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Study on sensory analysis of vanilla flavour coconut (*Cocos nucifera* L.) Kulfi

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Abstract

An investigation was carried out at Dairy Science Laboratory of Department of Animal Husbandry and Dairy Science, College of Agriculture, Dr. B.S.K.K.V., Dapoli (M.S.) to determine the different quality parameters of kulfi blended with cow milk and coconut (*Cocos nucifera* L.) kernel extract and enriched with vanilla flavor. In present study, blend of cow milk and coconut kernel extract was used in preparation of kulfi which further enriched with vanilla flavour at different levels. Sugar was added at the rate of 12 percent and fresh cream 14 percent of unsweetened condensed milk for all treatments. Cow milk was added at different levels viz. 80, 70 and 60 percent of admixture and coconut kernel extract was added at different levels viz. 20, 30 and 40 percent of admixture and vanilla was added at different levels viz. 0.2, 0.3 and 0.4 percent of unsweetened condensed milk. Studied for its sensory properties such as colour and appearance, body and texture, flavour, overall acceptability was carried out by trained panelist using 9-point hedonic scale. From the results of present investigation, it may be concluded that the most acceptable quality of vanilla flavour coconut kulfi can be prepared by using admixture with proportion of 70:30 i.e. blend of 70:30 proportion of cow milk and coconut kernel extract and 0.4 percent vanilla flavour.

Keywords: Kulfi, coconut (*Cocos nucifera* L.), coconut kernel extract, vanilla, Indian dairy product, frozen desert

Introduction

Kulfi is an Indian frozen dessert prepared from concentrated sweetened milk or cow or buffalo milk with or without added nuts and flavours. Kulfi is also known as *qulfi*, *kulfa*, *kulphy* etc. (Pandit, 2004) [1]. Kulfi is a delicious, wholesome and nutritious frozen dairy product which contains fat percentage not less than 10 percent, 3.5 percent proteins and 36 percent of total solids (Jadhav, 2002) [3]. It has similarities to ice-cream in appearance and taste. Coconut is the fruit of the coconut palm (*Cocos nucifera*), which is commonly used for its water, oil, and tasty meat. The raw white meat inside a coconut is referred to as the kernel. It has a firm texture and delicious, slightly sweet flavour. It also contains protein, several important minerals, and small amounts of B vitamins. The minerals in coconut are involved in many functions in human body. Coconuts are low in carbs and fat, which may be beneficial for blood sugar control. The coconut is also high in dietary fibres. The vanilla flavour is used for enrichment of the product. The use of proper quantitative mixture of cow milk, coconut kernel extract and flavouring agent vanilla leads to form novelty product with lots of nutritious values.

Material and Methods

The study entitled "Preparation of Kulfi blended with cow milk and coconut (*Cocos nucifera* L.) kernel extract and enriched with vanilla flavour" was carried out at the Department of Animal Husbandry and Dairy Science, College of Agriculture, Dapoli, Dist-Ratnagiri during the academic year 2021-22 to 2022-23. The details of material and methods followed are furnished here under.

Procurement and collection of ingredients

For preparation of vanilla flavour coconut kulfi, the raw ingredients like cream, sugar, vanilla flavour were procured from local market of Dapoli, Ratnagiri, Maharashtra.

Milk

Fresh cow milk was procured from the dairy farm of College of Agriculture, Dapoli.

Fresh cream

Good quality fresh cream was purchased from the local market.

Sugar

Good quality cane sugar was procured from the local market.

Coconut

Matured coconut were collected from instructional farm of Department of Horticulture, College of Agriculture, Dapoli.

Vanilla flavour

Good quality vanilla flavour essence was procured from the local market.

Sensory analysis

Sensory evaluation was performed in the laboratory under environmental conditions. The product was evaluated for sensory characteristics, viz. colour and appearance, body and texture, flavour and Overall acceptability using 9 points hedonic scale as per IS: 6273 (Part- II), 1971. A total of ten panelists were chosen with no medical conditions.

