

Formulation and Quality Evaluation of Whey-Based Fruit Juice

Nagadevi¹, Yamuna Devi Puraikalan²

¹Research Scholar, Department of Home Science, Mother Teresa Woman's University, Kodaikanal, India

²Assistant Professor, Department of Home Science, Mother Teresa Woman's University, Kodaikanal, India

Abstract: *The present study was carried out to formulate whey-based fruit juice at four different proportions and to determine its nutrient composition and sensory evaluation. To formulate whey-based fruit juice by the incorporation of pineapple pulp and whey powder at the level of 20 per cent, 40 per cent, 60 per cent and 80 per cent proportions. Whereas fruit juice prepared out of without adding whey powder were served as control. Among the different treatments, 40 percent incorporation of whey-based fruit juice was recorded highest scores for overall acceptability.*

Keywords: Whey, Sensory evaluation

1. Introduction

Nutrition is the science that interprets the interaction of nutrients and other substances in food such as phytonutrients, anthocyanins and tannins in relation to maintenance, growth, reproduction, health and disease of an organism. It includes food intake, absorption, assimilation, biosynthesis, catabolism and excretion [1]. Health is the level of functional or metabolic efficiency of a living organism. In humans it is the ability of individuals or communities to adapt and self-manage when facing physical, mental or social challenges [2]. "The Food you eat can be either the safest and most powerful form of medicine or the lowest form of poison" – Ann Wigmore (The Mother of Living Foods).

Milk is made of two proteins such as casein and whey. Whey protein can be separated from the casein in milk or formed as a by-product of cheese making. Whey protein is considered a complete protein and contains all nine essential amino acids and is low in lactose content [3]. Whey protein is a mixture of globular proteins isolated from whey, the liquid material created as a by-product of cheese production. Whey protein is commonly marketed and ingested as a dietary supplement and various health claims have been attributed to it in the alternative medicine community [4].

Whey is a by-product of the cheese-making process. Whey can be processed to yield whey protein in three forms such as whey isolate, whey concentrate and whey hydrolysate [5]. Whey Protein Isolate (WPI) has high amounts of protein, while minimizing the amount of lactose found more in whey protein concentrate. Whey protein isolate is easily digested and if cold-filtered can contain most of the immunoglobulins, whereas it also available in whey protein isolate brands with minimal artificial sweeteners that still tastes good [6]. WPI is the purest form of whey protein available and contains between 90 to 95 per cent protein. WPI are also very low in fat. Isolates are the purest protein source available. WPI contain protein concentrations such as 90 per cent or higher [7].

The serum (whey) protein family consists of approximately 20 per cent of alpha- lactalbumin, Blood Serum Albumin

(BSA), 50 per cent of beta- lactoglobulin, immunoglobulins, lactoferrin and transferrin and many minor proteins and enzymes [8]. Whey is made up of a number of proteins including Immunoglobulins, Alpha-Lactalbumin, BSA, Beta-Lactoglobulin, GlycoMacro Peptides (GMP), Lactoferrin, Amino acid content, Lactoperoxidase, Lysozyme, Lactose, minerals and Vitamins [9]. These contain a full spectrum of amino acids including the BCAA such as leucine, isoleucine and valine. Whey is an abundant source of Branched-Chain Amino Acids (BCAA) which is used to stimulate protein synthesis [10].

Whey has been shown to reduce cholesterol by inhibiting LDL (Low Density Lipoprotein) which is bad cholesterol production. Whey is also found to prevent breast cancer. It may help T-cell activity and decrease wasting tissues during illness and increase the well being and the speed of overall recovery. Elderly people and people with HIV have decreased glutathione levels and weakened immune systems. Whey has become a high interest in immune suppressed populations [11]. Health benefits of whey including immune health may help to maintain adequate glutathione levels by providing a high concentration of BCAA, for a healthy immune system and to help ward off disease. research suggests it may have far wider applications as a functional food in the management of conditions such as Cancer, Gastrointestinal problems, Anti-carcinogenic activities, Immune health, Mucule synthesis, Hepatitis B, HIV, Osteoporosis and Chronic stress. The possible health benefits of consuming whey protein include weight loss, anti-cancer properties, lower cholesterol, asthma and lowering blood pressure and reducing risk of cardiovascular disease [12].

Protein rich source such as whey protein isolate, whey protein concentrate, whole egg, cow's milk, egg white, beef, chicken, casein, soy protein and wheat gluten. Source of protein includes eggs, meat, poultry, seafood, dairy products, soy products, wheat protein, legumes, nuts and seeds. Protein supplements made from egg, soy, whey and casein proteins are often used by strength trained athletes to help meet protein requirements. Protein is available in a variety of dietary sources. These include foods of animal and plant origins as well as the highly marketed sport supplement

industry [13]. Per one hundred gram of whey powder contains macro nutrients such as 287.8kcal of energy, 37.9g of protein, 21.78g of fat and 10.44g of carbohydrate respectively. Other nutrients includes 380mg of phosphorous, 310mg of potassium, 160mg of calcium, 60mg of sodium, 30mg of vitamin C, 20mg of iron, 800mcg of folic acid, 18mg of vitamin E and 2000IU of vitamin A respectively [14].

2. Materials and Methods

Whey powders were used for the formulation of whey-based fruit juice. Ripened pineapple fruit were selected, cleaned, peeled, sliced and made into a pulp with a mixer. To formulate whey-based fruit juice by the incorporation of pineapple pulp.

