Nutritional Values and Some Physicochemical Properties of JellyPrepared from *Malusdomestica*Borkh.(Apple)

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Abstract

Apple (*Malusdomestica*Borkh.) is one of the most commonly cultivated trees and fruits in the world. When apple are plentiful, they can be perishable according to their shelf-life so apple jelly can be made. This jelly can be used as dessert and snacks freshly or preserved by using sodium benzoate for longer shelf life. Thus, the research was conducted by making jelly from apples via extraction of juice and can be substituted in place of ready-made jelly sold in market which is not suitable for consumers especially children. The fresh and mature apples were collected from ZayGyi market of Pyay Township in Bago Region, Myanmar and apple jelly was made to be safe, fresh, nutritious, healthy and acceptable food to consumers. The proximate analysis of the nutritional values was carried out by AOAC methods. Some physicochemical properties (pH, acidity, vitamin C and total soluble solid) were determined by standard reference methods and mineral contents by AAS method.This work could be implemented for the development in production of traditional foods and found to be nutritious like raw apples.

Keywords: Apple(*Malusdomestica*Borkh.), jelly, nutritional values, physicochemical properties, minerals

Introduction

Jellies are made from the strained juice of fruit. Jelly should be crystal clear and shimmering. It should hold its shape but be soft enough to spread. Jelly can come in a variety of flavors such as strawberry jelly, apple jelly, pamelo jelly and much more. It is typically eaten with a variety of foods. This includes jelly with toast or peanut, butter and jelly sandwich. Good jelly is clear and sparkling and has a fresh flavour of the fruit from which is made (Wiki, 2014).Apple fruits (*Malusdomestica*Borkh.) are plentiful and also popularizing in Myanmar, they are nutritious fruits, they can be perishable according to their shelf-life so apple jelly can be made. This apple jelly can be preserved by using suitable amount of sodium benzoate and it can be used as dessert and snacks. The aim of this work is to study the changes of nutritional values, physicochemical properties and mineral contents in the preparation of apple jelly and to provide healthy, safe product for consumers. This prepared jelly can be substituted in place of ready-made jelly sold in market which is not suitable for consumers especially children.

Materials and Methods

In this research, the chemical used throughout the experiments were analytical and reagent grade. They were procured from British Drug House (BDH) chemicals Ltd., Poole, England. All standard solutions and all other diluted solutions throughout the experimental runs were prepared by using deionized water. The apparatus used in this work were conventional lab glassware and modern equipment.

Sample collection

Mature apple fruits (*Malusdomestica*Borkh.) were collected from ZayGyi market of Pyay Township in Bago Region, Myanmar.

Preparation of applejelly

Processing for apple jelly, the whole apple fruits was washed to remove dirt then peeled the skin. After removing the skin, cut into small pieces and 1000g of fruits wereblended with a fruit processor and filtered to yield juice. A 700 mL of apple juice was added into the container and heated about 10 min at 160°C until the solution was boiled. After that, 300 g of sugar, 0.2 g of citric acid, 0.3 g of sodium chloride and 0.02 g of sodium benzoate were added into the container and added distilled water to make up 1 L. The solution was thoroughly stirred all ingredients until dissolved and was added solution containing 10 g of compound thickener and 5 drops of flavour. The mixture was heated and stirred about another 15 minutes and then cooled and poured into the cup. It was cooled about 30 minutes; finally, 1090 g of the apple jelly was obtained (Rasheda, 2011 and Waing Maw, 2014).

Figure1. Photos of apples, prepared apple jelly and jelly cups

Determination of nutritional values, some physicochemical properties and minerals

The nutritional values were determined by AOAC methods (Horwitz, W., 1980). Ascorbic acid content was determined by iodometric titration (Dereje, A. B. and Girma, S. G., 2015). Acidity was determined by simple titration method.Some minerals as Ca, Zn,Mg, K, P and Fe contents in samples were determined by AAS method.