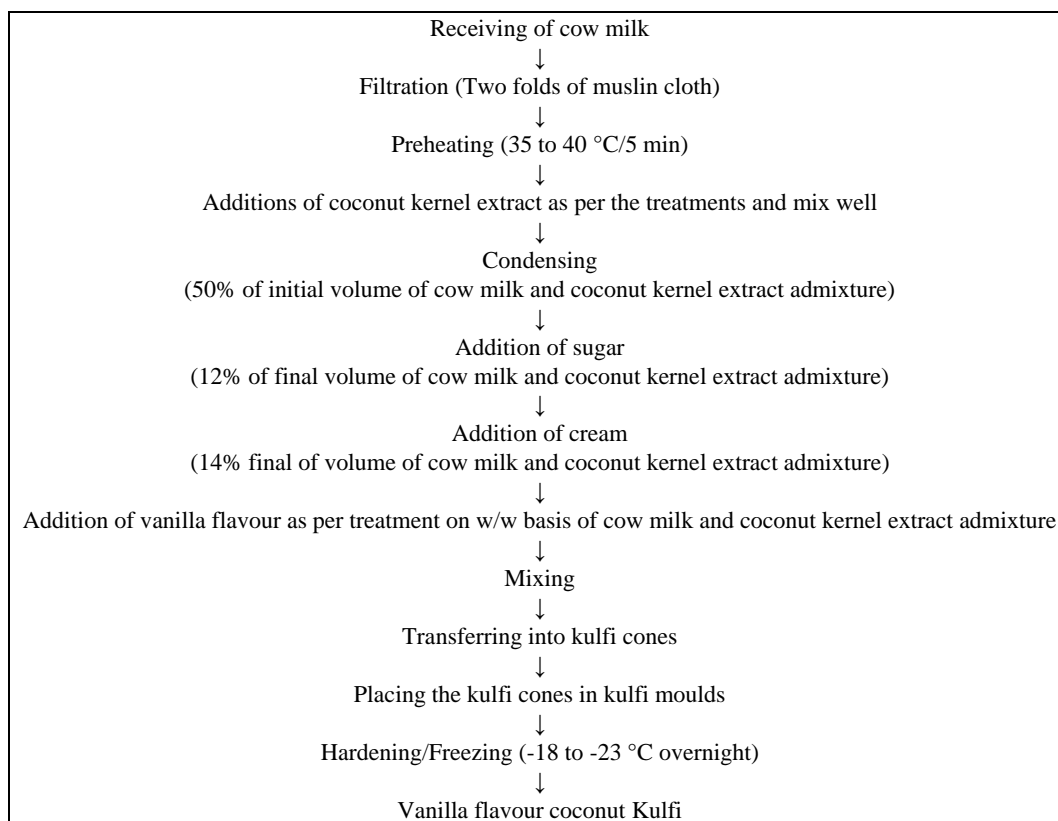
Treatment combination of vanilla flavour coconut kulfi

The research trial was conducted with 9 treatments and 6 replications.

Treatment combination of vanilla flavour coconut kulfi

Treatments	Quantity of ingredients used			
B1V1	Cow milk 80%	+	Coconut kernel extract 20%	+ Vanilla @ 0.2%
B1V2	Cow milk 80%	+	Coconut kernel extract 20%	+ Vanilla @ 0.3%
B1V3	Cow milk 80%	+	Coconut kernel extract 20%	+ Vanilla @ 0.4%
B2V1	Cow milk 70%	+	Coconut kernel extract 30%	+ Vanilla @ 0.2%
B2V2	Cow milk 70%	+	Coconut kernel extract 30%	+ Vanilla @ 0.3%
B2V3	Cow milk 70%	+	Coconut kernel extract 30%	+ Vanilla @ 0.4%
B3V1	Cow milk 60%	+	Coconut kernel extract 40%	+ Vanilla @ 0.2%
B3V2	Cow milk 60%	+	Coconut kernel extract 40%	+ Vanilla @ 0.3%
B3V3	Cow milk 60%	+	Coconut kernel extract 40%	+ Vanilla @ 0.4%

‘B’ stands for blend of cow milk and coconut kernel extract; ‘V’ stands for vanilla flavour.



