International Journal of Veterinary Sciences and Animal Husbandry

ISSN: 2456-2912
VET 2024; 9(1): 1029-1033

www.veterinarypaper.com
Received: 27-11-2023
Accepted: 02-01-2024

Anita Tanwar
Division of Livestock Products Technology, Faculty of Veterinary Sciences and Animal Husbandry, SKUAST, Jammu, Jammu and Kashmir, India

Anil Harsh
Department of Animal Breeding and Genetics, RAJUVAS, Bikaner, Rajasthan, India

Sunil Kumar
Division of Livestock Products Technology, Faculty of Veterinary Sciences and Animal Husbandry, SKUAST, Jammu, Jammu and Kashmir, India

Kanika Mahajan
Division of Livestock Products Technology, Faculty of Veterinary Sciences and Animal Husbandry, SKUAST, Jammu, Jammu and Kashmir, India

Corresponding Author:
Anil Harsh
Department of Animal Breeding and Genetics, RAJUVAS, Bikaner, Rajasthan, India

Apricot enriched egg albumin NOG-analysis of sensory attributes and standardization of drink pre-pration

Anita Tanwar, Anil Harsh, Sunil Kumar and Kanika Mahajan

Abstract
The objective of the present study was to create a nutritive beverage that contains high-quality protein and is devoid of sugar. A mixture called egg albumen nog was prepared using varying quantities of apricot. The apricots were boiled in water and then finely chopped to obtain a pulp. Simultaneously, the eggs were disinfected using a 2% solution of sodium hypochlorite and pasteurized at a temperature of 64 °C for the duration of 2.5 minutes. The albumin from the eggs was separated and beaten using a blender until it reached a frothy consistency. The fresh cow milk was adjusted to contain 3.5% fat and 8.5% SNF. All the ingredients, including the milk, beaten albumin, apricot pulp, artificial food-grade color, gelatine, and sugar-free aspartame, were combined in a mixer and thoroughly mixed. Three different concentrations of apricot, namely 15%, 20%, and 25%, were integrated into the formulation, and after conducting sensory evaluation and analyzing physicochemical parameters, it was determined that 20% apricot pulp yielded the most favourable results. In relation to the physicochemical composition, the observations indicated a moisture content of 85%, fat content of 2.75%, protein content of 4.42%, ash content of 1%, dietary fiber content of 1.03%, and carbohydrate content of 5.8%. Consequently, the selection of the 20% concentration was based on both physicochemical and sensory attributes. The resultant product exhibits potential applications in cases of constipation and diabetes due to its high fiber content and absence of sugar, respectively.

Keywords: Egg nog, dietetic, apricot, egg albumen

Introduction

India is the third largest egg producers in the world and have continues growth in egg production as well as per capita availability. The annual growth rate in egg production has been recorded by 6.77% as compared to 2021-22 (BAHS, 2023) [1]. The per capita availability is 101 eggs per annum (BAHS, 2023) [1]. So the availability of eggs to each person are increasing and egg is a rich source of concentrated nutrients. The modest cost, easy availability, popular taste appeal and low calorific value, source of high biological protein, give egg a deserved place in diet. Eggs are the food that supplies everything. The nutritional value of the whole egg includes Water (75%), protein (12%), lipid (12 %), carbohydrates and minerals (1%) (Huopalahti *et al*., 2007; Abeyrathne *et al*., 2013) [2, 3]. Bioavailability of these proteins and other nutrients are very compared to other animal protein sources (Stadelman and Cottrill, 2001) [4]. Apricot, scientifically known as *Prunus armeniaca* L., is a fruit belonging to the Rosaceae family. This particular fruit is classified as a stone fruit and is commonly found in mid hill and dry temperate areas, specifically in the north-western Himalayas of India (Raj *et al*., 2012) [5]. The composition of the fruit consists of various components such as esters, volatile compounds, dietary protein, oil, and fibers (Haciseferooullari *et al*., 2007) [6]. Notably, apricots have been found to possess several medicinal properties, including ophthalmic, emetic, antiseptic, and antipyretic effects (Pramer & Kaushal, 1982) [7]. Furthermore, these fruits are rich in bioactive compounds like anthocyanins, carotenoids, and antioxidant polyphenols, making them a valuable source of nutrition (Vinson & Zubik, 2005; Hooshmand &Arjmandi, 2009) [8, 9].

