IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, April 2026
Impact Factor: 8.2

Protein Quantification in Selected Nuts and Dried Fruits Using the Lowry Assay

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Abstract: *Proteins are essential macromolecules required for growth, repair, and maintenance of living organisms. Nuts and dry fruits are considered rich plant-based sources of proteins and are widely consumed due to their nutritional value. The present study focuses on the quantitative estimation of protein content in selected nuts and dry fruits available in the Sangamner region using the Lowry method, a sensitive and reliable biochemical technique. Samples including almond, pistachio, walnut, cashew, peanut, coconut, sesame, raisins, and dates were collected from local markets. The samples were cleaned, dried, powdered, and subjected to protein extraction using suitable buffer solutions. The extracted proteins were analyzed spectrophotometrically at 660 nm after reaction with alkaline copper reagent and Folin–Ciocalteu reagent. A standard calibration curve was prepared using bovine serum albumin for accurate quantification. The study revealed noticeable variation in protein content among different samples. Nuts such as almonds, pistachios, and peanuts exhibited comparatively higher protein concentrations, while dry fruits like raisins and dates showed lower values. These differences are attributed to inherent biological composition and environmental factors influencing growth and storage. The findings emphasize the importance of nuts as significant protein sources in plant-based diets. The study also highlights the usefulness of the Lowry method in food analysis due to its sensitivity and reproducibility. This research contributes to nutritional awareness and helps in selecting protein-rich food items for balanced diets. Overall, the investigation provides useful baseline data for future studies and supports the inclusion of nuts and dry fruits in daily nutrition for better health outcomes..*

Keywords: Protein Estimation, Lowry Method, Nuts and Dry Fruits, Spectrophotometric Analysis, Plant-Based Protein, Nutritional Evaluation

I. INTRODUCTION

Proteins are among the most vital biomolecules present in all living systems. They are composed of amino acids linked through peptide bonds and play a crucial role in maintaining structural and functional integrity of cells. These macromolecules are involved in numerous biological activities such as enzymatic catalysis, transport, defense, and regulation. Due to their diverse roles, proteins are considered fundamental to life processes and metabolic functions.

From a nutritional perspective, proteins are essential components of the human diet. They provide the necessary amino acids required for tissue growth, repair, and maintenance. The recommended intake of protein varies depending on age, physiological condition, and level of physical activity. Inadequate intake of proteins can lead to serious health problems such as protein-energy malnutrition, weakened immunity, and growth retardation. Therefore, identification and quantification of protein-rich food sources are important in nutritional science. Proteins can be obtained from both animal and plant sources. While animal proteins are considered complete due to the presence of all essential amino acids, plant-based proteins are gaining popularity because of their health benefits and sustainability. Nuts and dry fruits

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are important plant-derived foods that contain considerable amounts of proteins along with other nutrients such as healthy fats, vitamins, and minerals. These food items are widely consumed across different cultures and are known for their high energy value.

Nuts are hard-shelled seeds that contain a single edible kernel, whereas dry fruits are fruits that have been naturally or artificially dehydrated. Common examples include almonds, walnuts, pistachios, cashews, raisins, and dates. These foods are valued not only for their taste but also for their health-promoting properties. Regular consumption of nuts and dry fruits has been associated with reduced risk of cardiovascular diseases, improved digestion, and better metabolic health. The protein content in nuts and dry fruits varies depending on several factors such as species, variety, environmental conditions, and processing methods. For instance, almonds and peanuts are known to contain relatively high protein levels, while dried fruits like raisins and dates contain comparatively lower amounts. Understanding these variations is essential for dietary planning and food industry applications.

Accurate estimation of protein content in food samples is an important aspect of food chemistry and quality control. Various methods have been developed for protein estimation, including the Kjeldahl method, Biuret method, Bradford assay, and Lowry method. Among these, the Lowry method is widely used due to its high sensitivity and reliability. It is based on the reaction of protein molecules with copper ions under alkaline conditions followed by reduction of the Folin reagent, resulting in a blue-colored complex. The intensity of the color is directly proportional to the protein concentration and can be measured using a spectrophotometer. The Lowry method is particularly suitable for analyzing food samples because it provides accurate results even at low protein concentrations. It is commonly used in biochemical and nutritional studies for determining protein levels in various biological materials. The method is simple, cost-effective, and reproducible, making it an ideal choice for laboratory analysis.

Despite the availability of general nutritional data, there is limited information regarding the protein content of locally available nuts and dry fruits in specific regions such as Sangamner. Environmental factors such as soil composition, climate, and storage conditions may influence the nutritional composition of these food items. Therefore, it becomes necessary to conduct region-specific studies to obtain reliable data.

