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Microbial analysis of manufacturing functional kalakand by using inulin and wheatgrass powder

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Abstract

Kalakand is a traditional milk product made by heating milk and adding sugar and coagulant as needed. Despite the fact that both types of milk had the same nutritional content, Kalakand made from cow milk and acidic milk was shown to have lesser acceptance than Kalakand made from buffalo milk. Danedar Khoa is used to make traditional Kalakand, and buffalo milk is favoured over cow milk due to its higher fat content. It's also critical to utilise the proper amount of citric acid and sugar in the mix, as these ingredients have a significant impact on the end product's texture and flavour. The purpose of this study was to see how inulin and wheatgrass powder affected microbiological analyses in kalakand. In this study, 1.0 percent inulin powder was blended with 4 percent, 6 percent, and 8 percent wheat grass powder in the Oa, Ob, and Oc treatments, with powdered sugar added to the Kalakand preparation. The Od, Oe, and Of treatments used 2.0 percent inulin powder with 4%, 6%, and 8% wheat grass powder, respectively; the Og, Oh, and Oi treatments used 3.0% inulin powder with 4%, 6%, and 8% wheat grass powder, respectively; and the Oj, Ok, and Ol treatments used 4.0 percent inulin powder with 4%, 6%, and 8% wheat grass powder, respectively. Control (O0) has an average value of 8.12. The above table also shows that treatment combinations (Ob) and (O0) had the highest and lowest Standard Plate Count (105 cfu/g) compared to the other treatments, with control (O0) having the mean value of 2.95. The above table also shows that treatment combinations (Od) and (O0) had the highest and lowest yeast and mould (cfu/g) concentration, respectively, compared to the other treatments.

Keywords: Microbial analysis, standard plate count, yeast and mould count, coliform, wheatgrass powder, inulin, milk products

1. Introduction

Kalakand is a traditional milk product created by heating milk and then adding sugar and the appropriate coagulant. Despite the fact that the two forms of milk had the same nutritional value, we observed that Kalakand made from cow milk and acidic milk had lower acceptance than Kalakand made from buffalo milk (Tewari *et al.*, 2019) [7]. Because buffalo milk has a higher fat content than cow milk, Kalakand is usually produced using Danedar Khoa. It's also crucial to use the right amount of citric acid and sugar, as these ingredients have a big impact on the texture and flavour of the final product (David, 2015) [1]. Dietary fibre consumption has increased in recent years as public awareness of its health advantages has grown (Jain *et al.*, 2015) [8]. Chicory root, garlic, wheat, bananas, and artichokes are all high in inulin, a naturally soluble dietary fibre that has long been ingested by humans (Tewari, 2019) [9]. Several studies have shown that inulin has a therapeutic effect in the treatment of obesity. Wheatgrass powder is an excellent source of vitamins, minerals, cancer prevention agents (Landon, 2014), compounds, and phytonutrients (Kumar & Singh, 2017) [3]. Wheatgrass powder is also a powerful liver and blood cleanser (Mishra *et al.*, 2020) [5]. It cleanses the body of poisons and pollutants from the surroundings. This is due to the presence of beneficial components in wheatgrass powder that protect us from cancer-causing chemicals, such as Superoxide Dismutase (SOD), which decreases the effects of radiation and other poisons in the body. This procedure can remove metals and harmful compounds from the body from head to toe. The treatment combination Oh was found to be more overall acceptable than the other treatment combination after sensory assessment. In terms of overall acceptability, the highest range of Oh is 8.47, which is greater than the mean of the other therapy combinations. As a result, the treatment combination formula of "Buffalo milk (100 ml) + 10% sugar + 3% inulin + 6% wheat grass powder" has been confirmed to be standardised for kalakand production. The goal of this study is to optimise and standardise inulin and wheatgrass powder amounts in kalakand.

2. Methods and Materials

The current study took place in the Department of Dairy Technology's research lab at Warner College of Dairy Technology, Sam Higginbottom University of Agriculture, Technology and

Sciences, Prayagraj-211007, Uttar Pradesh (India). All of the raw components were purchased in the Prayagraj market. The product was made with potable water. It was made certain that the materials used were disease-free. According to the course of therapy, 1.0 percent inulin powder was combined with 4%, 6%, and 8% wheat grass powder in the O_a, O_b, and O_c treatments, respectively, with the addition of powdered sugar in the Kalakand preparation. In the O_d, O_e, and O_f treatments, 2.0 percent inulin powder was combined with 4 percent, 6 percent, and 8 percent wheat grass powder, respectively. O_g, O_h, and O_i treatments utilised 3.0% inulin powder with 4%, 6%, and 8% wheat grass powder, respectively, whereas O_j, O_k, and O_l treatments used 4.0 percent inulin powder with 4%, 6%, and 8% wheat grass powder, respectively. As a control, the Kalakand was made without inulin powder (O₀). This is how Kalakand is manufactured. For the manufacture of the control and experimental Kalakands, buffalo milk was purchased. The fat level of this milk was restricted at 6% before it was used to make Kalakand. Kalakand was prepared according to De's directions (1982). Only analytical-grade chemicals were used in this experiment to assure the correctness of the results. "Kalakand is enriched with wheat grass, and Inulin was standardised and assessed for organoleptic qualities using a 9-point hedonic scale" (Amerine *et al.*, 1965). The samples were examined for physiochemical properties according to the protocol ICAR manual in Dairy Chemistry (1972)^[10] and Indian standard (1980)^[2].

