Academic Journal of Nutrition 1 (2): 10-13, 2012
ISSN 2309-8902

DOI: 10.5829/idosi.ajn.2012.1.2.55100

Vitamin Changes in Sweets with Time and Storage Conditions

[1]N.R. Jayalakshmi, [2]D.N. Saraswathi Raman and [1]B Vijaya

[1]Department of Microbiology and Biotechnology, Research Scholar,
Bangalore University, Jnana Bharathi Campus, Bangalore, India
[2]Department of Botany, St. Joseph's Post Graduate and Research Centre, Bangalore-27, India

Abstract: Vitamin changes associated with different temperature and period of storage were measured in sweets rasmalai and badam pista roll. A comparative study was done between these sweets from two different sweet marts. With standard colorimetric techniques the analysis was carried out and by applying statistical methods the variations were tabulated. The vitamin content (niacin and ascorbic acid) decreased with increase in temperature and storage period in accordance with moisture and pH.

Key words: Malnutrition · Milk based and khoa based sweets · Fortification · Moisture · Storage period

INTRODUCTION

Every mineral and vitamins are essential for proper metabolism of the organism. The proportion of each fuel liberation and utilization as an energy source solely depends on the tissue, dietary intake and the hormonal state. Even a minor change in the dietary intake routinely or any malnutrition creates havoc in the body's metabolic activities leading to diseased condition [1]. The recommended daily dietary intakes give the moderate intake for different categories. Although many a times the recommendations are followed, the need for proper nutrient is not fulfilled. The main reason is the loss of nutrients, mainly vitamins during processing, cooking and storage [2, 3], when they pass into water used for soaking or cooking or into drip loss ways like thawing. Water-soluble vitamins niacin and vitamin C are heat labile and get oxidized upon exposure to air and they become inactive after combining with certain food additives or environmental contaminants [4]. This suggests the requirement of food processing after preparation, to meet the needs of the nutrients. Many processed foods, including sweets are already available in market with numerous plant ingredients, shown to be beneficial in disease prevention. In addition to this, the preservation of valuable nutrients during storage is also under process. Thus, according to the dietary guidelines, one should try to eat different forms of food to have all the nutrients required. The guidelines even suggest going easy with milk and milk based sweets [5-8].

Traditional milk based products are of great importance as nutritional supplements since several years and now many milk based sweets like burfi, kalakhand, gulabjamun, rasmalai, rasgolla, basundi, kalajamun etc. contribute much of dairy requirements of the population [9]. Studies on storage limitations, nutrient changes and physiological changes such as texture, appearance, flavor, aroma, pH, moisture etc. and microbial growth during storage are highly useful. Results of such studies help us in effective usage of sweets as nutrient source.

The present work aimed in analyzing the variations in vitamin content at different storage conditions.

MATERIALS AND METHODS

The research study was undertaken with two sweets, Rasmalai and Badam pista roll; milk based (channa and khoa) sweets. The sweets were purchased from two famous sweet marts AB and AND, Bangalore.

The extraction and estimation of niacin and ascorbic acid was done by using following procedures. Ascorbic acid was extracted with oxalic acid and estimated by di-nitro phenyl hydrazine method and Niacin was extracted with sulphuric acid treatment and estimated by using cyanogen bromide method [10].

The variations in sweets with reference to ascorbic acid and niacin contents were analyzed with a statistical ANOVA test. The values were analyzed with F-table, where two criteria H0 and H1 are compared with (3,6) and (2,6) degrees of freedom at 5% and 1% consideration [11].

Corresponding Author: N.R Jayalakshmi, Department of Microbiology and Biotechnology, Research Scholar, Bangalore University, Jnana Bharathi campus, Bangalore, India.

RESULTS AND DISCUSSION

Data of ascorbic acid and niacin contents are represented in fig. 1 a, b, c, d and fig. 2 a, b, c, d for two different sweet marts AB and AND.