In recent times, the food industry has witnessed a significant development in the form of ready-to-drink (RTD) protein beverages that offer high nutritional value, particularly for muscle building and enhanced physical strength.

Typically, these protein beverages are prepared using whey, milk, soy, and egg protein, or a combination of these ingredients (Dairy Export Council, 2017) [10]. In this series of beverages eggnog is a rich, creamy beverage, traditionally popular during New Year parties and thanks giving days Day (Perry *et al*., 2009) [11]. The inclusion of apricot, with its diverse range of beneficial components, could potentially enhance the nutritional profile of such protein beverages. By incorporating apricot extracts or derivatives into these beverages, manufacturers can tap into the numerous health benefits associated with this fruit, thereby providing consumers with a more comprehensive and wholesome product. This innovation not only expands the options available to individuals seeking protein-rich beverages but also showcases the versatility and adaptability of apricots as an ingredient in the food industry. As, apricots possess a wide array of bioactive compounds and medicinal properties, making them a valuable fruit in the food industry. Incorporating apricot extracts into protein beverages could potentially enhance the nutritional value and overall health benefits of such products. This development signifies a significant advancement in the field of food technology and offers consumers a greater variety of options for meeting their nutritional needs and goals. Therefore, this preparation of innovative drink was undertaken to optimize the formulation and processing of apricot enriched dietetic egg nog as well as analysis of their physico-chemical and sensory attributes.

Materials and Methods

For the purpose of this particular study, the dried apricots were procured from the local market of R. S. Pura, Jammu, a region known for its rich agricultural produce. It is worth noting that apricots, which are a key ingredient in this research, underwent a meticulous process to ensure their suitability for experimentation. Firstly, they were subjected to boiling in water, which aimed to soften their texture and enhance their pulpiness. Subsequently, they were finely chopped, thus allowing for the extraction of their precious pulp. In a similar vein, the eggs that were employed in this study were acquired from the local market of R. S. Pura, Jammu, ensuring their freshness and reliability as a research component. Prior to their utilization, these eggs underwent a thorough disinfection process involving a 2% sodium hypochlorite solution. This step aimed to eliminate any potential contaminants and establish a safe and sanitary environment for experimentation. The eggs were then subjected to pasteurization at a temperature of 64 °C for a duration of 2.5 minutes, a process that further ensured their safety and suitability for consumption. Moreover, the fresh cow milk that was utilized in this research was procured from the esteemed dairy farm of SKUAST-J. To ensure its compliance with the research requirements, the milk was meticulously adjusted to contain 3.5% fat and 8.5% SNF (solids-not-fat) content. This adjustment aimed to harmonize the milk's composition with the other ingredients, allowing for accurate and reliable results. Furthermore, the milk was subjected to a standard boiling process followed by a cooling phase, which aimed to enhance its stability and longevity. It is noteworthy that all the chemicals employed in this study were of the highest quality and purity, as they were sourced from reputable and well-established firms renowned for their analytical-grade products, such as Qualigens, CDH, and Hi-media, among others.