Flow diagram 1: Preparation for Kulfi blended with cow milk and coconut kernel extract and enriched with vanilla flavour

Results and Discussion**Colour and appearance**

Table 1 illustrates the finding regarding the colour and

appearance of vanilla flavour coconut kulfi as affected by various levels of cow milk and coconut kernel extract admixture and vanilla flavour.

Table 1: Average score for colour and appearance of vanilla flavour coconut kulfi (9 point Hedonic Scale)

Levels of	Levels of vanilla flavour (%)			Mean
	B1	B2	B3	
B1	6.67	6.75	6.39	6.83c
B2	7.67	7.92	8.33	7.97b
B3	7.50	7.75	8.22	7.82a
Mean	7.28c	7.47b	7.88a	7.54

ANOVA

SV	DF	SS	MSS	Cal F	Tab F (5%)	Results	Tab F (1%)	Results
TRET	8	17.31704	2.16463	17.79148	2.15	S	2.94	S
B	2	13.78481	6.89241	56.64992	3.20	S	5.11	S
V	2	3.37370	1.68685	13.86454	3.20	S	5.11	S
B x V	4	0.15852	0.03963	0.32572	2.58	NS	3.77	NS
Error	45	5.475	0.12167					
Total	53							

	SE(M)	SE(D)	CD 5%	CV	CD 1%
B	0.0822	0.1163	0.2342	4.2451	0.3127
V	0.0822	0.1163	0.2342		0.3127
B x V	0.1424	0.2014	0.4056		0.5416

The critical perusal of Table 1 indicate that amongst various treatment combinations the highest score in colour and appearance for vanilla flavour coconut kulfi was observed in treatment B2V3 (8.33) i.e. blend of 70:30 proportion of cow milk and coconut kernel extract and 0.4 percent vanilla flavour followed by B3V3 (8.22) i.e. blend of 60:40 proportion of cow milk and coconut kernel extract and 0.4

percent vanilla flavour, while lowest score was observed in treatment B1V3 (6.39) i.e. blend of 80:20 proportion of cow milk and coconut kernel extract and 0.4 percent vanilla flavour. The statistical interpretation of data indicates that the levels of coconut kernel extract B1, B2 and B3 and the levels of vanilla flavour V1, V2 and V3 are differ from with one another at 1 percent level of significance respectively.