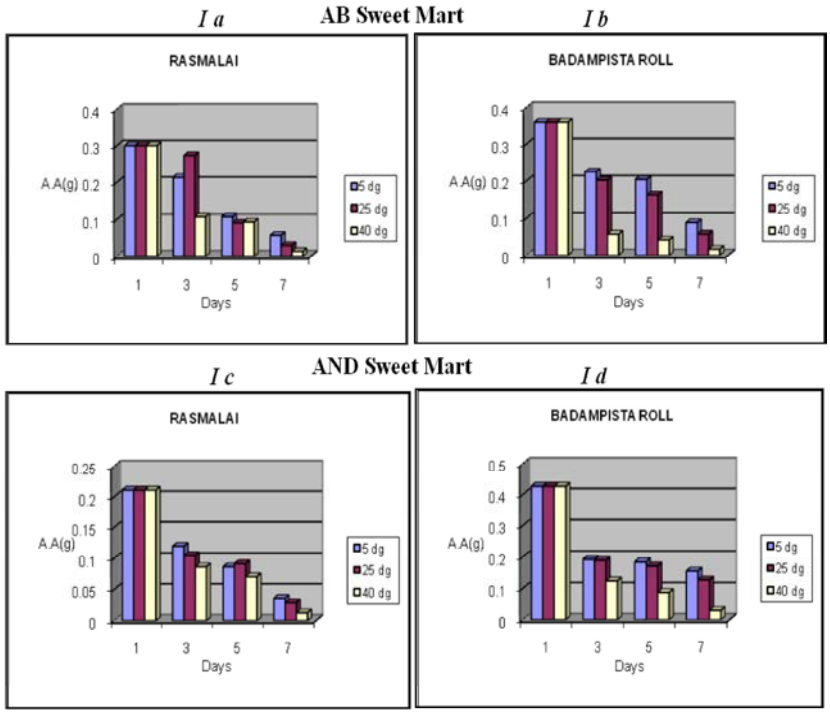
The ascorbic acid content varies according to days and temperature. As the days of storage increases, there was a decrease in the ascorbic acid content. This decrease varies according to temperature, at 5°C the decrease is gradual and at 25°C there is moderate decrease. At 40°C there is rapid decrease in vitamin content, till third day the vitamin content remains quite stable, but later on at 40°C there is a rapid decrease and at seventh day there is very negligence level of vitamin.

The niacin content also decreased with increased storage period, similar to that of ascorbic acid. There is significant decrease in the values with two sweets of two different sources. Niacin is found to be more stable than ascorbic acid [12]. The result of the present study also indicated the same. Among the different temperatures, 5°C was found to be the best for storage, even with the increased storage period.

The two sweets from two sources show similar variations. There was a significant difference in the vitamin content between days, when compared to that of different temperature. The ascorbic is a fragile molecule. When exposed to minor environmental stress/changes their activity is ceased [12]. So, this relates directly with the result obtained in the present study with temperature and different period of storage, there is a significant decrease in the vitamin C content. The oxidation reactions lead to further degradation of all nutrients that are present [13]. This directly leads to the total loss of nutrients.

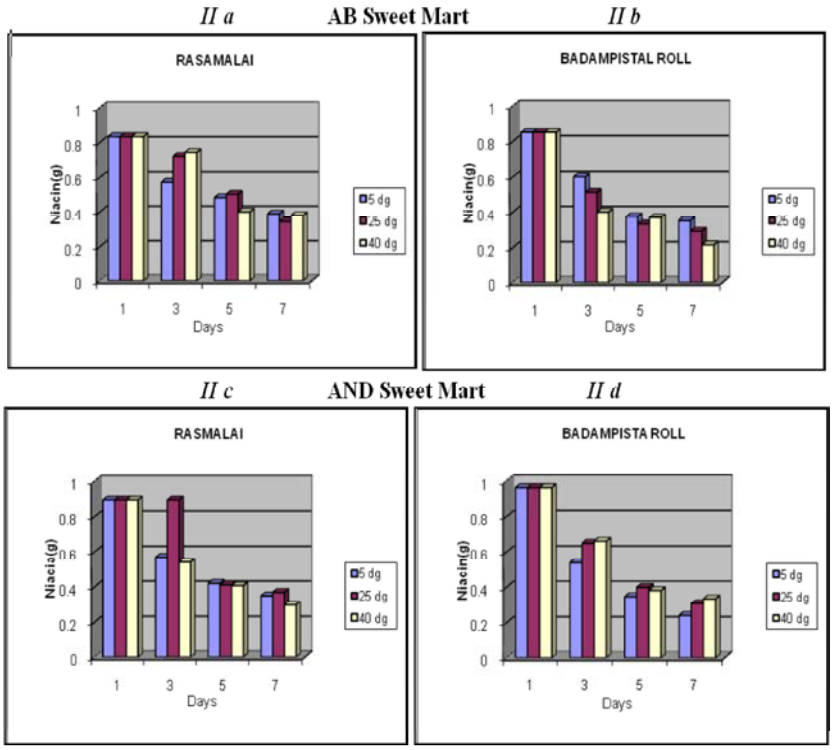
The vitamin loss is lesser at 5ºC, when compared with 25ºC and 40ºC. This is due to maintenance of moisture content and inherent pH. The moisture/water content of the sweet also determines the nutrient quality. If the moisture content keeps decreasing as the storage continues, it results in loss of nutrients [13]. The refrigerated foods maintain the moisture content, whereas water is crystallized, which again in turn do not allow any microorganisms to grow. This results in the nutrient maintenance of the sweets. So, with higher moisture content, more the freshness of food is maintained and vice versa with higher moisture, the same with the variation in pH [14].