Flow chart for preparation of dietetic egg albumin nog

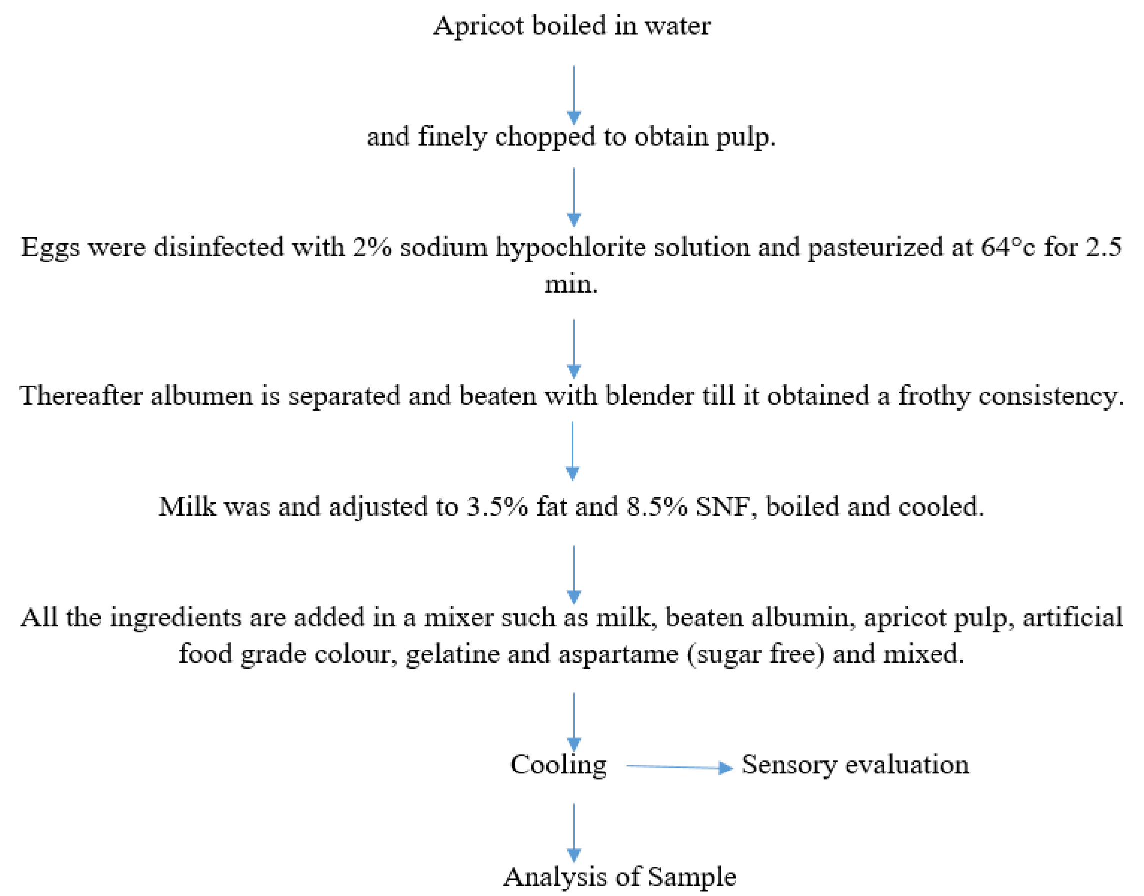

Table 1: Formulation of Apricot Enriched Dietetic Egg Nog

Ingredients	Control	T_1	T_2	T_3
Milk (ml)	100	100	100	100
Egg albumin (gm)	15	15	15	15
Gelatine (gm)	0.5	0.5	0.5	0.5
Sugar free tablet (gm)	0.1	0.1	0.1	0.1
Apricot (gm)	-	15	20	25

*T_1: 15% Apricot, T_2: 20% Apricot, T_3: 25% Apricot

Analytical procedures

The prepared eggnog was evaluated for proximate analysis i.e. moisture, fat, protein, fibre and carbohydrate. To determine the proximate composition of the samples, the widely accepted AOAC (Association of Official Analytical Chemists) methods from the year 1995 were employed. These methods provide a standardized and reliable framework for the analysis of various components within the samples under investigation. The crude protein content within the samples was determined using the Kjeldahl method, a highly reliable and accurate technique that involves the digestion of the sample and subsequent measurement of the nitrogen content. The crude lipid content, on the other hand, was determined using the Soxhlet method, which involves the extraction of lipids from the sample using an organic solvent. Finally, the ash content within the samples was determined by subjecting them to a high temperature of 550°C overnight in a muffle furnace, thereby ensuring the complete combustion of organic matter and leaving behind only the inorganic residue. In order to obtain accurate and comprehensive data, various analytical techniques were employed throughout this study. Firstly, the moisture content of the samples was determined by subjecting them to a rigorous drying process in a hot air oven. This process involved exposing the samples to a temperature of 105°C for a duration of 4 hours, or until a state of constant weight was achieved. This meticulous approach aimed to eliminate any residual moisture from the samples, ensuring precise and reliable measurements. Additionally, the carbohydrate content of the samples was calculated using the difference method, which involves determining the weight of all other components present in the sample and subtracting it from the total weight of the sample. This approach allows for the accurate quantification of the carbohydrate content, a crucial parameter for assessing the nutritional composition of the samples.