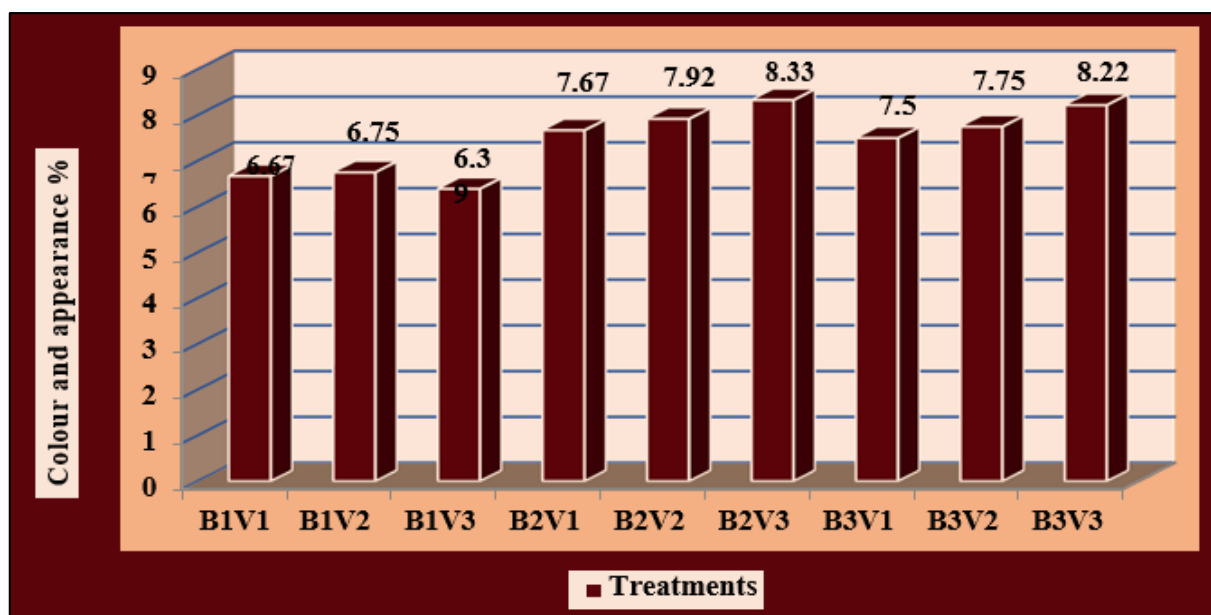


Fig 1: Colour and appearance of vanilla flavour coconut Kulfi

Body and texture

Table 2 illustrates the finding regarding the body and texture of vanilla flavour coconut kulfi as affected by various levels

of cow milk and coconut kernel extract admixture and vanilla flavour.

Table 2: Average score for body and texture of vanilla flavour coconut kulfi (9 point Hedonic Scale)

Levels of blends (%)	Levels of vanilla flavour (%)			Mean
	V1	V2	V3	
B1	6.25	6.75	6.93	6.62c
B2	7.58	7.90	8.42	7.97a
B3	7.33	7.83	8.25	7.81b
Mean	7.06c	7.47b	7.87a	7.46

ANOVA

SV	DF	SS	MSS	Cal F	Tab F (5%)	Results	Tab F (1%)	Results
TRET	8	25.64593	3.20574	15.85256	2.15	S	2.94	S
B	2	19.57148	9.78574	48.39103	3.20	S	5.11	S
V	2	5.92148	2.96074	14.64103	3.20	S	5.11	S
B x V	4	0.15296	0.03824	0.18910	2.58	NS	3.77	NS
Error	45	9.1	0.20222					
Total	53							

	SE(M)	SE(D)	CD 5%	CV	CD 1%
B	0.1060	0.1499	0.3019	5.4508	0.4032
V	0.1060	0.1499	0.3019		0.4032
B x V	0.1836	0.2596	0.5229		0.6983