The inherent pH of the food varies, although most foods are neutral/acidic. When the food is stored at temperature around 25-35°C (normal room temperature), there is a tendency of microbial attack, which in turn induces the changes pH. The foods with the near to the neutral/acidic pH gets readily spoiled by bacteria.



Dg-degree celsius

Fig. 1a,1b,1c,1d, Variations In Niacin Content Influenced By Temperature And Storage Period



Dg-degree Celsius

Fig. 1a,1b,1c,1d, Variations In Niacin Content Influenced By Temperature And Storage Period

The food with low pH (below 4.5) gets readily spoiled by yeasts and molds. All milk based and khoa based sweets have a pH nearer to neutral / slightly acidic and hence bacteria attack the food upon storage. This enhances the reduction of pH and allows other organisms to grow [15]. Rasmalai with all parameters studied shows decrease in its nutrients and the decrease is quite rapid, as it is purely milk based. The sudden increase or decrease in its nutrient content is mainly attributed to its contact with ras (milk), as ras is mainly prone to bacterial attack. Thus sweet, if it has to be consumed as whole, then within 24 hours of its preparation it should be used to have nutrient value at its best.

Badam pista roll also shows decrease in the nutrient content upon incubation at different temperature for a particular storage period of time. But the decrease or increase is not very rapid, a gradual/narrow variation is observed. This further increase in the contents is also very narrow, indicating the lesser microbial activity. So, with these variations, this sweet can be stored at any temperature for 3-4 days and then it can be consumed. However there is a gradual nutrient loss with storage.

Hence, there is a need to have uniformity and maintenance of nutrient at the optimum level by the manufacturers. The quality control is highly essential to maintain the stability and uniformity at each and every point of production. Processing and fortifying sweets are essential to maintain all the nutrients, especially vitamins to prevent the malnutrition after consumption of sweets [16].

CONCLUSION

The result of the present study indicates the changes associated with storage under different condition such as temperature and period of storage. The study also indicates the loss of nutrients and there by questioning the authenticable nutrient value of sweets.

ACKNOWLEDGEMENT

I am grateful to Dr. K. Natarajan, K.C. Das Research Labs. for his advice on methods for analysis and providing the fresh samples for analysis.

I also extend the sincere thanks to ARID (Adarsh Research Institute for Development), Bangalore, for allowing doing the above project with funding.

REFERENCES

1. Jones, P.J., D.E. MacDougall, F. Ntanios and C.A. Vanstone, 1997. Dietary phytosterols as cholesterol-lowering agents in humans. Canadian J. Physiology and Pharmacol., 75: 217-227.
2. Recommended Dietary Allowances, 1997. 1998 and 2000. Recommended Daily Dietary intakes. Standing committee on the scientific evaluation of Dietary Reference intakes.
3. Carrolyn, D.B., 1997. CRC Desk reference for nutrition. CRC Press. LLC.
4. Deeds, F., 1959. Time - temperature tolerance in frozen foods. J. Am. Dietet. Assor., 35: 128-130.
5. Douglass, J.S., R.H. Matthews and F.N. Hepburn, 1982. Composition of foods and breakfast cereals. Agricultural Handbook, USDA, Washington D.C., 8-1: 8.
6. Anderson, B.A., 1983. Conserving Nutritional Values in Foods. Home Garden Bulletin, USDA, Washington D.C., pp: 90.
7. Reeves, J.B. and J.L. Weihrauch, 1979. Composition of foods, fats and oils. . Agricultural Handbook, USDA, Washington D.C., 456: 8-4.
8. McCarthy, M.A. and R.H. Matthews, 1984. Composition of Foods, Nut and Seed Products: Dietary Guidelines for Americans. Agricultural Handbook, USDA, Washington D.C., 137: 8-12.
9. Monica, C.S., 2001. Fortification with nutrients like vitamin-niacin on channa based sweets. M.Phil. thesis, K.C. Das research Labs. Bangalore.
10. Sadasivam, S. and A. Manickam, 1996. Biochemical Methods. New age international Publishers.
11. Marvello, P. and G. Kimberlee, 2000. Principles of Biostatistics. Duxbury Thomson Learning.
12. Leslie, E.C., 1989. Nutrition Management for food services. Delmar Publishers Inc. ,
13. Jaruis, T., 1984. Vitamins Use and Abuse, Contemporary Nutrition. Minneapolis M.N. ,
14. Norman, W.D. and N.D. James, 1998. The technology of food preservation. CDS publishers and Distributors.
15. Corlett, D.A., 1980. pH and acidity, Microbial ecology of food. Academic Press Inc.,
16. Dunn, M.D., 1983. Fundamentals of Nutrition. Van Nortrand Reinhold. New York.