addition stage of wheat grass extract in dahi preparation need to modify again to reserve the functional benefit of wheatgrass. Wheat grass extract added before and after fermentation increased whey drainage and alter its textural as well as physico-chemical properties. For the present investigation the wheat grass extract added during fermentation after 4 hrs old incubated samples for getting the optimum physical structure and sensory test of dahi.

5. Reference
2. De S. Outlines of Dairy Technology; 29th impression, Oxford University, press. Delhi, 2009, 419.


