FICCO PUBLIC HEALTH JOURNAL
Publisher: Ficco Scientific Corner
Website: http://journal.theficco.com/index.php/publichealth
Email: editor@theficco.com

E-ISSN: 3047-9126
Vol. 3 | No. 01 | 2026
Open Access

ORIGINAL ARTICLE

Development of CAPINA Blenderized Formula Based on Banana, Mung Bean Extract, Chicken Breast, and Dragon Fruit as a Low-Sodium and Low-Fat Liquid Diet in Bhayangkara Hospital, Kediri

Fadillah Diana Lukman[1)], Ariqah Hidayatun Nisa'[1)], Friska Juniarda[1)], Nelli Nafidatul Isfanah[1)], Novita Dwi Arianti[1)], Pinky Apriliawan[1)], Suci Rahayu[2)], Ana Nur Filiya[1)]*, Nanik Hamidah[1)], Rr Lieliesnaini Octaviariani Sutoyo[1)], Nuzul Dwi Utami[1)]

[1)] Institut Ilmu Kesehatan Bhakti Wiyata Kediri, email: fadillahdiana1234@gmail.com (FDL); ariqahidayatunnisa14@gmail.com (AHN); friskajuniarda350@gmail.com (FJ); nelliisfanah05@gmail.com (NNI); novitadwia201@gmail.com (NDA); pinkyapriliawan9@gmail.com (PA); ana.nur.filia@iik.ac.id (ANF); nanik.hamidah@iik.ac.id (NH); rr.lieliesnaini@iik.ac.id (RLOS); nuzul.utami@iik.ac.id (NDU)

[2)] Rumah Sakit Bhayangkara Kediri, email: ucengmaru@gmail.com

*** Author Correspondence**; email: ana.nur.filia@iik.ac.id

DOI: 10.5281/zenodo.18509128 **Received:** January 26, 2025 **Accepted:** February 05, 2026 **Published:** February 07, 2026

ABSTRACT

Background: Meeting the nutritional requirements of hospitalized patients receiving low-sodium (LS) and low-fat (LF) liquid diets remains a significant clinical challenge, particularly due to the frequent use of tajin as the main liquid diet, which provides inadequate energy and protein. Insufficient nutritional intake may increase the risk of hospital malnutrition and adversely affect clinical recovery. This study aimed to develop a CAPINA blenderized formula based on banana, mung bean extract, chicken breast, and dragon fruit as a nutritionally improved liquid diet alternative, and to evaluate its nutrient composition, acceptability, and cost-effectiveness. **Methods**: A true experimental study was conducted using a posttest-only control design with a Completely Randomized Design (CRD). Two formulations were developed: F_0 (without dragon fruit) and F_1 (with the addition of 10 Gram of dragon fruit). Nutrient composition was assessed using quantitative descriptive analysis, while acceptability was evaluated based on color, aroma, texture, and taste by 10 panelists using a hedonic scale. Cost analysis was performed to assess the economic feasibility of each formulation. **Results**: The results showed that the energy content of F_0 and F_1 was 285.4 kcal and 281.7 kcal, respectively, with comparable protein contents of 15.38 Gram and 15.45 Gram. Both formulations met the criteria for LS and LF diets due to their low fat content. Acceptability testing demonstrated higher overall acceptance for F_1, particularly in color (100%) and taste (93%). High acceptance was also observed for aroma and texture in both formulations. Cost analysis indicated that F_1 was more cost-effective than F_0. **Conclusion**: In conclusion, the CAPINA blenderized formula, particularly formulation F_1, represents a promising alternative to tajin for hospitalized patients requiring LS and LF liquid diets, as it provides improved nutritional adequacy, high acceptability, and favorable cost-effectiveness.

Keywords: Blenderized formula, Liquid diet, Low-sodium diet, Low-fat diet, Nutrient adequacy

INTRODUCTION

Meeting the nutritional requirements of hospitalized patients is an integral component of clinical care and plays a crucial role in supporting recovery, preventing complications, and improving the effectiveness of medical therapy. Patients with certain clinical conditions, such as dysphagia, decreased level of consciousness, gastrointestinal disorders, nausea and vomiting, or postoperative status, are often unable to consume solid foods and therefore require liquid diets. Liquid diets are

E-ISSN: 3047-9126
Vol. 3 | No. 01 | 2026

formulated to be easily digested, safe for oral or tube feeding administration, and capable of meeting patients' energy and nutrient requirements during hospitalization (Reber *et al.,* 2019).