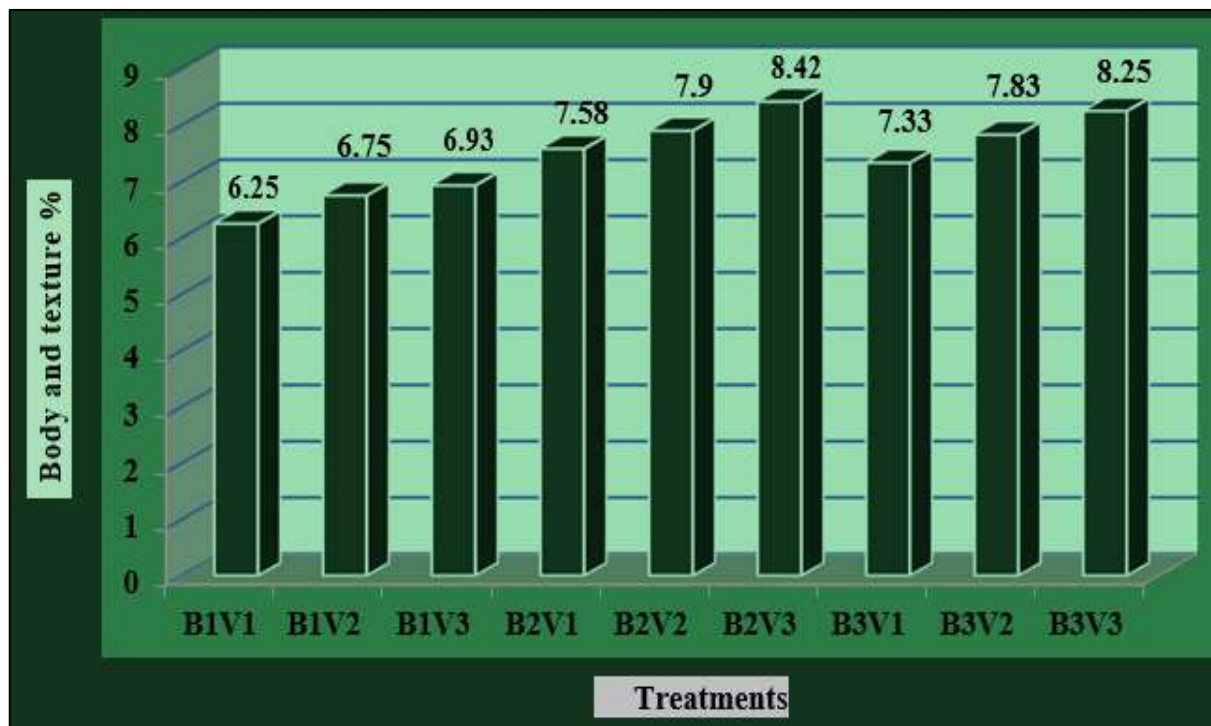


Fig 2: Body and texture of vanilla flavour coconut Kulfi

The critical perusal of Table 2 indicate that amongst various treatment combinations the highest score in body and texture for vanilla flavour coconut kulfi was observed in treatment B2V3 (8.42) i.e. blend of 70:30 proportion of cow milk and coconut kernel extract and 0.4 percent vanilla flavour followed by B3V3 (8.25) i.e. blend of 60:40 proportion of cow milk and coconut kernel extract and 0.4 percent vanilla flavour, while lowest score was observed in treatment B1V3 (6.25) i.e. blend of 80:20 proportion of cow milk and coconut kernel extract and 0.4 percent vanilla flavour. The statistical interpretation of data indicates that the levels of coconut kernel extract B1, B2 and B3 and the levels of vanilla flavour

V1, V2 and V3 are differ from with one another at 1 percent level of significance respectively. The results clearly indicates that as the level of coconut kernel extract and vanilla flavour increases there is simultaneously increase in score of body and texture.

Flavour

Table 3 illustrates the finding regarding the flavour of vanilla flavour coconut kulfi as affected by various levels of cow milk and coconut kernel extract admixture and vanilla flavour.

Table 3: Average score for Flavour of vanilla flavour coconut kulfi (9 point Hedonic Scale)

Levels of blends (%)	Levels of vanilla flavour (%)			Mean
	V	V	V	
B1	6.33	6.75	6.83	6.64c
B2	7.42	8.08	8.50	8.00a
B3	7.33	7.67	8.17	7.72b
Mean	7.03c	7.50b	7.83a	7.45

ANOVA

SV	DF	SS	MSS	Cal F	Tab F (5%)	Results	Tab F (1%)	Results
TRET	8	25.17593	3.14699	14.97247	2.15	S	2.94	S
B	2	18.62037	9.31019	44.29515	3.20	S	5.11	S
V	2	5.89815	2.94907	14.03084	3.20	S	5.11	S
B x V	4	0.65741	0.16435	0.78194	2.58	NS	3.77	NS
Error	45	9.458333	0.21019					
Total	53							

	SE(M)	SE(D)	CD 5%	CV	CD 1%
B	0.1081	0.1528	0.3078	5.6138	0.4110
V	0.1081	0.1528	0.3078		0.4110
B x V	0.1872	0.2647	0.5331		0.7119

The critical perusal of Table 3 indicate that amongst various treatment combinations the highest score in flavour for vanilla flavour coconut kulfi was observed in treatment B2V3 (8.50) i.e. blend of 70:30 proportion of cow milk and coconut kernel extract and 0.4 percent vanilla flavour followed by B3V3 (8.17) i.e. blend of 60:40 proportion of cow milk and coconut kernel extract and 0.4 percent vanilla flavour, while lowest score was observed in treatment B1V3 (6.33) i.e. blend of

80:20 proportion of cow milk and coconut kernel extract and 0.4 percent vanilla flavour. The statistical interpretation of data indicates that the levels of coconut kernel extract B1, B2 and B3 and the levels of vanilla flavour V1, V2 and V3 are differ from with one another at 1 percent level of significance respectively. The results clearly indicates that as the level of coconut kernel extract and vanilla flavour increases there is simultaneously increase in score of flavour.

