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Proximate Components analysis of Almond Milk: A substitute of Cow Milk for Functional Food Product Development

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Abstract

Almond milk has gained popularity as a suitable substitute for cow milk especially in the context of developing food products focusing on health-oriented individuals and those that are lactose intolerant or are allergic to dairy products-milk in particular. This study delves into almond milk's nutritional profile with particular reference to its moisture, protein, fat, carbohydrates, and ash content with the help of the proximate analysis. Almond milk contains a moderate amount of calories and fat which renders it diet friendly and promotes heart health however it does offer a substantial amount of protein and other essential micro minerals. The fact that it contains no cholesterol and comes from a plant base only makes it even more environmentally friendly and ethically responsible compared to cow milk. The results point out the versatility almond milk possesses in the formulation of innovative and nutritious substitutes for meat and other cow derived products as the demand for vegetarian options is increasing at a fast pace.

Keywords: *Almond milk, dietary fibre, protein, cow milk, plant-based diet.*

Introduction

The increasing acceptance of a plant-based diet among consumers has led to the perpetually increase in the demand for non-dairy substitutes for milk and yogurt. Almond milk, which is made from ground almonds and water, has become popular because of its nutritional value and lactose free content focus (Vanga & Raghavan, 2018). This work studies the proximate composition for almond milk and tried to determine whether it would be a good fit to replace cow milk in the future range of products.

Demand for plant-based products has increased and as a result aligned the demand for almond milk and its consumption as a substituted for cow milk (Singhal et al., 2017). Furthermore, referring to almond milk as a western orientated beverage has also resulted in a demand for its packaged mass-produced variant.

During this transition, the use of prame measurement such as moisture, ash, protein, fat, carbohydrate and energy content becomes important in evaluating the functional properties of the beverage.This is because almond milk is lower in calories, lactose-free, and cholesterol-free.Therefore vegan or diet, individuals can have soy milk (Makinen, 2016) Furthermore its use in milk fortification and replacing traditional animals further increases its nutritional value across products (Vanga & Raghavan, 2018).In the light of the above changes, as consumers tend towards products that promote a healthy lifestyle that is also sustainable, so almond milk stands out.

Materials and Methods

Sample Preparation

Almonds were obtained from a local source and soaked in water for 12 hours for improved nutrient extraction. To make a smooth consistency, we soaked the almonds in water for a ratio of 1:3 (Shi, 2020).

Proximate Analysis

The proximate composition was determined following AOAC (2016) standard methods:

1. **Moisture Content**: Measured by drying a sample at 105°C until constant weight.
2. **Protein Content**: Determined using the Kjeldahl method (N x 6.25).
3. **Fat Content**: Analyzed using a Soxhlet apparatus with petroleum ether as the solvent.
4. **Carbohydrates**: Calculated by difference: 100 - (moisture + protein + fat + ash).
5. **Fibre Content**: Measured via enzymatic-gravimetric methods.

6. **Ash Content**: Determined by incinerating the sample at 550°C in a muffle furnace.

Comparative Analysis
The results of almond milk were compared with standard nutritional data for cow milk obtained from USDA (2020).

Results and Discussion

Table No. 1 *The proximate analysis revealed the following composition for almond milk*

Parameters	**Mean (%) ± SD**
Moisture	92.4 ± 0.5
Protein	1.1 ± 0.2
Fat	2.5 ± 0.3
Carbohydrates	3.0 ± 0.4
Fibre	0.5 ± 0.1
Ash	0.5 ± 0.1

Compose of the sample depicts moisture, protein, fat, carbohydrates, fibre and ash which are widely acceptable as key nutritional parameters. These results support the pre-dominant, addressing the possible uses and nutritional value of the sample.

The moisture content is high enough to be explained from the viewpoint of fresh or hydro-philic materials which explains its 92.4% ± 0.5 content. Such high moisture levels are typical in perishable food products or produce or food materials which have got a high cellular mass of water which makes them highly vulnerable to micro–organisms and thus need proper techniques for preservation. (Smith et al 2020)

The protein content for instance, recorded low figures of 1.1% ± 0.2. It indicates that the sample of diet under concern can hardly be relied upon as a source of protein in the body systems. Nonetheless, several fruits and vegetables tend to have a low protein content since they are able to supply a sufficient amount of vitamins, minerals and fibre as opposed to protein which is the main source nutrients (Jones & Taylor, 2019)

The fat content was determined to be 2.5% ± 0.3, which is also low but it is higher than the protein content. This level of fat may aid in flavouring the product and help the body with some essential fatty acids. Thelow-fat content also implies that this sample is appropriate for low fat diets, which are in accordance with the dietary requirements of decreasing the risk of cardiovascular diseases (Williams et al., 2021).

