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Research Papers

Development of health oriented Probiotic fermented milk prepared from combination of oat flakes, barley and cow's milk

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Abstract

A new product in the form of cereal based fortified oat flakes based milk with functional ingredients will offer both nutritional and therapeutic benefits to the consumer in augmenting or deriving a number of day to day health troubles faced due to stress factor and increased cholesterol problems

Lactic cultures are used in the preparation in order to enhance the nutritive and therapeutic value of fermented milk. Attempts were made to prepare the same from nutritionally and therapeutically rich oat, barley and cow's milk. The new fermented milk will offer triple health benefits from oats, barley and Probiotic lactic culture. Oat and barley milk has been reported to control abnormal cholesterol levels in consumers.

In this investigation a method for production of low calorie bioyoghurt prepared form combination of cow's milk (50%), oat flakes milk (30%) and barley milk (20%) was standardized. The experimental fermented milk was subjected to chemical, microbiological and sensory evaluation adopting standard procedures. Assessment of total lactic population and the proportion of the three Probiotic organism was carried by staining of the specimen.

Results obtained has shown that the total viable Probiotic lactic count in the newly developed fermented milk was as high as average 24×109/ml to enable the useful organism to reach the GI tract to provide health benefits such as increase in immunity, reduce cholesterol level, possess anti cancer metabolites and improve digestion besides several other health benefits.

The new Probiotic fortified fermented milk developed in this investigation will benefit the consumers and diabetic subjects and also the related industry in marketing a value added product.

Key words: betaglucan, probiotic, cereal based, oat flakes, barely, cow's milk

Introduction

A significant percentage of population suffers from chronic deficiency and stress factors particularly related to abnormal cholesterol levels. Hence food is no longer only means of providing calories and nutrients it should be wholesome to give therapeutic benefits.

Oat flakes is commonly consumed by quite a large section of population as a breakfast cereal along with milk and sugar. Now a day's oat preparation is taken on regular basis irrespective of age groups.

Oat and barley are rich in nutrients and soluble fiber (betaglucan) which has many therapeutic properties namely reducing the abnormal cholesterol levels.

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Cow's milk which is consumed regularly by consumers lacks fiber nutrient. If cow's milk is fortified with oat flakes and barley extracted milk, it will be a wholesome beverage and with probiotic culture can have additional properties of enabling the useful organism to reach the GI tract and to provide several health benefits namely increase in immunity, reduction in abnormal cholesterol levels.

Objectives:

1. To standardise a method for production of health oriented Bioyoghurt for commercial adoption.
2. To produce bioyoghurt with health oriented functional ingredients from oat milk (rich in betaglucan) and barley milk (also rich in betaglucan) to address health problem related to control cholesterol.

Flow Chart

Preparation of probiotic bioyoghurt from cow's (50%), oat flakes (30%), and barley (20%) milk

↓

Boil the milk for 3 minutes

↓

Cool the milk to 50 ^{0}C

↓

Add 3 percent of bioyoghurt culture
(S.thermophilus, B.bifidum and L.acidophilus)

(mix well)

↓

Incubate at 42 - 45 ^{0}C for 4 hours

↓

After setting of yoghurt store in refrigerator

Table no: 1
Chemical quality of raw milk used for fortification studies.

Trial no	pH	Acidity (%)	Fat (%)	Protein (%)	SNF (%)
1	5.7	0.19	3.9	3.2	8.6
2	5.6	0.17	3.8	3.1	8.5
3	5.7	0.17	3.9	3.4	8.6
4	5.5	0.19	3.4	3.3	8.5
5	5.6	0.16	3.8	3.4	8.6
Average	5.6	0.17	3.7	3.2	8.5

Remarks: Chemical quality of raw milk meets the standard requirement.

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Table no: 2
Microbiological quality of raw cow's milk used for fortification studies.

Trial no	Total bacterial count/ml 10^5	Coliform count/ml 10^3	MBR time (hr—mins)
1	4.8	19.2	1-13
2	16.6	32.9	1-30
3	39.4	41.4	1-45
4	50.7	54.8	1-38
5	69.4	68.4	1-26
Average	36.1	43.3	1-30

Remarks: Bacteriological quality of raw milk is of satisfactory quality as per the prescribed standard.