2.1 Treatment combination

O₀ – Buffalo milk (100 ml) +10% sugar (Normal Kalakand)
 O_a – Buffalo milk (100 ml) + 10% sugar + 1% inulin + 4% wheat grass powder
 O_b – Buffalo milk (100 ml) + 10% sugar + 1% Inulin + 6% wheat grass powder
 O_c – Buffalo milk (100 ml) + 10% sugar + 1% Inulin + 8% wheat grass powder
 O_d – Buffalo milk (100 ml) + 10% sugar + 2% Inulin + 4% Wheat grass powder
 O_e – Buffalo milk (100 ml) + 10% sugar + 2% Inulin + 6% Wheat grass powder
 O_f – Buffalo milk (100 ml) + 10% sugar +2% Inulin + 8% wheat grass powder
 O_g – Buffalo milk (100 ml) + 10% sugar + 3% Inulin + 4% wheat grass powder
 O_h – Buffalo milk (100 ml) + 10% sugar + 3% Inulin + 6% wheat grass powder
 O_i – Buffalo milk (100 ml) + 10% sugar + 3% Inulin + 8% wheat grass powder
 O_j – Buffalo milk (100 ml) + 10% sugar + 4% Inulin +4% wheat grass powder
 O_k – Buffalo milk (100 ml) + 10% sugar + 4% Inulin + 6%

wheat grass powder

O_l – Buffalo milk (100 ml) + 10% sugar + 4% Inulin + 8% wheat grass powder

No. of treatments= 12+1

No. of replication= 5

Total no. of trials= 65

3. Results and Discussions

Table 1: Table exhibit Standard Plate Count (105 cfu/g) of final prepared Kalakand

Treatments	R1	R2	R3	R4	R5	Mean
O ₀	8.00	8.29	8.11	8.10	8.09	8.12
O _a	9.19	9.20	9.16	9.15	9.14	9.17
O _b	9.23	9.24	9.20	9.19	9.18	9.21
O _c	9.20	9.21	9.17	9.16	9.15	9.18
O _d	9.21	9.22	9.18	9.17	9.16	9.19
O _e	9.17	9.18	9.14	9.13	9.12	9.15
O _f	9.16	9.17	9.13	9.12	9.11	9.14
O _g	9.16	9.17	9.13	9.12	9.11	9.14
O _h	9.19	9.20	9.16	9.15	9.14	9.17
O _i	9.18	9.19	9.15	9.14	9.13	9.16
O _j	9.17	9.18	9.14	9.13	9.12	9.15
O _k	10.31	8.00	9.12	9.11	9.10	9.13
O _l	9.35	9.00	9.14	9.13	9.12	9.15
Mean	9.19	9.02	9.07	9.06	9.05	9.08
Minimum	8.00	8.00	8.11	8.10	8.09	8.12
Maximum	10.31	9.24	9.20	9.19	9.18	9.21
F- test				S		
S. Ed. (±)				0.146		
C. D. (P = 0.05)				0.292		

The above ANOVA table is exhibit that the mean value of control (O₀) is 8.12. The above table also exhibit that treatment combination (O_b) & (O₀) contains highest and lowest Standard Plate Count (105 cfu/g) than the other treatments respectively.

Table 2: Table exhibit ANOVA for Standard Plate Count (105 cfu/g) in final prepared Kalakand

ANOVA						
Source	d. f.	S.S.	M.S.S.	F. Cal.	F. Tab. 5%	Result
Replication	4	0.2324	0.0581	1.083	2.57	NS
Treatment	12	5.0378	0.4198	7.830	1.96	S
Error	48	2.5737	0.0536	-	1.55	-
Total	64	7.8439	-			-

The above ANOVA table is exhibit that the F. Cal. Value is higher than the F. Tab. value on their respective d.f at 5% significant level. due to treatments. The above table also exhibit significant difference (P<0.05) between various therapies.