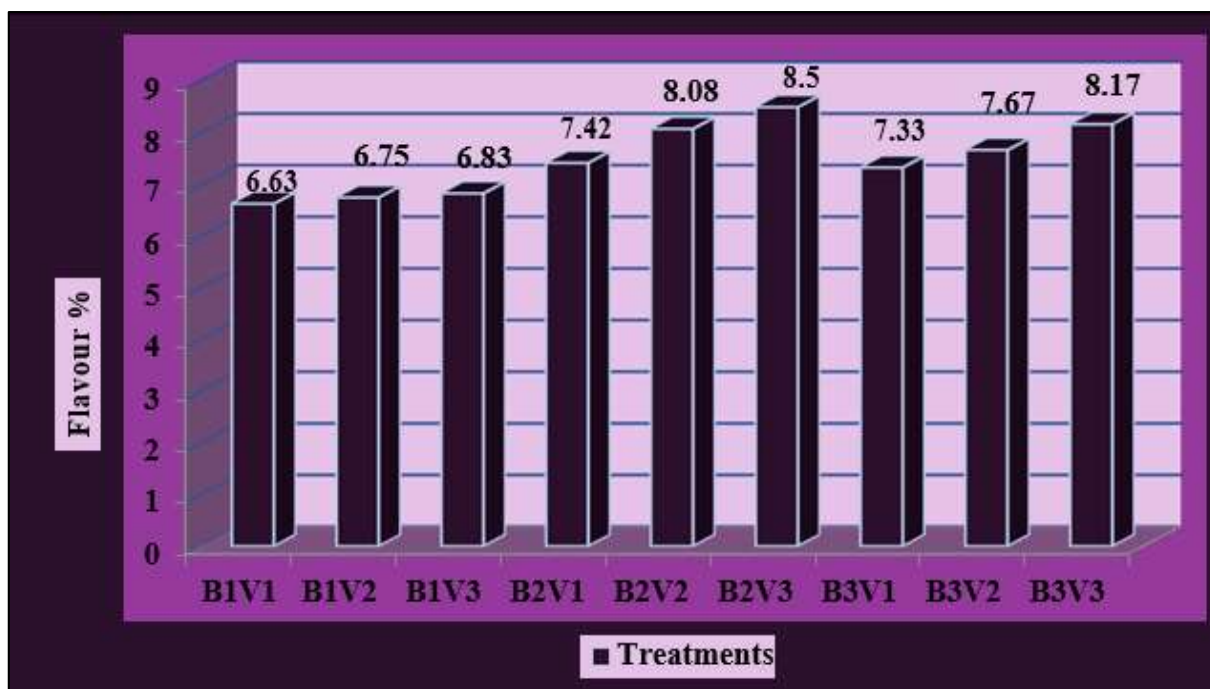


Fig 3: Flavour of vanilla flavour coconut Kulfi

Overall acceptability

Table 4 illustrates the finding regarding the overall acceptability of vanilla flavour coconut kulfi as affected by

various levels of cow milk and coconut kernel extract admixture and vanilla flavour.

Table 4: Average score for Overall acceptability of vanilla flavour coconut kulfi (9 point Hedonic Scale)

Levels of blends (%)	Levels of vanilla flavour (%)			Mean
	V1	V2	V3	
B1	6.75	6.90	7.08	6.91c
B2	7.83	8.25	8.75	8.28a
B3	7.52	8.08	8.57	8.06b
Mean	7.37c	7.74b	8.13a	7.75

ANOVA

SV	DF	SS	MSS	Cal F	Tab F (5%)	Results	Tab F (1%)	Results
TRET	8	25.53815	3.19227	31.25136	2.15	S	2.94	S
B	2	19.36148	9.68074	94.77157	3.20	S	5.11	S
V	2	5.29037	2.64519	25.89558	3.20	S	5.11	S
B x V	4	0.88630	0.22157	2.16914	2.58	NS	3.77	NS
Error	45	4.596667	0.10215					
Total	53							