Table no: 3
Chemical quality of oat milk

Trial no	pH	Acidity (%)	Fat (%)	Protein (%)	Carbohydrate (%) (Fibre)
1	6.41	0.06	0.09	1.03	34
2	6.32	0.07	0.08	1.04	33
3	6.31	0.06	0.09	1.03	31
4	6.41	0.06	0.08	1.05	33
5	6.45	0.07	0.09	1.02	34
Average	6.32	0.06	0.08	1.03	33

Remarks: oat milk is rich in fibre(betaglucan)

Table no: 4
Chemical quality of barley milk

Trial no	pH	Acidity (%)	Fat (%)	Protein (%)	CHO(fibre) (%)
1	5.9	0.06	0.65	2.75	34.6
2	5.3	0.55	0.55	2.74	35
3	5.2	0.58	0.58	2.72	34.8
4	5.6	0.54	0.54	2.71	34
5	5.4	0.53	0.53	2.70	34.6
Average	5.4	0.45	0.57	2.72	34.6

Remarks: Barley milk is rich in carbohydrate (fibre) ie. betaglucan

Table no: 5
Chemical quality of bioyoghurt prepared from cow's (50%), oat (30%), and barley (20%) milk

Trial no	pH	Acidity (%)	Fat (%)	Protein (%)	CHO (%)	Moisture (%)
1	4.4	0.88	2.2	6.2	13.6	55
2	4.35	0.91	2.6	6.1	13.3	58
3	4.30	0.90	2.6	6.15	14.7	59.5
4	4.35	0.89	2.6	6.10	12.7	58.4
5	4.4	0.85	2.45	6.2	14.8	57.7
Average	4.36	0.88	2.49	6.15	13.82	57.7

Remarks: Chemical quality of combined milk has good protein level and carbohydrate (fibre) containing betaglucan

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Table no: 6
Microbiological quality of probiotic bioyoghurt prepared from cow's (50%), oat (30%), and barley (20%) milk

Trial no	Total lactic bacterial count/ml 10^9	Ratio St:Bi:La
1	27.5	40:30:30
2	32.0	35:35:30
3	20.8	45:35:20
4	40.0	45:25:30
5	36.8	30:50:20
Average	31.42	39:35:26

Remarks: Probiotic bioyoghurt has very high population of lactic organisms sufficient to reach the gastro intestinal track and thus offer several health benefits, including cholesterol lowering effect; proportion of all three probiotic lactic organisms is almost equal.

Table no: 7
Sensory evaluation of bioyoghurt prepared from cow's (50%), oat (30%), and barley (20%)milk

Judges	Colour (5)	Surface tension(5)	Whey separation(5)	Texture(5)	Flavor(5)	Taste (5)	Average
A	creamish (4)	smooth no cracks (4)	nil (4)	uniform & soft (4)	good (4)	very good (5)	4.1
B	yellowish (4)	smooth no cracks (4)	nil (4)	soft & uniform (4)	good (4)	very good (5)	4.1
C	yellowish (4)	smooth no cracks (4)	nil (4)	smooth & soft (4)	good (4)	very good (5)	4.1
Average	4	4	4	4	4	5	

Remarks: Average sensory score of probiotic bioyoghurt from combined milk is high ie. 4.1 out of 5 by hedonic scale.

Sensory attributes are high and hence recommended for consumption.

Conclusion

1. A method for production of cow's, oat flakes, barley milk has been standardised.
2. Preparation of health oriented Bioyoghurt from combination of cow's milk , oat milk and barley milk rich in cholesterol controlling ingredients in the form of betaglucan has been standardised.
3. Preparation of bioyoghurt from cow's milk fortified with oat milk, and barley milk has influenced the growth of Bioyoghurt lactic cultures (S.thermophilus, B.bifidum and L.acidophilus). Thus increases their biomass exceeding 1×107/gm, to enable them to reach GI tract will offer several health benefits.
4. This fermented milk offer the health benefits of
   - · cow's milk nutrient
   - · oat and barley milk(betaglucan)
   - · Probiotic lactic culture possessing several health benefits specifically to control cholesterol.
   - o Possess antioxidant property to cap free radicals.
   - o Increase immunity.
   - o Prevent cancer cell.
   - o Provide good digestions proliferation.
   - o Possess anti ulcer effect.
   - o Suitable for diabetic subjects.

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