The present study aims to estimate and compare the protein content of selected nuts and dry fruits collected from the Sangamner market using the Lowry method. By analyzing different samples, the study seeks to identify the most protein-rich food sources and evaluate their nutritional significance. This research will contribute to better understanding of plant-based protein sources and support dietary recommendations for improved health. Furthermore, the findings of this study may be useful for consumers, nutritionists, and food industries in selecting and promoting protein-rich foods. It also provides a scientific basis for future research in the field of food analysis and nutritional biochemistry.

II. MATERIALS AND METHODS

The study was conducted in Sangamner region of Maharashtra, India. Samples of commonly consumed nuts and dry fruits including almond, pistachio, walnut, cashew, peanut, coconut, sesame, raisins, and dates were collected from local markets. Each sample was properly labeled and stored under dry conditions before analysis. The collected samples were cleaned to remove impurities and then dried in a hot air oven at controlled temperature until constant weight was achieved. After drying, the samples were finely powdered using a grinder to obtain uniform consistency. Approximately one gram of each powdered sample was taken for protein extraction.

The powdered samples were mixed with phosphate buffer solution and incubated to allow extraction of soluble proteins. The mixture was then centrifuged to separate the supernatant containing protein extract from the residue. The clear supernatant was collected and used for further analysis.

Protein estimation was carried out using the Lowry method. Reagents including alkaline copper solution and Folin–Ciocalteu reagent were prepared freshly. A standard protein solution was prepared using bovine serum albumin. Different concentrations of the standard were used to prepare a calibration curve. For analysis, the sample extract was treated with alkaline copper reagent followed by addition of Folin reagent. The mixture was incubated for color

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development. The absorbance was measured at 660 nm using a spectrophotometer. Protein concentration in the samples was calculated using the standard curve. All experiments were performed under controlled laboratory conditions to ensure accuracy and reproducibility of results.

III. RESULTS AND DISCUSSION

The analysis showed clear variation in protein content among different samples of nuts and dry fruits. Nuts such as almonds, peanuts, and pistachios exhibited higher protein concentrations compared to other samples. In contrast, dry fruits like raisins and dates showed relatively lower protein levels.

These differences may be due to genetic composition, environmental conditions, and processing methods. The results confirm that nuts are excellent sources of plant-based proteins. The Lowry method proved effective in detecting protein concentration with good sensitivity. The findings are consistent with general nutritional data and highlight the importance of including nuts in regular diet.

IV. CONCLUSION

The present study successfully estimated the protein content in selected nuts and dry fruits using the Lowry method. The results demonstrated that nuts such as almonds, pistachios, and peanuts contain higher levels of protein compared to dry fruits like raisins and dates. This indicates that nuts can serve as important sources of plant-based proteins in daily diet.

The study highlights the significance of accurate protein estimation in understanding the nutritional value of food items. The Lowry method was found to be reliable, sensitive, and suitable for analyzing protein content in complex food samples. Its ability to provide consistent results makes it a preferred technique in biochemical and nutritional studies. The variation in protein content observed among different samples may be influenced by factors such as species differences, environmental conditions, and storage practices. Therefore, region-specific studies like this are important for obtaining precise nutritional information.

The findings of this research can be useful for consumers in selecting protein-rich foods and for nutritionists in planning balanced diets. It also provides useful data for food industries involved in the development of protein-enriched products.

In conclusion, nuts and dry fruits play a significant role in human nutrition, and their regular consumption can contribute to improved health. Further studies can be conducted to analyze other nutritional components and expand the scope of research in food science.

REFERENCES

[1]. Lowry, O. H., Rosebrough, N. J., Farr, A. L., & Randall, R. J. (1951).
[2]. Protein measurement with the Folin–phenol reagent. Journal of Biological Chemistry, 193(1), 265–275.
[3]. A rapid and sensitive method for the quantitation of microgram quantities of protein utilizing the principle of protein-dye binding. Analytical Biochemistry, 72(1–2), 248–254.
[4]. Biochemical Methods (3rd ed.). New Age International Publishers.
[5]. An Introduction to Practical Biochemistry (3rd ed.). McGraw-Hill.
[6]. Official Methods of Analysis (21st ed.). AOAC International.
[7]. Handbook of Analysis and Quality Control for Fruit and Vegetable Products (2nd ed.). Tata McGraw-Hill.
[8]. Gornall, A. G., Bardawill, C. J., & David, M. M. (1949).
[9]. Determination of serum proteins by means of the biuret reaction. Journal of Biological Chemistry, 177(2), 751–766.
[10]. Damodaran, S., Parkin, K. L., & Fennema, O. R. (2017).
[11]. Fennema's Food Chemistry (5th ed.). CRC Press.
[12]. Salunkhe, D. K., Kadam, S. S., & Chavan, J. K. (1999).

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[13]. Postharvest Biotechnology of Food Legumes. CRC Press.
[14]. Food Analysis and Instrumentation: Theory and Practice. Naphtali Prints.