At Bhayangkara Hospital Kediri, liquid diets for patients prescribed low-sodium (LS) and low-fat (LF) diets are still primarily based on tajin as the main formulation. Tajin is rice cooking water that has traditionally been used due to its smooth texture and ease of swallowing. However, tajin contains very low levels of nutrients, particularly energy and protein, making it insufficient to meet the nutritional requirements of hospitalized patients (Najman *et al.,* 2024).. This condition is consistent with the findings of El-Regal (2016), who reported that liquid diet formulations in several hospitals are still dominated by food ingredients with low energy density and inadequate protein content.

Inadequate energy and protein intake among hospitalized patients may increase the risk of malnutrition, delay wound healing, impair immune function, and prolong the length of hospital stay. Kaegi-Braun *et al.* (2021) emphasized that insufficient nutritional intake during hospitalization is associated with increased clinical complications and suboptimal treatment outcomes. Therefore, there is a need for alternative liquid diets with higher nutrient density that remain consistent with the principles of low-sodium (LS) and low-fat (LF) diets.

Blenderized formulas represent an approach that has increasingly been recommended in hospital nutrition services. These formulas are prepared from whole food ingredients processed into a liquid and homogeneous texture, resulting in higher energy and protein density compared with conventional liquid diets such as tajin. In addition, blenderized formulas are relatively cost-effective, flexible in ingredient modification, and demonstrate good gastrointestinal tolerance (Ojo *et al.,* 2020). The use of blenderized formulas also enables the utilization of locally available food ingredients with high nutritional quality and value content. This approach supports sustainable and context-appropriate hospital nutrition practices.

The selection of food ingredients in the development of blenderized formulas should consider nutritional value, safety, and compatibility with patients' clinical requirements. Bananas serve as an easily digestible source of carbohydrates and provide essential vitamins and minerals, particularly potassium (Vu *et al.,* 2025). Mung beans contribute plant-based protein, soluble fiber, and micronutrients that support metabolic function (Hou *et al.,* 2019). Chicken breast is a high-quality source of animal protein with low fat content, making it suitable for low-fat diets (Gorissen *et al.,* 2018). The addition of a limited amount of red dragon fruit may enhance visual appeal and palatability, while also providing bioactive compounds such as betacyanins with antioxidant properties, without increasing fat or sodium content (Shah *et al.,* 2023).

The scientific novelty of this study lies in the development of the CAPINA blenderized formula, which uniquely combines locally available food ingredients, banana, mung bean extract, chicken breast, and dragon fruit, into a single liquid diet formulation specifically designed to meet the requirements of low-sodium and low-fat diets for hospitalized patients in Indonesia. Unlike conventional hospital liquid diets that are largely carbohydrate-based and low in protein, such as tajin, the CAPINA formula integrates both plant- and animal-based protein sources to improve energy and protein density without increasing fat or sodium levels. Furthermore, this study is novel in its comprehensive evaluation of the CAPINA formula, encompassing nutritional composition analysis, organoleptic acceptability testing, and cost analysis within a hospital food service context, thereby providing practical and applicable evidence for its implementation (Ojo *et al.,* 2020)

CAPINA is formulated from locally available food ingredients, making it easy to produce both at the household and healthcare level. The availability of stable and affordable ingredients allows CAPINA to be produced independently by families to meet daily nutritional needs, while also facilitating hospitals in ensuring the continuity of food supply in accordance with nutritional service standards. Furthermore, the use of local food ingredients

E-ISSN: 3047-9126
Vol. 3 | No. 01 | 2026

contributes to production cost efficiency, ease of raw material procurement, and flexibility in processing, making CAPINA an applicable, sustainable, and relevant food solution to support nutritional interventions at the household and healthcare levels.

Based on these considerations, this study was conducted to develop a CAPINA blenderized formula based on banana, mung bean extract, chicken breast, and dragon fruit as an alternative liquid diet for patients prescribed low-sodium (LS) and low-fat (LF) diets at Bhayangkara Hospital Kediri. This study aimed to evaluate the nutritional composition, organoleptic acceptability, and cost analysis of the developed formula, with the expectation that the findings may provide a basis for implementing a more nutrient-dense, acceptable, and cost-efficient liquid diet within hospital food service systems.