	SE(M)	SE(D)	CD 5%	CV	CD 1%
B	0.0753	0.1065	0.2146	3.7308	0.2865
V	0.0753	0.1065	0.2146		0.2865
B x V	0.1305	0.1845	0.3717		0.4963

The critical perusal of Table 4 indicate that amongst various treatment combinations the highest score in overall acceptability for vanilla flavour coconut kulfi was observed in treatment B2V3 (8.75) i.e. blend of 70:30 proportion of cow milk and coconut kernel extract and 0.4 percent vanilla flavour followed by B3V3 (8.57) i.e. blend of 60:40 proportion of cow milk and coconut kernel extract and 0.4 percent vanilla flavour, while lowest score was observed in treatment B1V3 (6.75) i.e. blend of 80:20 proportion of cow

milk and coconut kernel extract and 0.4 percent vanilla flavour. The statistical interpretation of data indicates that the levels of coconut kernel extract B1, B2 and B3 and the levels of vanilla flavour V1, V2 and V3 are differ from with one another at 1 percent level of significance respectively. The results clearly indicates that as the level of coconut kernel extract and vanilla flavour increases there is simultaneously increase in score of overall acceptability.

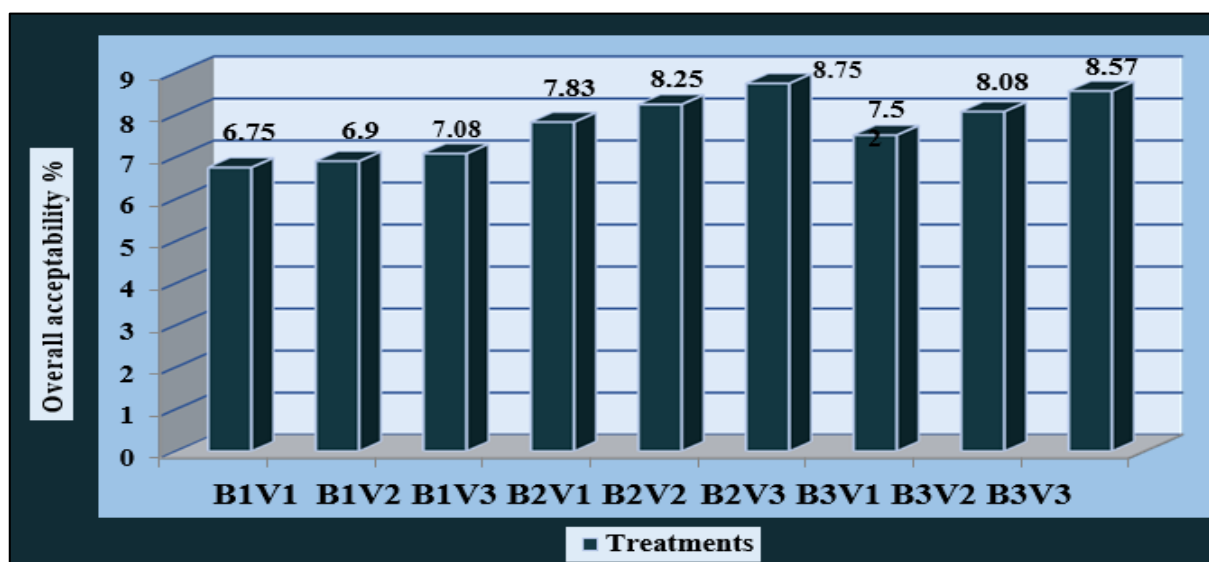


Fig 4: Overall acceptability of vanilla flavour coconut Kulfi

Conclusion

According to the findings, the kulfi prepared by using cow milk and coconut kernel extract at 70:30 proportion as base material and enriched with vanilla flavour @ 0.4% had the best organoleptic characteristics, including colour and appearance, body and texture, flavour and overall acceptability. Thus, B2V3 treatment of vanilla flavour coconut kulfi was found as most acceptable.

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