Results and Discussion

Nutritional values of apple and prepared apple jelly

The nutritional values (water, ash, protein, fat,fibre and carbohydrate) in samples were determined by AOAC methods. Water is substrate of biological reactions or acts as the matrix or vehicle in which these reactions take place. It regulates the temperature and pH in the human body and maintains cell and tissue integrity. The water contents of apple and prepared apple jelly were carried out by oven drying method. The water content of apple fruit (84.31%) was higher than that of the prepared apple jelly (66.09%).

The ash content of apple and prepared apple jelly were carried out by using muffle furnace. The ash content of apple (0.25%) was lower than that of the prepared apple jelly (0.77%). Higher ash content of jelly may be due to inorganic ingredients such, NaCl andsodium benzoate added in the preparation of jelly.

Protein is necessary for building and repairing of body tissues. It also acts as transport nutrients which strengthen the immune system. The protein contents of

apple and prepared apple jelly were carried out by Macro-Kjeldahl method. The protein content of apple (0.11%) was higher than that of the prepared apple jelly (0.06%).

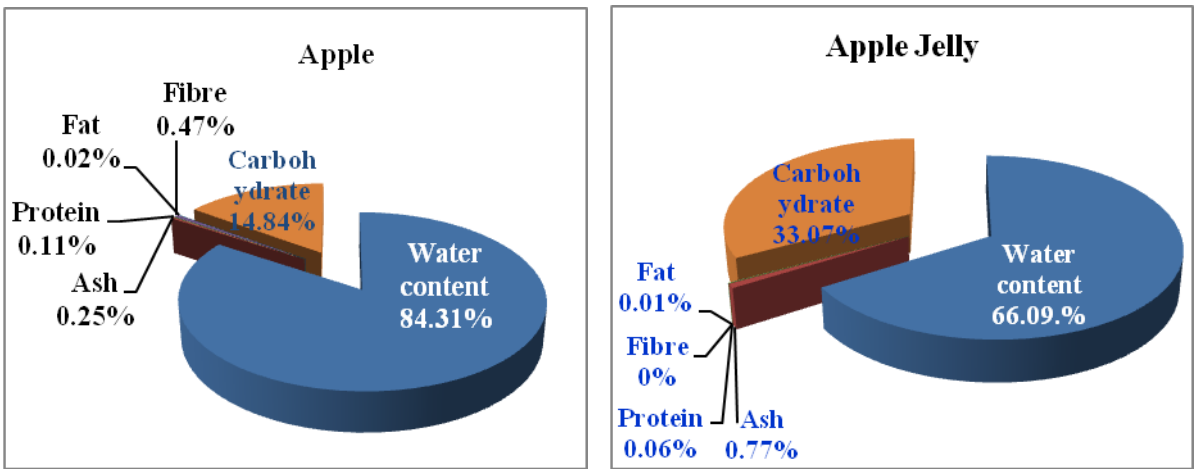
The fat contents of apple and prepared apple jelly were carried out by Soxhlet extraction method. The fat content of apple (0.02%) was higher than that of the prepared apple jelly (0.01%).The fibre contents of apple and prepared apple jelly were carried out by acid-base treatment method. The fibre content of apple (0.47%) and there is no fibre in prepared apple jelly.

The carbohydrate content was determined by using the difference between 100 and sum of percent of water, ash, protein, fibre and fat. The un-expectable data of carbohydrate content is due to using different method. This method is especially used

No.	Parameters	Values (%)	
		Apple	Apple Jelly
1	Water content	84.31	66.09
2	Ash	0.25	0.77
3	Protein	0.11	0.06
4	Fibre	0.47	0.00
5	Fat	0.02	0.01
6	Carbohydrate	14.84	33.07

in determination of total carbohydrate content of food that is sufficiently accurate for practical nutrition work. The carbohydrate content of apple (14.84%) was lower than that of the prepared apple jelly (33.07%). The observed data are listed in Table 1.The pie graphs ofnutritional values of apple fruits and prepared apple jelly were shown in figures 2 (a) and (b).The energy value of apple was 60 kcal where jelly was 132 kcal, so eating jelly gives more energy than that of fruits.