METHODS

This study employed an experimental design using a true experimental posttest-only control design with a Completely Randomized Design (CRD) approach. Two CAPINA blenderized formulations were developed: F_0 without the addition of dragon fruit and F_1 with the addition of 10 Gram of dragon fruit. Each formulation was prepared in triplicate. The study was conducted on 26 November 2025 at the Nutrition Department of Bhayangkara Hospital Kediri. The object of the study was the CAPINA blenderized formula, while sensory acceptability testing involved 10 small expert panel consisting of 4 nutritionist, 1 head of nutrition installation and 5 food processing staff at Bhayangkara Hospital Kediri who evaluated color, aroma, texture, and taste.

The ingredients used included bananas, mung bean extract, chicken breast, and dragon fruit. All ingredients were cooked by boiling, blended until a homogeneous consistency was achieved, and diluted with mineral water to a final volume of 200 mL. Nutrient composition analysis included energy, carbohydrate, protein, and fat contents, which were calculated based on the Indonesian Food Composition Table.

Sensory acceptability testing was conducted using a 5-point hedonic scale, and the results were subsequently categorized as acceptable (scores 3–5) or unacceptable (scores 1–2) (Amalia., 2020). The number of panelists (10 individuals) was considered adequate for this study, as previous sensory evaluation literature indicates that 8–15 untrained panelists are sufficient for hedonic testing in preliminary product development and acceptability studies. Untrained panelists are commonly used to represent general consumer perception and to assess overall product acceptance rather than detailed sensory profiling (Meilgaard *et al.,* 2016).

Data analysis was performed using descriptive quantitative analysis without the application of inferential statistical tests. This approach was selected because the primary objective of the study was to describe and compare the nutritional characteristics and sensory acceptance of the developed formulations, rather than to test hypotheses or generalize findings to a wider population. Descriptive analysis is widely recommended in early-stage formulation and product development studies to present acceptance trends and product characteristics in a clear and practical manner (Lawless and Heymann, 2010). All data were processed using Microsoft Excel and are presented as percentages.

RESULTS AND DISCUSSION

The development of the CAPINA blenderized formula based on banana, mung bean extract, chicken breast, and dragon fruit was intended for patients prescribed low-fat (LF) and low-sodium (LS) diets with swallowing difficulties. Sensory acceptability testing was conducted organoleptically by panelists, evaluating four parameters: color, aroma, texture, and taste of the blenderized formulations.

The product was formulated by comparing variations in the proportion of banana and dragon fruit. Two formulations were developed: Formula 0 (banana 73%, mung bean extract 9%, chicken breast 18%, dragon fruit 0%) and Formula 1

E-ISSN: 3047-9126
Vol. 3 | No. 01 | 2026

(banana 68%, mung bean extract 9%, chicken breast 18%, dragon fruit 5%). The composition of Formula 0 and Formula 1 is presented in Table 1.

Table 1. Modification of F_0 and F_1 Formulations

Ingredient	Ingredient Composition	
	F_0	F_1
Banana	160 Gram	150 Gram
Mung bean extract	20 Gram	20 Gram
Chicken breast	40 Gram	40 Gram
Dragon fruit	0 Gram	10 Gram
Total	**220 Gram**	**220 Gram**

Recipe modification in this study was conducted to produce a blenderized formula that not only meets sensory requirements but also provides improved nutritional value compared with previously used traditional formulations, such as tajin. The basic formulation (F0) consisted of banana, mung bean extract, and chicken breast, while formulation F1 was modified by slightly reducing the proportion of banana and adding 10 Gram of dragon fruit. This modification was designed to enhance color, aroma, and visual appeal, as food color is one of the most influential factors affecting taste perception and patient acceptability. With the addition of dragon fruit, formulation F1 exhibited a more appealing reddish-purple color, which is consistent with the findings of Cox and Melo (2019), who reported that color intensity can enhance perceived food quality and consumer preference.