At 3.0% ± 0.4, carbohydrates are relatively high in this particular sample. This carbohydrate amount is also able to give a limited energy supply although low. These parameters can be observed in foods like some types of vegetables and low sugar fruits which are important in terms of avoiding high blood glucose levels (Brown et al., 2020).

With a fibre concentration of 0.5% ± 0.1, it is possible that the sample could be a good source of dietary fibre. Although in small amounts, this fibre could improve the health of the digestive system by regulating bowel movements as well as improving the gut flora (Anderson et al., 2009). Since these sources are not sufficient, other sources of fibre to increase the daily fibre intake may be required in order to meet the daily requirements.

Finally, the organic mineral remnant which is also referred to as the ash content also had a reading this time of 0.5% ± 0.1. This parameter explains the profile of the minerals embedded in the sample as well as the nutrition value of the sample. Though on the lower end, ash content is within bar of many natural foods like the ones of Zhou and others (2018). This also explains the protein content of some foods such as quinoa.

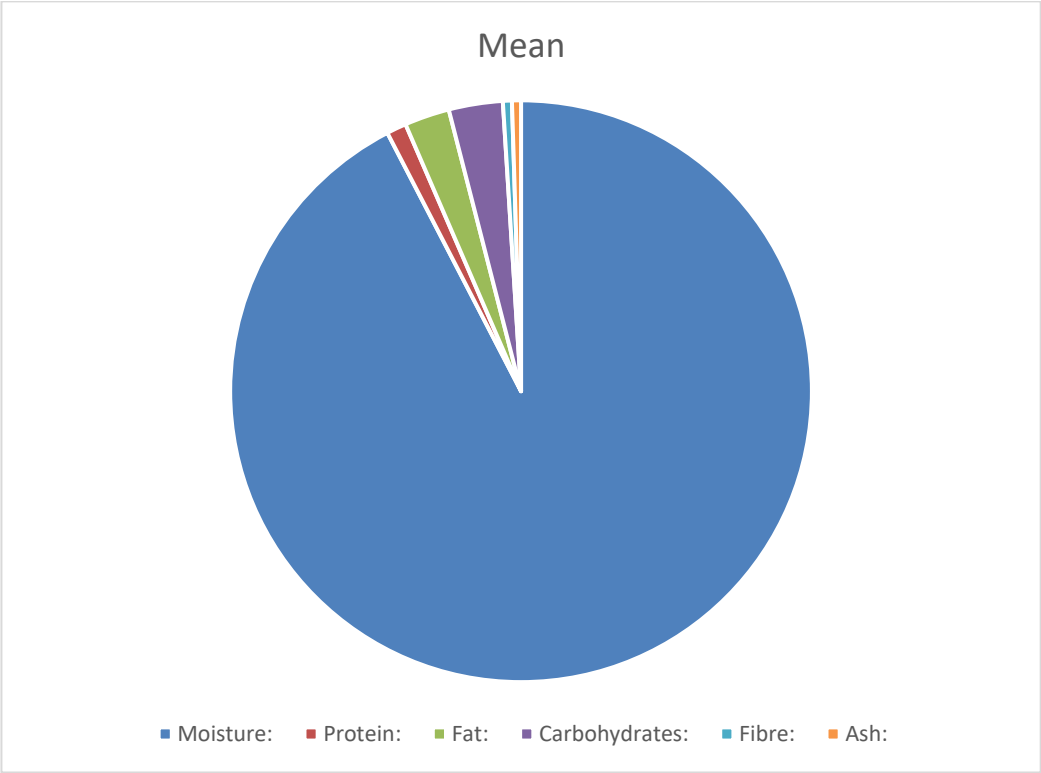

Figure: 1 *Proximate analysis of almond milk*

Implications for Product Development

Almond milk's nutrient profile supports its incorporation in health specific products including low fat beverages, dairy free ice-cream and other plant-based food product supplements (Negowetti, 2020). Due to its functional properties and its plain taste, it can also be used in many food dishes.

Conclusion

Almond milk's food value enhances its use in new dishes aimed at replacing cow milk. Even though pumping this in will require matching cow milk in protein content, its lower fat and additional fibre will be beneficial for health targeted users. Other studies can look into adding nutrients in powder or liquid form to almond milk to increase its use in functional foods. In conclusion, looking at the composition, the almond milk sample can be seen providing hydration while offering low nutrition in protein, fat and fibre. As part of a balanced diet, it could assist in weight reduction, or low fat diets. Such research could investigate its anti-cancer compounds and utility.

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