International Journal of Food Science and Nutrition
ISSN: 2455-4898; Impact Factor: RJIF 5.14
Received: 23-01-2020; Accepted: 26-02-2020; Published: 27-03-2020
www.foodsciencejournal.com
Volume 5; Issue 2; 2020; Page No. 87-89

Sensory evaluation of traditional Indian vermicelli kheer prepared using camel milk

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Abstract
Camel Milk is considered as a food of high nutritive value with many therapeutic applications. Being deficient in β-lactoglobulin it is an option for lactose intolerant patients who generally cannot tolerate cow's milk. Compared to other ruminants' milk, camel milk is valued for its better digestibility due to the smallest milk-fat globules and its hypoallergenic properties in humans. In the present study, an attempt was made to prepare vermicelli kheer, a traditional Indian sweet dish, using camel milk (test) instead of cow's milk (control). Results of the study indicated that camel milk vermicelli kheer had acceptable sensory attributes with respect to appearance, taste, color and consistency. Overall acceptability of the samples-control and test highlighted the fact that cow milk can be successfully replaced by camel milk in the preparation of vermicelli kheer.

Keywords: camel milk, vermicelli Kheer, taste, overall acceptability

1. Introduction
Camel milk, the white gold of desert [1], is known to have many therapeutic properties [2]. It appears opaque white in color, has a faint sweetish odor with a sharp taste, and can be salty sometimes [3]. The composition of camel milk is known to be similar to human milk [4] and, is reported to contain all the beneficial nutrients required by the human body [5, 7]. Studies have suggested that camel milk is rich in anti-rotavirus antibodies and hence, proven beneficial for rotavirus infection in children [8]. Research findings have suggested camel milk as being safe for children and also effective in the treatment of autism [9]. It has been reported as a good alternative for cow's milk [10] and considered an option for individuals who cannot ingest cow's milk due to intolerance [11, 12]. The present pilot study was planned to use camel milk as a substitute to cow's milk in the preparation of Kheer. Kheer, a traditional sweet dish in India, is generally prepared using cow's milk along with rice, sago, broken wheat or vermicelli during religious festivities. In this study, vermicelli kheer was prepared using locally available camel milk produced in UAE, and sensory evaluation was performed to determine the acceptability of the product.

2. Materials and Methods
2.1. Procurement of Raw materials
A market survey was conducted to collect information on different camel milk products available in supermarkets in Dubai. Full cream camel milk available in the market was chosen for kheer preparation. Although, milk with different fat contents can be used for the preparation of kheer, full cream was chosen because the traditional Indian sweets are generally made using full cream milk from cow in order to m*eet al*l the sensory attributes of a sweet dish. Vermicelli, sugar, cardamom used in the preparation were procured from the local supermarket in Dubai.

2.2. Preparation of Kher
In a thick bottom pan 1 litre of milk was heated and allowed to boil with occasional stirring. To this, 150gms of vermicelli roasted to golden brown color using 10gms of ghee was added. It was mixed well and allowed to cook till vermicelli softened. 60 grams of sugar was added and mixed well and boiled further till the kheer thickened and finally ¼ tsp cardamom powder was added and mixed. The above standard recipe was used to prepare both cow milk (control) as well as camel milk vermicelli kheer (test).

2.3. Sensory evaluation of Camel milk kheer
The prepared kheer was evaluated for sensory characteristics in terms of appearance, taste, consistency, aroma, and overall acceptability by 10 semi-trained panel members comprising of staff members and students of School of Life Science, Manipal Academy of Higher Education, Dubai campus, using 9-point Hedonic scale. All the 10 panel members selected were Indian expats residing in UAE. The judgments by the panel members were made using descriptive terms ranging from digit 9 which meant 'like extremely' to digit 1 which meant 'dislike extremely'. The sensory score card thus marked by the panelists was collected and the data was tabulated and subjected to appropriate statistical analysis.

3. Result and Discussion
The results of the data collected on different sensory attributes like appearance, taste, texture, aroma, and overall acceptability was tabulated, and illustrated diagrammatically. The mean sensory scores of kheer-control and test prepared using same standard recipe has been illustrated in Fig-1. 9-point Hedonic scale was used for the sensory evaluation where the maximum score for evaluation of a product was 45 and minimum was 5. Mean ±SD scored by control and test sample were 40.9±0.73 and 39.5±1.35 respectively.