Table 2. Nutrient Composition of F_0 and F_1

Nutrient Composition	F_0	F_1
Energy	285,4 kcal	281,7 kcal
Carbohydrate	50,24 Gram	48,72 Gram
Protein	15,38 Gram	15,45 Gram
Fat	2,62 Gram	2,85 Gram

The nutrient composition of formulations F_0 and F_1 demonstrated relatively stable macronutrient profiles despite modifications in ingredient proportions. The findings of this study are consistent with, yet extend, previous research on blenderized liquid diets and nutritionally improved hospital formulas. In comparison with traditional rice-based liquid diets such as *tajin*, which are characterized by very low energy and protein density, the CAPINA formulations (F_0 and F_1) demonstrated substantially higher nutritional adequacy, particularly in terms of energy and protein content. This aligns with the observations of El-Regal (2016), who reported that many hospital liquid diets fail to meet patients' nutritional requirements due to reliance on carbohydrate-dominant,low-protein formulations. However, unlike the diets described by El-Regal, the CAPINA formula integrates both plant- and animal-based protein sources, resulting in a more balanced macronutrient profile without increasing fat or sodium levels. The energy content of both formulations was comparable, with 285.4 kcal in F_0 and 281.7 kcal in F_1, as the addition of only 10 Gram of dragon fruit resulted in minimal changes in energy content, given the relatively small difference in energy values between banana and dragon fruit based on the Indonesian Food Composition Table. The carbohydrate content of F_1 was slightly lower due to the reduced proportion of banana; however, it remained adequate to support patients' energy requirements. Protein content in both formulations was nearly identical (approximately 15.4 Gram), as the amounts of chicken breast and mung bean extract were unchanged. Consequently, protein quality was maintained through the combination of animal- and plant-based protein sources (Gorissen *et al.,* 2018).The fat content of both formulations was low, making them suitable for patients with limited gastrointestinal tolerance (Hron and Rosen, 2020).

Compared with tajin, which has very low nutritional value, formulations F_0 and F_1 provided substantially higher and clinically relevant contributions of energy and protein. Inadequate energy and protein intake during hospitalization increases the risk of complications and prolonged length of stay, highlighting the importance of providing nutritionally adequate formulas to support the recovery process (Kaegi-Braun *et al.,* 2021). These findings are consistent with El-Regal (2016), who reported that hospital liquid diets are often dominated by carbohydrate-based

E-ISSN: 3047-9126
Vol. 3 | No. 01 | 2026

formulations with inadequate protein content. In contrast, the CAPINA formulations provide substantially higher protein density while maintaining low fat levels, aligning with recommendations for nutritionally optimized blenderized diets. Furthermore, compared with the blenderized enteral formulas reviewed by Ojo et al. (2020), the energy and protein content of CAPINA falls within the range considered adequate to support hospitalized patients, while utilizing locally available ingredients that enhance feasibility in routine hospital food services.

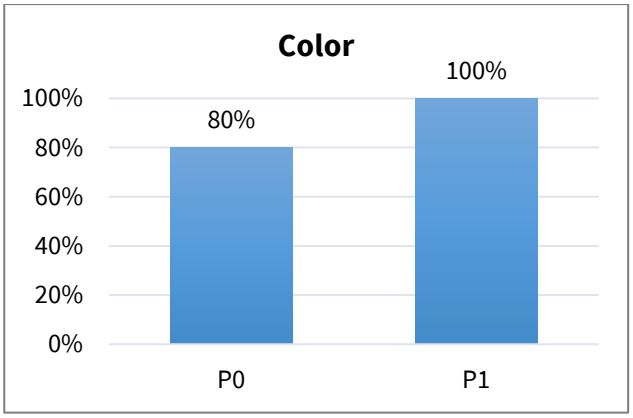

Figure 1. Color Acceptability Diagram

The organoleptic test results indicated that formulation F_1 achieved higher color acceptability than F_0. Formulation F_0 reached a color acceptance rate of only 80%, as its appearance tended to be brownish due to enzymatic browning of banana and the processing of other ingredients. In contrast, formulation F_1, which was supplemented with red dragon fruit, achieved 100% color acceptability. This improvement is attributable to the presence of betacyanin pigments, which produced a more appealing pink coloration. This finding supports the work of Spence (2015), who emphasized that food color plays a critical role in shaping taste expectations and overall acceptability. The enhanced color acceptance observed in formulation F_1 therefore reflects not only aesthetic improvement but also a sensory response consistent with established theories of food perception. In addition to enhancing color, the incorporation of dragon fruit also increased the perception of freshness and overall visual appeal, thereby creating a positive initial perception of product quality among panelists (Arsyad, 2022).