Table 1 Nutritional Value of Apple and PreparedApple Jelly



(a) (b)

Figure 2 Nutritional values of (a) apple (b) prepared apple jelly

Some physicochemical properties of apple and prepared applejelly

No.	Parameters	Values	
		Apple	Apple Jelly
1	pH	4.31	4.42
2	Total Soluble Solid (°Brix)	12.50	40.00
3	Acidity (mL of 0.1N NaOH/100g sample)	38.98	46.17
4	Vitamin C (mg/100g)	44.00	12.60

The pH, acidity, ascorbic acid and total soluble solid (TSS) contents in samples were determined and the observed data are listed in Table 2. The variations in pH, total soluble solid, acidity and vitamin C content of apple fruits and prepared apple jelly were shown in figures 3 (a, b, c and d).The pH of apple fruit (4.31%) was lower than that of the prepared apple jelly (4.42%).The acidity of apple fruit (38.98mL of 0.1N NaOH/100g) was lower than that of the prepared apple jelly (46.17 mL of 0.1N NaOH/100g).The ascorbic acid content of apple fruit (44.00 mg/100g) was higher than that of the prepared apple jelly (12.60 mg/100g).The total soluble solid of apple fruit (12.50 °Brix) was lower than that of the prepared apple jelly (40.00°Brix).

Table 2 Some Physicochemical Properties of Prepared Apple and Apple Jelly

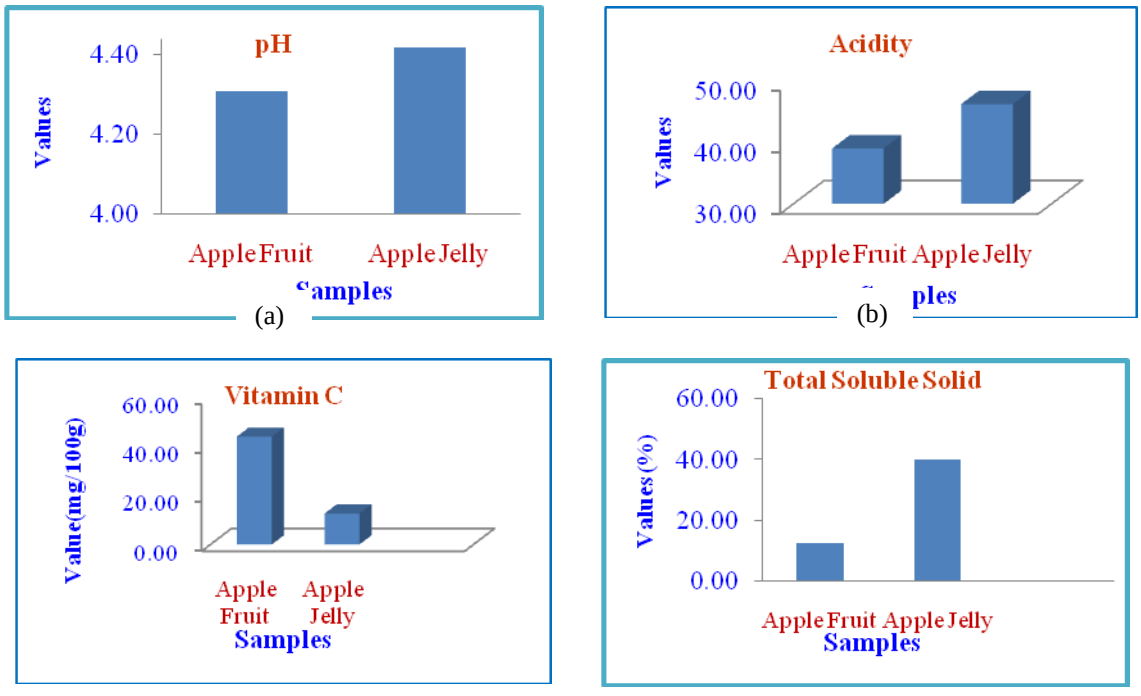


Figure 3. Variation in (a) pH (b) acidity (c) vitamin C (d) total soluble solid of apple and prepared apple jelly