The Mean ±SD for appearance of the product was 8.3±0.48 and 8.0± 0.47 scored by control and test samples respectively and is presented in Fig-2. The values indicated that there was no significant difference between the samples. The taste, consistency and aroma of Camel milk kheer scored 8.0±0.66, 7.7±0.67, 7.8±0.79 as illustrated in Fig -3, Fig-4 and Fig-5 respectively, compared to 8.3±0.48, 8.0±0.67, 8.1±0.32 scored by Cow's milk. Score '7' as per the hedonic scale is 'like moderately' and '8' is 'like very much'. The overall acceptability of control sample was 8.2±0.42 and test sample was 8.0±0.47 as represented in Fig-6, emphasizing the fact that both the products were acceptable with a 'like very much' score.

There was no significant difference between the control and test samples with respect to all the sensory attributes tested as shown in Table -1. Thus, the results of the study revealed that cow milk can be successfully substituted with camel milk in the preparation of vermicelli kheer.

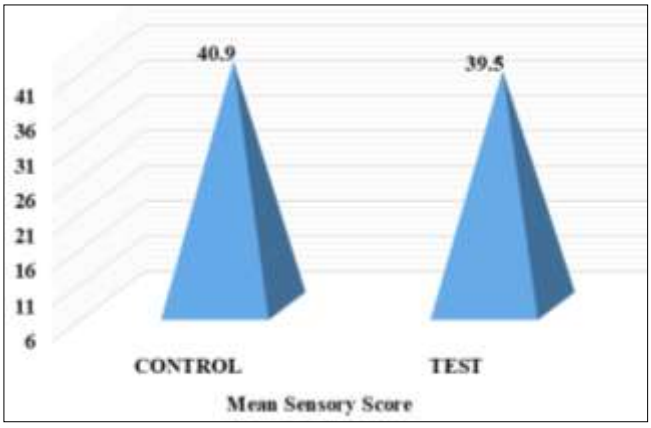

Fig 1: Mean sensory scores of Cow Milk (C) and Camel Milk Kher (T)

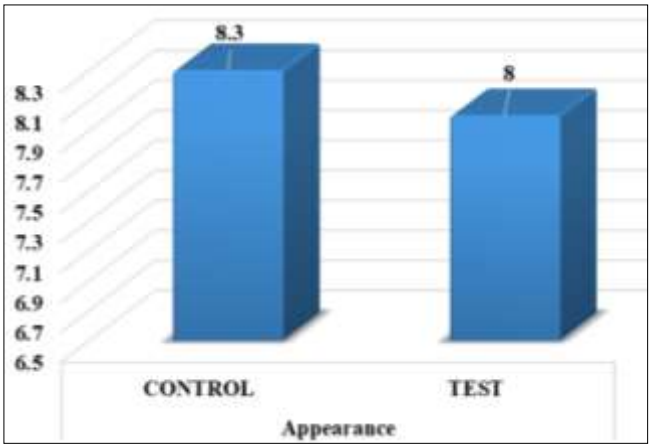

Fig 2: Mean Sensory Scores of Appearance of Cow Milk Kher (C) and Camel Milk Kher (T)

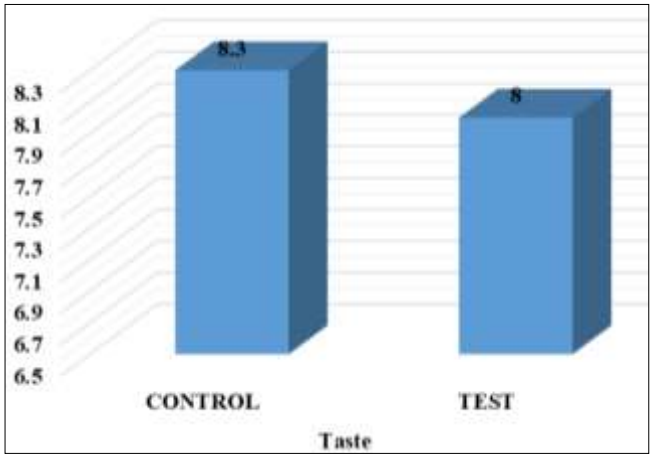

Fig 3: Mean Sensory Scores of Taste of Cow Milk Kher (C) and Camel Milk Kher (T)

