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3.8. An Evaluation of the Effect of the Incorporation of *Nostoc Commune* (Cushuro) on the Nutritional Value of a Compote for the Elderly

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Introduction: Malnutrition in older adults in Peru increases their risk of anemia and osteoporosis. To address this challenge, we proposed including ingredients that provide essential nutrients in preparations intended for this age group. *Nostoc commune* (Cushuro) is a nutritious food that grows at an altitude of 3000 m above sea level, and its consumption promotes local production and sustainability. Additionally, its polysaccharide content provides a gelling effect. In this context, the effect of incorporating Cushuro on the nutritional value of a compote for older adults was evaluated.

Methodology: Two formulations of quinoa, mango, and passion fruit compote were prepared with the same proportion of ingredients except for their Cushuro content: Formulation 1 (with Cushuro) and Formulation 2 (without Cushuro). A proximal analysis and calcium and iron evaluations were performed using validated methods.

Results: The micronutrient results were obtained from a 250 g sample of compote. Formulation 1 contained 136.7 kcal, of which protein represented 1.34%, carbohydrates 11.8%, and fats 0.09% with 41.2 mg of iron and 567.1 mg of calcium. Formulation 2 contained 153.4 kcal, of which protein represented 4.56%, carbohydrates 9.92%, and fats 0.14% with 30.7 mg of iron and 391.1 mg of calcium. Both formulations reached the calcium and iron requirements for older adults that correspond to a snack (10% of the total caloric value). Additionally, Formulation 1 was classified as high in calcium and iron according to the Codex guidelines on nutritional labeling.

Conclusions: The inclusion of *Nostoc commune* (Cushuro) in compotes offers nutritional benefits. There were higher levels of calcium and iron in Formulation 1, reaching the 10% recommended for older adults.

3.9. Apple Fermentation: Valorization of Surpluses from the Fruit Industry

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Introduction: Fermentation is an anaerobic process in which sugars are converted into alcohol by bacterial enzymes or into lactic acid by yeasts. Apple is rich in vitamins and phytochemicals, mainly flavonoids, and it is responsible for antioxidant action. Apples that are unsuitable for fresh use or of inappropriate commercial size are not valued in the market, as they often do not have the physical characteristics the consumer appreciates and are therefore rejected. Furthermore, in industries and fruit processing, high amounts of waste are generated.

Objectives: Study possibilities for valorizing apple waste through fermentation, combining the circular and sustainable economy concepts.

Methods: Local producers, processing industries, and commercial areas were contacted to establish collaborations and test different apple fermentation conditions, varying the part of the fruit used. Flasks with apple and water were placed in the oven at 30 °C, samples were collected every 24 h, and the pH was measured. The fermented products were analyzed to evaluate their antimicrobial activity, measuring the inhibition halo for *Escherichia coli*, *Staphylococcus aureus*, *Bacillus cereus*, *Pseudomonas aeruginosa*, *Staphylococcus epidermidis*, and *Candida albicans*.

Results: The most promising was the test with only apple pulp, since it was under these conditions that a greater inhibition halo was recorded compared to tests with combinations of pulp, peel, seed, and stem. Fermented apple pulp demonstrated greater activity in the sensitivity test for *Staphylococcus aureus*, *Bacillus cereus*, *Pseudomonas aeruginosa*, and *Staphylococcus epidermidis*.

Conclusions: Fermented apple appears to have antimicrobial activity against several species. It is necessary to repeat the tests and analyze the intermediate fermentation times. It would be interesting to vary the state of division of the fruit as well as to carry out biostimulation tests and bioinoculation. As a future project, in addition to analyzing antimicrobial activity, it is intended to identify fermented products, using UV/VIS spectrophotometry and HPLC.

3.10. Brown Rice Bran Powder, When Added to the Standard Diet, Could Alleviate Cardiometabolic Risk Factors and Antioxidant Status in Patients with Metabolic Syndrome

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Introduction: Due to its beneficial contents including dietary fiber and γ -oryzanol, brown rice bran powder (BRBP) can be considered as a functional food item. Hence, the current trial aims to investigate the effects of BRBP consumption on cardiometabolic risk factors, antioxidant status, and gastrointestinal symptoms in adults diagnosed with metabolic syndrome (MetSyn).

Subjects, Materials and Methods: In this 8-week open label, controlled trial, fifty patients with MetSyn were randomized into a control (who only received the standard diet (SDiet)) or intervention group (who were additionally administered 15 g/day BRBP). Patients' demographic and anthropometric data were recorded. Blood samples were then gathered to analyze levels of metabolic factors and antioxidant enzymes activity. Moreover, the Gastrointestinal Symptom Rating Scale (GSRS) questionnaire was completed.

Results: Analysis of covariance (ANCOVA) controlled for the baseline levels revealed that at the study endpoint, compared to the controls who only followed an SDiet, patients who additionally received BRBP showed significant reductions in body mass index (BMI) and (p -value 0.0001; effect size (ES): -1.29), waist circumference (p -value 0.001; ES: -1.12), total cholesterol (p -value = 0.046; ES: -0.66), low-density lipoprotein cholesterol (p -value = 0.037; ES: -0.67), and fasting blood sugar (p -value = 0.015; ES: -0.79). Further, BRBP consumption resulted in significant improvements in high-density lipoprotein cholesterol (p -value = 0.050; ES: 0.62), serum activities of catalase (p -value = 0.026; ES: 0.72), glutathione peroxidase (p -value 0.001; ES: 1.08), and superoxide dismutase (p -value = 0.009; ES: 0.84), as well as constipation rate (p -value = 0.018; ES: -0.85) compared to SDiet alone. However, no significant changes were found regarding levels of triglyceride, glutathione, and blood pressure after the trial.