3. Treatment

- T1- fruit juice (control)
- T2- fruit juice + 20% whey powder
- T3- fruit juice + 40% whey powder
- T4- fruit juice + 60% whey powder
- T5- fruit juice + 60% whey powder

The whey powder incorporated fruit juice was prepared with specified amount of whey powder as mentioned treatments. All the ingredients such as pineapple, artificial sweetener and water were used for fruit juice in the level of variations.

The sensory evaluation of the researcher's experimental and respective control products were carried out by 10a.m among the semi-trained (N= 30) panel members. The staffs and students of Mother Teresa Women's University, Chennai, Tamilnadu, India, from the Department of Home Science were included as semi-trained panel members and also students of Madras Medical Mission College of Health science, Chennai, Tamilnadu, India, from the Department of Clinical Nutrition. The evaluation of criteria includes organoleptic characteristics such as appearance, aroma, taste, clarity, consistency, palatability, mouth feel, appetizing, acidity and overall acceptability were determined by rating scale. The mean scores given by thirty members were used for statistical analysis. The panelists were explained about each quality attributes to avoid judgment variability.

4. Result and Discussion

The organoleptic properties of whey-based fruit juice were evaluated appearance, aroma, taste, clarity, consistency, palatability, mouth feel, appetizing, acidity and overall acceptability. The data pertaining to the organoleptic evaluation was influenced by different treatments were presented in Table I. The overall acceptability and rating scale score was higher for the 40% whey powder incorporated fruit juice. The data reveals that there were significant differences at the level of 1% significances among 40%.

5. Conclusion

Sensory evaluation of the formulated product gave another perspective to the study. Individuals generally have varying preferences which can be based on several aspects. This type of formulation though it matches the trend where health drinks are preferred to protein rich drinks, it showed varying degrees of acceptance. Whey can be successfully incorporated into fresh fruit juices. With the addition of whey, the formulated product becomes nutrient dense giving it a value-addition for the consumer and a unique selling for the manufacturer. This way, whey can be utilized efficiently without wasting it as a mere waste material. The products can be highly beneficial in maintaining good health among individuals.

Table 1: Scores of organoleptic evaluation of formulated whey-based fruit juice

S.NO	Level of variations of whey powder (%)	Mean \pm S.D	t-value	Level of significance
1	Control (0)	46.6 \pm 2.873	6.427	NS
2	20	38.9 \pm 3.064	1.602	1%
3	40	43.7 \pm 2.076	2.420	1%
4	60	37.8 \pm 3.787	4.594	NS
5	80	36.7 \pm 4.745	1.855	1%

NS- Not Significance

Reference

- [1] National Institutes of Health, Joint Collection Development Policy: The National Agricultural Library, The National Library of Medicine, The Library of Congress, February 27, 1998, Updated October 14, 2014. Retrieved on 2014-12-13
- [2] Huber M, Knottnerus JA, Green, L., van der Horst H, Jadad AR, Kromhout D, Smid H. *BMJ* 2011; 343 (d4163)
- [3] Tony Rail and Beryl Thomas; Joseph Priestley's Journal while at Daventry Academy, 1754, transcribed from the original shorthand; Enlightenment and Dissent (University of Wales, Aberystwyth, 13, 49-113.
- [4] Marshall, K., 2004. "Therapeutic Applications of Whey Protein". *Alternative Medicine Review*, 9(2):136-156
- [5] Phillips SM (February 2011). "The science of muscle hypertrophy: making dietary protein count". *Proc Nutr Soc* (Review)70 (1):100doi:10.1017/S002966511000399X.PMID 21092368
- [6] Cribb, P., Williams, A., Carey, M., 2002. "The effect of whey isolate on strength, body composition and plasma glutamine". *Med Sci Sports Exercise*, 34(5):S299.
- [7] Rao, V.H.P. and Ganesh Kumar, C. (1999). Whey to wonders. *Processed Food Industry*, 3(8): 16-19.
- [8] Tunick MH (2008). "Whey Protein Production and Utilization.". In Onwulata CI, Huth PJ. *Whey processing, functionality and health benefits* (abstract). Ames, Iowa: Blackwell Publishing; IFT Press. pp. 1-13
- [9] Bunn JA, et al. Protein and Amino Acid Supplementation Does Not Alter Proteolytic Gene Expression following Immobilization. *J Nutr Metab*. (2011)

- [10] Kimball Scott; Jefferson, LS (2006). "Signaling Pathways and Molecular Mechanisms through which Branched-Chain Amino Acids Mediate Translational Control of Protein Synthesis". *The Journal of Nutrition* 136 (1): 227S–31S. PMID 16365087
- [11] Bounous G. "Whey protein concentrate (WPC) and glutathione modulation in cancer treatment.". *Anticancer Research*. 2000 Nov-Dec;20(6C):4785-92. Accessed October 11th 2013.
- [12] Zemel MB (May 2003). "Functional properties of whey, whey components, and essential amino acids: mechanisms underlying health benefits for active people (review)". *J. Nutr. Biochem.* 14 (5): 251–8. doi:10.1016/S0955-2863(03)00030-5. PMID 12832028
- [13] Abou Samra R, et al. Effect of different protein sources on satiation and short-term satiety when consumed as a starter. *Nutr J.* (2011)
- [14] VanCalcar SC and Ney DM. Food products made with glycomacropeptide, a low-phenylalanine whey protein, provide a new alternative to amino Acid-based medical foods for nutrition management of phenylketonuria. *J Acad.Nutr Diet.* 2012;112(8):1201-1210.

Author Profile

Nagadevi.V is an Research Scholar, at the Department of Home Science, Mother Teresa Woman's University.