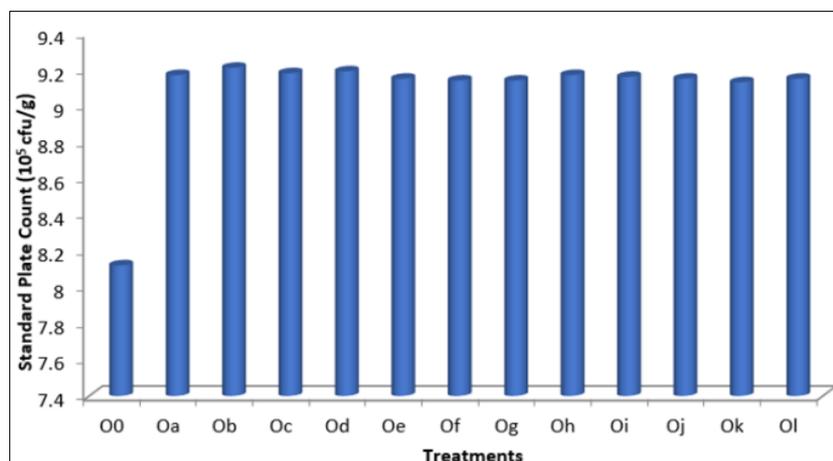


Fig 1: Graphical illustration of Standard Plate Count (10⁵ cfu/g) of final prepared Kalakand

Table 3: Table exhibit fracturability in Yeast & mould (cfu/g) content of final prepared Kalakand

Treatments	R1	R2	R3	R4	R5	Mean
O ₀	2.98	2.99	2.94	2.93	2.90	2.95
O _a	3.35	3.76	3.61	3.60	3.57	3.58
O _b	3.56	3.57	3.62	3.61	3.58	3.59
O _c	3.51	3.52	3.57	3.56	3.53	3.54
O _d	3.58	3.59	3.64	3.63	3.60	3.61
O _e	3.55	3.56	3.61	3.60	3.57	3.58
O _f	3.53	3.54	3.59	3.58	3.55	3.56
O _g	3.56	3.57	3.62	3.61	3.58	3.59
O _h	3.57	3.58	3.63	3.62	3.59	3.60
O _i	3.49	3.50	3.55	3.54	3.51	3.52
O _j	3.48	3.49	3.54	3.53	3.50	3.51
O _k	3.49	3.50	3.55	3.54	3.51	3.52
O _l	3.84	3.35	3.60	3.59	3.56	3.59
Mean	3.50	3.50	3.54	3.53	3.50	3.52
Minimum	2.98	2.99	2.94	2.93	2.90	2.95
Maximum	3.84	3.76	3.64	3.63	3.60	3.61
F- test				S		
S. Ed. (±)				0.043		
C. D. (P = 0.05)				0.085		

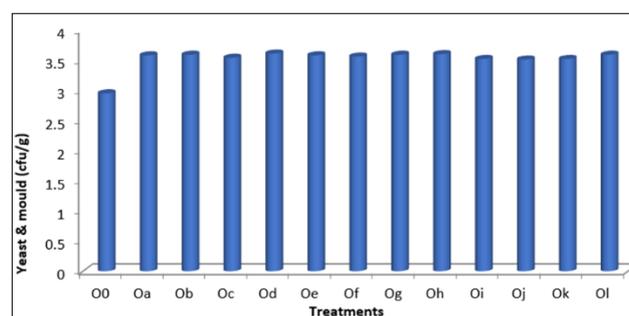


Fig 2: Graphical illustration of fracturability in Yeast & mould (cfu/g) content of final prepared Kalakand

The above ANOVA table is exhibit that the mean value of control (O₀) is 2.95. The above table also exhibit that treatment combination (O_a) & (O₀) contains highest and lowest Yeast & mould (cfu/g) content than the other treatments respectively.

Table 4: Table exhibit ANOVA for fracturability in Yeast & mould (cfu/g) content in final prepared Kalakand

ANOVA						
Source	d. f.	S.S.	M.S.S.	F. Cal.	F. Tab. 5%	Result
Replication	4	0.0225	0.0056	1.241	2.57	NS
Treatment	12	1.8168	0.1514	33.407	1.96	S
Error	48	0.2175	0.0045	-	-	-
Total	64	2.0569	-	-	-	-

The above ANOVA table is exhibit that the F. Cal. Value is higher than the F. Tab. value on their respective d.f at 5% significant level. Due to treatments. The above table also exhibit significant difference ($P < 0.05$) between various therapies.

4. Conclusion

The mean value of control (O₀) is 8.12. The above table also exhibit that treatment combination (O_b) & (O₀) contains highest and lowest Standard Plate Count (10⁵ cfu/g) than the other treatments respectively and the mean value of control (O₀) is 2.95. The above table also exhibit that treatment combination (O_d) & (O₀) contains highest and lowest yeast & mould (cfu/g) content than the other treatments respectively.

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