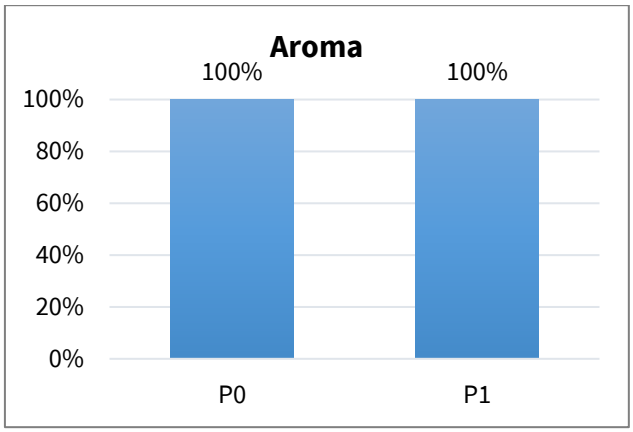

Figure 2. Aroma Acceptability Diagram

Aroma acceptability in the organoleptic test indicated that both formulations F_0 and F_1 achieved a 100% acceptance rate, demonstrating that all panelists found the aroma of both formulas acceptable. The aroma of F_0 was derived from the combination of banana, mung bean extract, and chicken breast, resulting in a mild, natural, and familiar aroma profile. Meanwhile, the addition of dragon fruit in formulation F_1 provided a light, fresh, and slightly more complex fruity aroma without significantly altering the base aroma. Fruity aromas are known to enhance perceptions of freshness and flavor expectations; therefore, F_1 received additional appreciation despite having the same overall acceptance level as F_0 (Spence, 2015).

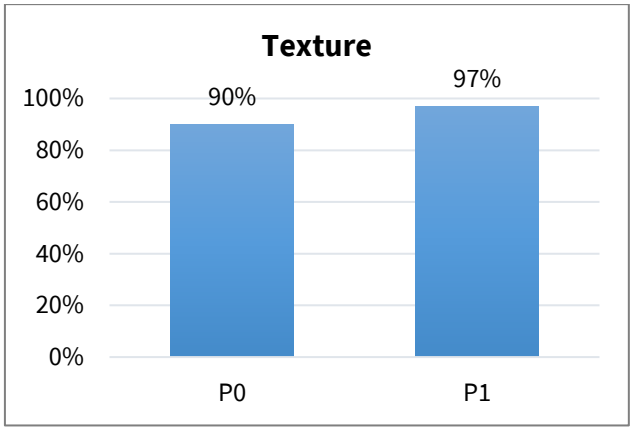

Figure 3. Texture Acceptability Diagram

E-ISSN: 3047-9126
Vol. 3 | No. 01 | 2026

The organoleptic test results indicated that the texture of formulations F_0 and F_1 was relatively similar, with no meaningful difference observed. Texture acceptability reached 90% for F_0 and 97% for F_1, showing only a small difference of 7%. This similarity can be attributed to the use of the same main ingredients and identical processing methods, particularly mung bean extract and chicken breast, which contributed to a smooth, homogeneous, and creamy texture, as well as bananas, which are easily blended. The addition of 10 Gram of dragon fruit in formulation F_1 did not substantially affect texture, as its high water content and low fiber content did not alter the viscosity of the formula. Both formulations were considered to meet the ideal texture criteria for blenderized diets, namely being smooth, stable, and easy to swallow (Hron and Rosen, 2020). The CAPINA formulations are comparable to blenderized feeds described in previous studies, which emphasize the importance of appropriate viscosity and homogeneity to ensure swallowing safety and patient tolerance.