Sensory evaluation

In order to assess the sensory properties of the finished product, a sensory evaluation was conducted. This evaluation involved the participation of sensory panellists who were expert faculties in the field from the SKUAST-J University. These panellists were carefully selected based on their extensive knowledge and experience in sensory evaluation methodologies. The input and insights provided by these panellists were instrumental in evaluating the organoleptic characteristics of the finished product. It is worth mentioning that the study conducted by Gorachiya *et al*. in 2018 served as a valuable reference and benchmark (8-point descriptive scale) for the sensory evaluation process. Their research findings and methodologies were utilized to ensure the accuracy and reliability of the sensory evaluation conducted in this study.for colour and appearance, odour, taste, aftertaste, consistency and overall acceptability.

Fig 1: Apricot enriched dietetic egg albumin Nog

Statistical analysis

The statistical analysis of the obtained results was conducted by employing the technique of analysis of variance (ANOVA) and the least significant difference (LSD) test. This analytical procedure was carried out using the highly renowned software of statistical package for social sciences (IBM SPSS Statistic 20), which is widely recognized for its reliability and accuracy in data analysis. It is worth mentioning that the methodology followed for this analysis was in accordance with the guidelines provided by Snedecor and Cochran (1994) [14]. In order to ensure the validity and rigor of the findings, a significance level of 95% was set, which is a commonly accepted threshold for determining the statistical significance of the results.

Results and Discussion

The results of present study were presented in table 2 and 3.

Proximate analysis of apricot enriched dietetic egg albumin nog

Effect of apricot on moisture content of dietetic egg albumin nog

The outcomes of the statistical analysis revealed a noteworthy and statistically significant decrease ($p<0.05$) in the moisture content as the proportion of apricot pulp in the mixture with milk increased. As shown in figure 2 that the decrease in moisture content can be attributed to the concurrent increase in the total solid content. This finding is consistent with the observations made by El-Sayed and Ramadan (2019) [15] in their study on fermented rice milk beverage that contained 20% physalis pulps, which exhibited a higher solid content. This suggests that the increase in apricot pulp in the mixture contributes to a denser and more concentrated composition, resulting in reduced moisture content.

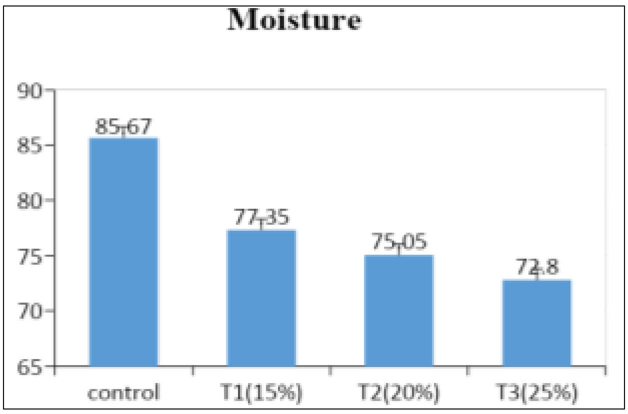

Fig 2: Effect of apricot on moisture content of dietetic egg albumin nog

Effect of apricot on ash and fibre content of dietetic egg albumin nog

The result revealed as shown in figure 3 that ash content was increased as apricot pulp was increased. T_3 has highest amount of ash content as it having more apricot pulp that is 25%. The observed increase in the total solid content can be attributed to the higher mineral content present in apricot pulp, as indicated by the research conducted by Ahmed *et al.* (2020) [16]. Their study emphasized the significance of the mineral composition of apricot pulp, which is likely to contribute to the overall solid content of the mixture. Furthermore, the analysis of crude fiber content revealed a positive correlation with the percentage of apricot pulp in the mixture. This increase in crude fiber content can be explained by the higher percentage of fiber present in apricot pulp. This finding is supported by the research conducted by Ali *et al.* (2015) [17], who reported that apricot pulp contains approximately 11.50% crude fiber.