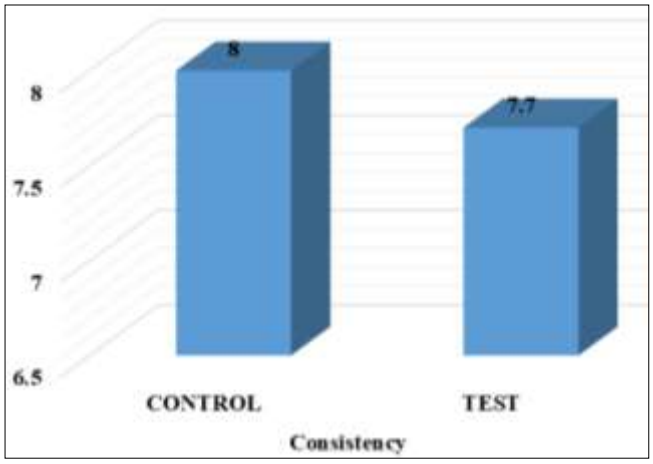

Fig 4: Mean Sensory Scores of Consistency of Cow Milk Kher (C) and Camel Milk Kher (T)

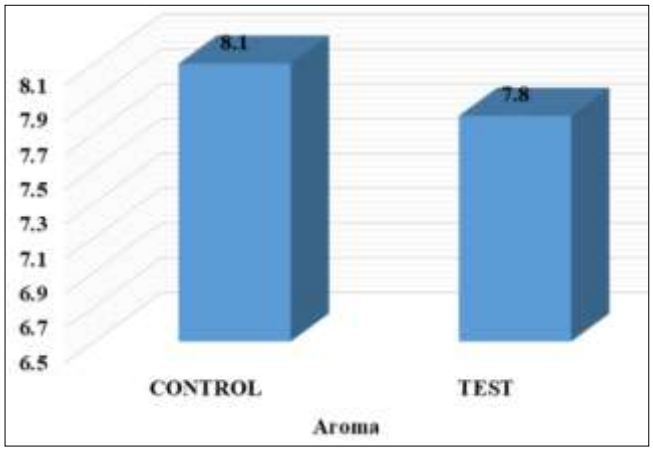

Fig 5: Mean Sensory Scores of Aroma of Cow Milk Kher (C) and Camel Milk Kher (T)

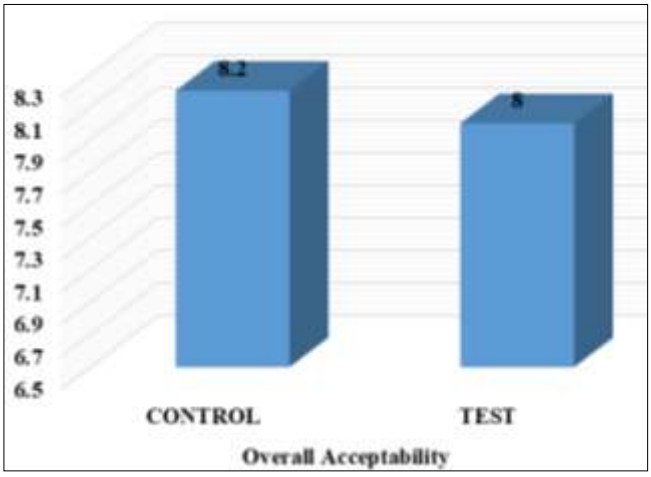

Fig 6: Mean Sensory Scores of Overall Acceptability of Cow Milk Kher (C) and Camel Milk Kher (T)

Table 1: Mean ± SD of Sensory attributes of Cow Milk Kheer (Control) and Camel Milk Kheer (Test)

Sensory Attributes	Control	Test	*p-value**
Appearance	8.3±0.48	8.0±0.47	0.097
Taste	8.3±0.48	8.0±0.66	0.097
Consistency	8.0±0.67	7.7±0.67	0.172
Aroma	8.1±0.32	7.8±0.79	0.139
Overall Acceptability	8.2±0.42	8.0±0.47	0.084

* NS-Not Significant, p <0.05

4. Conclusion

The present pilot study was carried out with a view to embrace the goodness of camel milk in the preparation of one of the traditional Indian sweet dish which is vermicelli kheer. Camel milk which offers therapeutic benefits is effortlessly available in many supermarkets in UAE. Considering the huge population of Indian expats residing in UAE, the substitution proposed in the study might be useful. Camel milk is also deficient in β-lactoglobulin and hence, it is a promising option for lactose intolerant patients who cannot tolerate cow's milk. The results of the study revealed that camel milk kheer is given a score of 'like very much' by the panel members considering its overall acceptability. Thus, camel milk can be successfully used in the preparation of kheer and there is a lot of scope to explore many Indian recipes using camel milk in UAE.

5. Acknowledgment

The authors wish to thank Dr. Arif Hussain, Dr. Faheem SM and all the Staff Members and Students of School of Life Sciences, Manipal Academy of Higher Education- Dubai campus, for their constant support and motivation during the course of the study.

6. References

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