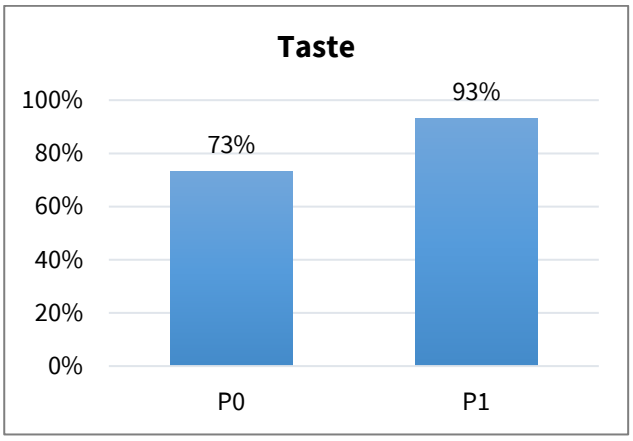

Figure 4. Taste Acceptability Diagram

The organoleptic test results indicated that formulation F_1 had higher taste acceptability compared with F_0. Formulation F_0 achieved a taste acceptance rate of only 73%, as the combination of banana, mung bean extract, and chicken breast was perceived as less harmonious and produced a lingering beany aftertaste for some panelists. In contrast, formulation F_1 achieved a higher acceptance rate of 93%, as the addition of dragon fruit provided a fresh sweetness that helped neutralize the flavors of mung bean and chicken, resulting in a lighter and more cohesive taste profile. The incorporation of fruit has been shown to improve flavor balance and product palatability; therefore, formulation F_1 was perceived as more palatable and more easily accepted than F_0 (Yasin & Liputo, 2017). This pattern is consistent with previous sensory studies showing that fruit addition can reduce undesirable aftertastes and enhance overall flavor harmony, indicating that the improved taste acceptability of formulation F_1 reflects a deliberate sensory optimization rather than a coincidental preference.

In the literature on blenderized tube feeding, the use of pureed whole-food-based meals as an alternative for patients receiving enteral nutrition has increased due to evidence suggesting several potential clinical benefits compared to standard commercial enteral formulas. Studies in the literature indicate that blended formulas can improve gastrointestinal tolerance, for example, by reducing the incidence of diarrhea. This does not necessarily worsen nutritional status when designed appropriately, although the evidence is still limited and varies between (Breik *et al.,* 2024).

Blenderized formulas that incorporate local foods such as bananas and dragon fruit can provide a source of easily digestible carbohydrates and fiber that support gastrointestinal function without adding excess sodium, aligning with the needs of a low-sodium diet. Bananas are known for their composition of easily absorbed simple sugars and high potassium, while dragon fruit provides antioxidants and soluble fiber that benefit the gut microbiota without contributing excess fat. This combination of ingredients can support a low-fat nutritional profile if the use of additional oils or fat sources is strictly controlled (Hebuterne, X *et al., 2003)*. Meanwhile, chicken breast is a low-fat source of animal protein that can meet clinical protein requirements for tissue recovery without significantly increasing total fat intake. Mung bean extract adds plant-based protein as well as fiber and phytonutrients, which can potentially contribute to the desired nutritional adequacy of the blended formula (Machado, M.C.V *et al.,* 2018).

E-ISSN: 3047-9126
Vol. 3 | No. 01 | 2026

P_0

Figure 5. Results of P0 Formulation

P_1

Figure 6. Results of P0 Formulation

CONCLUSION

The CAPINA blenderized formula based on banana, mung bean extract, chicken breast, and dragon fruit provided higher energy and protein contents than tajin, indicating greater potential to meet the nutritional requirements of hospitalized patients prescribed low-sodium (LS) and low-fat (LF) diets. Both formulations (F_0 and F_1) demonstrated comparable nutritional profiles and were suitable as hospital liquid diets.

The addition of dragon fruit in formulation P1 was shown to enhance sensory acceptability, particularly in terms of color and taste, without increasing fat content or compromising nutritional quality. Moreover, formulation P_1 was more cost-efficient than F_0. Therefore, the CAPINA blenderized formula, especially formulation F_1 can be recommended as an alternative to tajin in hospital liquid diet services.

ACKNOWLEDGMENTS

The authors would like to express their sincere gratitude to the Nutrition Department of Bhayangkara Hospital Kediri for their support and cooperation during the implementation of this study. The authors also acknowledge the academic community of the Undergraduate Nutrition Study Program, Faculty of Health Sciences, Bhakti Wiyata Institute of Health Sciences Kediri, for their guidance and valuable input. In addition, the authors extend their appreciation to all panelists who participated in the organoleptic testing of this study.