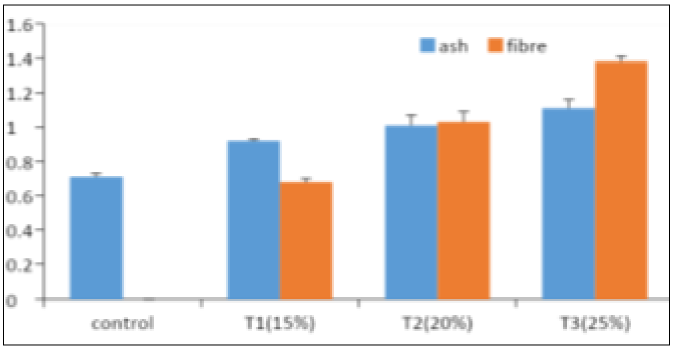

Fig 3: Effect of apricot on ash and fibre content of dietetic egg albumin NOG

Effect of apricot on Fat, Protein & Carbohydrate of dietetic egg albumin nog

The outcome of the study indicated as shown in figure 4, that the control sample exhibited the highest fat content, while no statistically significant difference was observed among the T1, T2, and T3 samples ($p>0.05$). The fat content slightly decreased with the addition of apricot pulp, which is known to contain a fat content ranging from 0.4-0.6% according to a study by Fatima *et al*. in 2018 [7]. Notably, this fat content is lower than that of milk. Although a slight change was observed in the protein content, it did not reach a level of statistical significance. A little bit change was recorded in content of protein, but significant difference was not was observed. Carbohydrate content was found maximum in $T_3$and it was increased with the increasing amount of apricot pulp. Apricot pulp is not only the good source of fibre and minerals but also sugars. (Butt *et al*., 2015) [19].

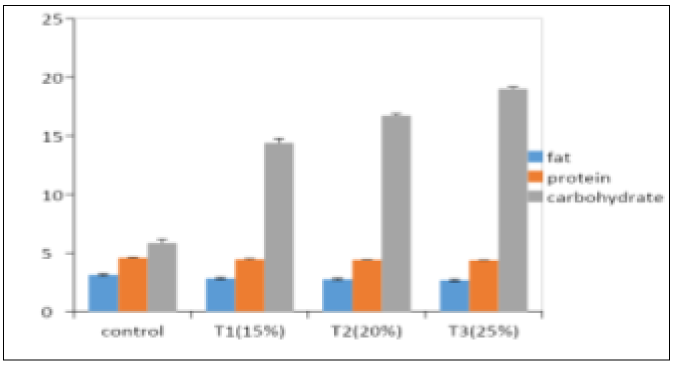

Fig 4: Effect of apricot on Fat, Protein & Carbohydrate of dietetic egg albumin nog

Sensory evaluation of apricot enriched dietetic egg albumin nog

A panel of judge evaluated the egg albumin nog for colour and appearance, odour, taste, after taste, consistency and over all acceptability. As shown in the figure 5 that the egg albumin nog had 20% apricot pulp, was found highly accepted by the panellist. Ashraf *et al*, (2018) [20] have also conducted a study in which they made an interesting observation that the incorporation of apricot powder at a level of 18% in the preparation of dough for the formation of nut crackers resulted in a highly acceptable product. This finding provides valuable insights into the potential applications of apricot powder in the food industry. Furthermore, Mohamed and Shalaby (2016) [21] have also reported their observations on the acceptance of a spreadable processed cheese analogue that was made with the highest percentage of apricot pulp, which was 30%. The study found that this particular product was mostly accepted by consumers due to its highly desirable sensory attributes. This finding highlights the importance of apricot pulp in enhancing the sensory qualities of food products. Additionally, the taste of apricot is primarily influenced by the presence of sugars and organic acids, while the aroma is determined by a wide range of volatile organic compounds (VOCs) (Xi *et al*., 2016) [22]. These VOCs play a crucial role in the overall sensory experience of apricot-based products. In fact, more than 80 aroma compounds have been identified in the volatile fraction of apricots, with terpenes, esters, lactones, aldehydes, and alcohols being the main chemical families. This extensive range of aroma compounds further underscores the complexity and richness of apricot's sensory profile. Moreover, it is important to note that volatile compounds have a direct impact on the sensory quality of both fresh and processed fruit products, particularly in terms of their odour, aroma, and flavour. Understanding the composition and role of these volatile compounds is essential for developing high-quality apricot-based products that meet consumer expectations (Dragovic-Uzelac *et al*., 2005) [23].