Minerals contents

The variation in minerals content of apple fruits and prepared apple jelly was studied by AAS method and the resultant data were shown in Table 3 and Figure 4. Calcium keeps the nervous system, muscle function and needed for blood clotting. Calcium content of apple fruit (156.61ppm) was higher than that of the prepared apple jelly (135.79ppm).Zinc is an essential mineral, and it supports healthy immune system and also a requirement for the senses of smell and taste. Zinc content of apple fruit (1.09ppm) was higher than that of the prepared apple jelly (0.04ppm).Magnesium helps regulate blood glucose levels and aid in the production of energy and protein. Magnesium content of apple fruit (39.53ppm) was higher than that of the prepared apple jelly (14.49ppm). The potassium and vitamin C have important roles to play in our overall cardiac health. Potassium is a maintaining rhythm and function of all the muscles in our body including heart. The valence of this rhythm is maintained by potassium. Apart from muscle function the vitamin C in apple help in growth and repair of body tissues and cartilage resulting in healthy blood vessels .This way together potassium and vitamin C regulate blood pressure and help in normalizing the blood flow through the body. Potassium is plentiful in apple. Potassium content of apple fruit (1254.00 ppm) was lower than that of the prepared apple jelly (1333.00 ppm).Phosphorous is an essential mineral primarily used for growth and repair body cells and tissues. Phosphorus content of apple fruit (17.03ppm) was higher than that of the prepared apple jelly (2.17ppm).Iron helps to transport oxygen around the body making it essential for life and also producing energy, optimal immune function and strong oxygen in our muscles. Iron content of apple fruit (0.59ppm) was lower than that of the prepared apple jelly (1.72ppm).

Table 3.Minerals Content of Apple andPrepared Apple Jelly

No.	Minerals	Concentration (ppm)	
		Apple	Apple Jelly
1	Ca	156.61	135.79
2	Zn	1.09	0.04
3	Mg	39.53	14.49
4	K	1254.00	1333.00
5	P	17.03	2.17
6	Fe	0.59	1.72

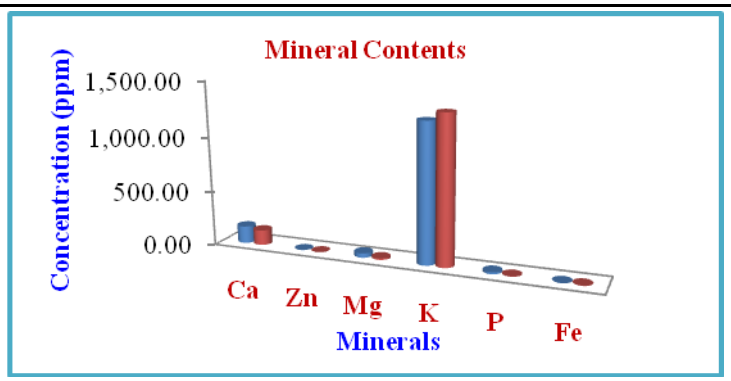


Figure 4.Variation in minerals content of apple and prepared apple jelly

Conclusion

This study showed that acceptable apple jelly was prepared from apple (*Malusdomestica*Borkh.). The main aim of this work is to find out the nutritional values, physicochemical properties and minerals content of original apple and prepared apple jelly for provide to consumers. According to the nutritional value results, high water content was found both of apple and prepared apple jelly. The prepared apple jelly gives more carbohydrate and energy than apple to consumers. From the results of the physicochemical properties (pH, acidity, vitamin C and total soluble solid) of apple and prepared apple jelly, both of them are acidic food but the former has higher source of vitamin C and lower in soluble solid than the later. According to the mineral (Ca, Zn, Mg, K, P and Fe) point of view, they provide multiple health benefits to consumers. These results would be implemented in any way for the development in production of traditional foods. When apple are plentiful, they can be perishable according to their shelf-life so apple jelly can be made. This apple jelly can be used as fresh dessert and snacks in the place of ready-made fast food. The process of making this apple jelly will do a better job in retaining the taste, appearance, and nutritive value of fresh fruit and also helpful to our health.

Acknowledgements

The authors wish to meditate Professor, DrTun Cho, Head of Department of Chemistry, Pyay University, for his kind provision of opportunity to do this research work.

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