REFERENCES

El-Regal, M. E. (2016). Enteral Nutrition in Intensive Care Units: Factors that Hinder Adequate Delivery. *Journal of Nutritional Medicine and Diet Care*, *2*(2). https://doi.org/10.23937/2572-3278.1510016

Gorissen, S. H. M., Crombag, J. J. R., Senden, J. M. G., Waterval, W. A. H., Bierau, J., Verdijk, L. B., & Van Loon, L. J. C. (2018). Protein Content and Amino Acid Composition of Commercially Available Plant-Based Protein Isolates. *Amino Acids*, *50*(12), 1685–1695. https://doi.org/10.1007/s00726-018-2640-5

Hebuterne, X., F. Bozzeti., J.M. Moreno Villares., *et al.* (2003). Home enteral nutrition in adults:

E-ISSN: 3047-9126
Vol. 3 | No. 01 | 2026

a European multicentre survey. *Clinical Nutrition, 22(3), 261-266.* https://doi.org/10.1016/So261-5614(03)00005-0

Hou, D., Yousaf, L., Xue, Y., Hu, J., Wu, J., Hu, X., Feng, N., & Shen, Q. (2019). Mung Bean (Vigna radiata L.): Bioactive Polyphenols, Polysaccharides, Peptides, and Health Benefits. *Nutrients*, *11*(6), 1238. https://doi.org/10.3390/nu11061238

Hron, B., & Rosen, R. (2020). Viscosity of Commercial Food-based Formulas and Home-prepared Blenderized Feeds. *Journal of Pediatric Gastroenterology and Nutrition*, *70*(6). https://doi.org/10.1097/MPG.0000000000002657

Kaegi-Braun, N., Mueller, M., Schuetz, P., Mueller, B., & Kutz, A. (2021). Evaluation of Nutritional Support and In-Hospital Mortality in Patients With Malnutrition. *JAMA Network Open*, *4*(1), e2033433. https://doi.org/10.1001/jamanetworkopen.2020.33433

Lina, Breik., Lisa, Barker., Judy, Bauer., & Zoe E, Davidson. (2024). The effect of blended tube feeding compared to conventional formula on clinical outcomes in adults: A systematic review. Wiley Online Library from Monash University. https://doi.org/10.1111/1747-0080.12912

Machado, M.C.V., Valdirene, F.N.S., Andrea, Bottoni., & Tania, B.M. (2018). Nutritional and microbiological quality of commercial and homemade blenderized whole food enteral diets for home-based enteral nutrition therapy in adults. *Clinical Nutrition, 37(1), 177-181.* https://doi.org/10.1016/j.clnu.2016.11.020

Muh Arsyad. (2022). Konsentrasi Buah Mangga dan Buah Naga Terhadap Karakteristik Fisikokimia dan Organoleptik Serbuk Instan: Concentration of Mango Fruit and Dragon Fruit on Physicochemical and Organoleptic Characteristics of Instant Powder. *Perbal: Jurnal Pertanian Berkelanjutan*, *10*(3), 348–357. https://doi.org/10.30605/perbal.v10i3.2047

Najman, K., Ponikowska, P., Sadowska, A., Hallmann, E., Wasiak-Zys, G., Świderski, F., & Buczak, K. (2024). Physicochemical Properties and Nutritional Relevance of Rice Beverages Available on the Market. *Applied Sciences*, *14*(19), 9150. https://doi.org/10.3390/app14199150

Ojo, O., Adegboye, A. R. A., Ojo, O. O., Wang, X., & Brooke, J. (2020). The Microbial Quality and Safety of Blenderised Enteral Nutrition Formula: A Systematic Review. *International Journal of Environmental Research and Public Health*, *17*(24), 9563. https://doi.org/10.3390/ijerph17249563

Reber, E., Gomes, F., Bally, L., Schuetz, P., & Stanga, Z. (2019). Nutritional Management of Medical Inpatients. *Journal of Clinical Medicine*, *8*(8), 1130. https://doi.org/10.3390/jcm8081130

Shah, K., Chen, J., Chen, J., & Qin, Y. (2023). Pitaya Nutrition, Biology, and Biotechnology: A Review. *International Journal of Molecular Sciences*, *24*(18), 13986. https://doi.org/10.3390/ijms241813986

Spence, C. (2015). On the Psychological Impact of Food Colour. *Flavour*, *4*(1), 21. https://doi.org/10.1186/s13411-015-0031-3

Vu, N. D., Hang, N. T. T. N., Mi, K. D. Q., Anh, N. H. T., & Pham, B. A. (2025). Exploring the Nutritional Composition, Physicochemical Properties, and Biological Characteristics of Mature Banana Varieties (Musaceae). *Food Chemistry: X*, *28*, 102594. https://doi.org/10.1016/j.fochx.2025.102594

Yasin, Y. K., & Liputo, S. A. (2017). *Uji Tingkat Kesukaan Yoghurt Jagung Manis Dengan Penambahan Buah Naga*. *3*(2).