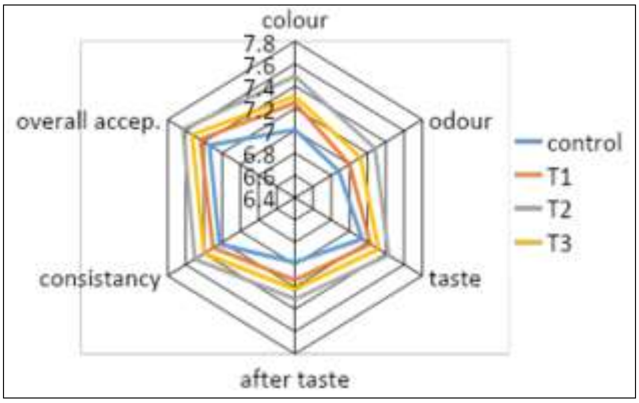

Fig 5: Effect of different levels of apricot on Sensory attributes of dietetic egg albumin nog

Table 2: Proximate analysis of apricot enriched dietetic egg albumin nog

Parameters	Control	T_1 (15%)	T_2 (20%)	T_3 (25%)
Moisture	85.67±0.38^{d}	77.35±0.34^{c}	75.05±0.16^{b}	72.80±0.24^{a}
Fat	3.13±0.05^{b}	2.83±0.04^{a}	2.75±0.05^{a}	2.67±0.07^{a}
Protein	4.59±0.02^{b}	4.45±0.04^{ab}	4.42±0.06^{ab}	4.39±0.08^{a}
Ash	0.71±0.02^{a}	0.92±0.01^{b}	1.01±0.06^{bc}	1.11±0.05^{c}
Fibre	-	0.68±0.02^{b}	1.03±0.06^{c}	1.38±0.03^{d}
carbohydrate	5.86±0.33^{a}	14.42±0.34^{b}	16.74±0.17^{c}	19.02±0.16^{d}

Mean ± SE* with different superscripts in a row wise (lower case alphabet) differ significantly ($p<0.05$). n = 6 for each treatment

Table 3: Score for Sensory evaluation of apricot enriched dietetic egg albumin nog

Parameters	Control	T_1 (15%)	T_2 (20%)	T_3 (25%)
Colour and appearance	7.01±0.07^{a}	7.25±0.05^{b}	7.49±0.04^{c}	7.31±0.05^{b}
Odour	6.88±0.07^{a}	7.00±0.06^{ab}	7.28±0.04^{c}	7.12±0.05^{bc}
Taste	7.14±0.06^{a}	7.23±0.06^{ab}	7.43±0.04^{c}	7.32±0.05^{c}
After taste	6.98±0.06^{a}	7.14±0.05^{ab}	7.31±0.05^{b}	7.22±0.06^{b}
Consistency	7.23±0.05^{a}	7.30±0.05^{ab}	7.50±0.03^{c}	7.40±0.03^{bc}
Over all acceptability	7.34±0.06^{a}	7.44±0.05^{ab}	7.63±0.02^{c}	7.53±0.03^{bc}

Mean ± SE* with different superscripts in a row wise (lower case alphabet) differ significantly ($p<0.05$).
n = 21 for each treatment.

Conclusion

In order to determine the optimum level of apricot incorporation, three levels of apricot (15%, 20%, and 25%) were tested. Based on sensory evaluation and physicochemical parameters, it was found that 20% apricot pulp yielded the most favourable results. The following observations were made: moisture content was approximately 85%, fat content was approximately 2.75%, protein content was approximately 4.42%, ash content was approximately 1%, dietary fiber content was approximately 1.03%, and carbohydrate content was approximately 5.8%. Consequently, the 20% level of apricot pulp was selected based on its favourable physicochemical and sensory attributes. Furthermore, the developed egg-based drink has the capacity to be stored for up to 5 days under refrigerated conditions. This drink is particularly noteworthy due to its high protein content.

References

1. BAHS. Government of India. Ministry of Agriculture and Farmers Welfare, Department of Animal Husbandry. New Delhi; c2023.
2. Huopalahti R, Fandino RL, Anton M, Schade R. Bioactive Egg Compounds. New York: Springer; c2007. p. 3-66.
3. Abeyrathne EDNS, Lee HY, Ahn DU. Egg white proteins and their potential use in food processing or and as nutraceutical and pharmaceutical agents- A review. Poultry Sci. 2013;92:3292-3299.
4. Stadelman WJ, Cotterill OJ. Egg Science and Technology. 4th ed. Westport, CT: Avi. Publ. Co.; c2001.
5. Raj V, Jain A, Chaudhary J. *Prunus armeniaca* (Apricot): An overview. J Pharm Res. 2012;5(8):3964-3966.
6. Haciseferooullari H, Gezer I, Ozcan MM, Asma BM. Postharvest chemical and physical mechanical properties of some apricot varieties cultivated in Turkey. J Food Eng. 2007;78:364-373.
7. Pramer C, Kaushal MK. Wild Fruits of Sub Himalayan Region. New Delhi, India: Kalyani Publishers; c1982.
8. Vinson JA, Zubik L. Dried fruits: excellent in vitro and in vivo antioxidants. J Am Coll Nutr. 2015;24(1):4-50.
9. Hooshmand S, Arjmandi BH. Dried plum, an emerging functional food that may effectively improve bone health. Ageing Res Rev. 2009;8(2):122-7.
10. Dairy Export Council. U.S. Dairy proteins and permeates in ready-to-drink beverages [Internet document]. Available from: http://www.thinkusadairy.org. 2020 Dec 25.
11. Perry A, Rasmussen H, Johnson EJ. Xanthophyll (lutein, zeaxanthin) content in fruits, vegetables and corn and egg products. J Food Compos Anal. 2009;22:9-15.
12. AOAC. Official methods of analysis. 16th ed. Washington, DC: Association of Official Analytical Chemists; c1995.
13. Gorachiya PR, Bais B, Kumar D, Devi D. Study of Formulation, Sensory Evaluation, Antioxidant Potential and Storage Study of Watermelon Based Whey Beverage from Camel and Buffalo Milk. J Anim Res. 2018;8(6):1075-1079.
14. Snedecor GW, Cochran WG. Statistical Methods. Calcutta, India: Oxford and IBH Publishing Co.; c1980.
15. El-Sayed H, Ramadan MF. Production of probiotic-fermented rice milk beverage fortified with cactus pear and physalis pulp. Zagazig J Agric Res. 2020;47(1):165-177.
16. Ahmed A, Raza A, Khalid N, Malik AM, Asghar M, Muhammad H, *et al*. Development of apricot (*Prunus armeniaca* L.) powder and its food application. J Pure Appl Agric. 2020;5(2):26-33.
17. Fatima T, Bashir O, Gani G, Bhat T, Jan N. Nutritional and health benefits of apricots. Int. J Unani Integr. Med. 2018;2(2):05-9.
18. Ali S, Masud KS, Abbasi T, Mahmood A, Hussain A. Apricot: Nutritional Potentials and Health Benefits: A Review. Ann Food Sci Technol. 2015;16(1):175-189.
19. Butt MS, Suleria HA, Ahmed W. Physicochemical Behavior of Zinc-Fortified, Sodium Caseinate-Based, Edible-Coated Apricots during Storage in Controlled Atmosphere. J Food Process Preserv. 2015;39(6):2431-41.
20. Nadeem M, Haseeb M, Aziz Awan J. Development and physico-chemical characterization of apricot-date bars. J Agric Res. 2012;50(3):409-421.
21. Ashraf U, Bandral JD, Sood M, Rafiq S, Sharma S. Effect of replacement of wheat flour with apricot powder on nutritional and sensory quality of nut crackers. Pharma Innovation. 2018;7(5):695.
22. Mohamed AG, Shalaby SM. Texture, chemical properties and sensory evaluation of a spreadable processed cheese analogue made with apricot pulp (*Prunus armeniaca* L.). Int J Dairy Sci. 2016;11(2):61-8.
23. Xi W, Zheng H, Zhang Q, Li W. Profiling taste and aroma compound metabolism during apricot fruit development and ripening. Int J Mol Sci. 2016;17(7):998.
24. Dragovic-Uzelac V, Delonga K, Levaj B, Djakovic S, Pospisil J. Phenolic profiles of raw apricots, pumpkins, and their purees in the evaluation of apricot nectar and jam authenticity. J Agric Food Chem. 2005;53(12):4836-42.