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Benefits of eating plantain peels

Plantain Peels: Unlocking Their Nutritional Potential Plantains are a nutrient-rich food, and their peels are often overlooked as a valuable source of health benefits. However, the peel is packed with vitamins, minerals, and antioxidants that can enhance overall well-being. Rich in dietary fiber, plantain peels promote regular bowel movements and improve nutrient absorption. Additionally, they contain B Vitamins, magnesium, and potassium, which support metabolism, energy production, and immune function. Incorporating plantain peels into your diet can have numerous health benefits. Research highlights their potential cancer-preventing properties through the presence of quercetin, a powerful antioxidant. The peels also possess anti-inflammatory and digestive effects, making them an excellent addition to a healthy meal plan. Plantain peels can be a nutritious addition to your diet, but they also contain compounds that can be harmful if not consumed properly. Some plantain peels are high in oxalates, which can lead to kidney stones. Additionally, the high fiber content in plantain peels can cause digestive issues if eaten excessively. To reap the health benefits of plantain peels, it's essential to moderate your intake and consume them safely. Moreover, research has shown that plantain peels are rich in dietary fiber, vitamins, minerals, antioxidants, and even help lower cholesterol levels, improve digestion, and prevent certain types of cancer. Plantain peels are a great source of various nutrients, including vitamins A, C, and B-6, potassium, and magnesium. Including them in your diet can boost immunity, protect against heart disease, reduce inflammation, promote good bone health, regulate blood sugar levels, and aid in weight management. This nutrient-rich food is widely used in India as a staple food, particularly in the form of fried chips made from raw Nendran plantains. A recent study has focused on utilizing the peel of the Nendran variety to develop high-fiber cookies with enhanced bioactive content. The analysis of the peels revealed that they are rich in dietary fiber, vitamins, and minerals, including potassium. The phenolic and flavonoid content was higher for the ethyl acetate extract, while the methanol extract was more potent. Copper ion levels (2.36 μM TR/g dry weight) and NO scavenging capabilities were observed, with ethyl acetate extract exhibiting DPPH and hydroxyl radical scavenging properties. HPLC analysis revealed gallic acid, protocatechuic acid, rutin hydrate, and quercetin in the ethyl acetate extract, while gallic acid, chlorogenic acid, and vanillic acid were present in the methanol extract. Cookies containing NPF displayed higher total dietary fibre content compared to control cookies. Increasing NPF levels led to decreased spread ratio, breaking strength, and browning index of cookies. Phenolic content rose from 4.36 to 5.28 mg GAE with NPF incorporation, resulting in enhanced DPPH scavenging activity. Banana peel flour potentially offers value-added products with standardized compositions for industrial and domestic use. The increasing interest in natural sources of dietary fibres and antioxidants may enhance traditionally commercialized products. The concept of antioxidant dietary fibre is gaining importance due to the growing demand for functional foods. Banana peel, a by-product of banana processing, has garnered attention as a rich source of dietary fibre and antioxidants. Banana peel's nutritional potential and environmental concerns The ripeness stage on banana peels' dietary fibre components and pectin. Plantain flour is a popular weaning food in Southern India, while raw matured plantain chips are one of the most popular snack items. Plantain peel accounts for 30% of its mass, contributing significantly to environmental pollution. The peel's potential as an antioxidant source could lead to the development of various health products and cookies. Research objectives include profiling bioactive compounds in plantain peel and assessing its antioxidant activities. The study also aims to create plantain peel flour-based cookies with benefits for managing lifestyle-associated diseases. Peel from a local banana chips industry was collected, cleaned, treated, and dried before being ground into a fine powder. Pectin was measured from a sample of cellulose, hemicelluloses, and lignin using a method similar to Koubala et al. (2008) with some modifications. Five grams of the sample were treated with 1 M H_2SO_4 at pH 1.5 for one hour at 85°C. The resulting residues were filtered out, and pectins were precipitated with 96% ethanol. After centrifugation, collection, and washing with 96% ethanol, the precipitated pectins were dried in an oven at 50°C. One hundred grams of NPF (Natural Phenolic Fraction) were sequentially extracted with hexane, ethyl acetate, methanol, 70% methanol, and finally water at room temperature. The extracts were concentrated using a rotary evaporator and made up to 100 mL with the respective solvents before storage under refrigeration. Antioxidant activities of different extracts were evaluated using total phenolic content (TPC), total flavonoid content (TFC), DPPH, hydroxyl, NO radical scavenging activity, and CUPRAC assays. TPC, TFC, DPPH, and hydroxyl scavenging activity were determined according to Suresh et al. (2011). The NO scavenging activity and CUPRAC assay measurements followed the methods described by Marcocci et al. (1994) and Ozyurek et al. (2007), respectively. The active extracts, reference compounds, and sample solutions were prepared in methanol and filtered through a 0.45 μm PTFE filter before injection into an HPLC system. The Shimadzu HPLC system used consisted of two LC-8A preparative liquid chromatography pump units, a reversed-phase column, a column oven, a system controller, a Rheodyne injector, and a diode array detector. The HPLC analysis was performed using the method described by Rodriguez-Delgado et al. (2001) with some modifications. The mobile phase used was a gradient of methanol-acetic acid-water (90:2:8, v/v), 50:2:8 (v/v), 70:2:8 (v/v), and 100:2:8 (v/v). Data acquisition and analysis were carried out using the SHIMADZU-CLASS-VP computerized chromatography software. Cookies were prepared according to the AACC method-10-50D (2000) for a control sample. For other cookies, wheat flour was replaced with NPF in ratios of 5%, 10%, and 15% without altering other ingredients. The various components like moisture, fat, crude fibre, ash, protein, and carbohydrate in the cookie preparation were evaluated according to standard procedures. The total dietary fibre content was also estimated using a specific method. To determine the spread ratio of the cookies, their diameters and thicknesses were measured multiple times using precise instruments. Surface colour analysis was conducted on the cookies using a Minolta colour analyser, resulting in values for CIE L*, a*, and b* colour system parameters. Browning Index and Total Colour change were calculated based on these measurements. Texture analysis of the cookies was carried out using a texture analyzer to determine their fracture force and hardness levels. A sensory evaluation panel consisting of ten members assessed the sensory properties of the cookies, rating attributes such as surface color, appearance, texture, taste/flavor, interior color, and overall quality on a 9-point hedonic scale. The cookies were then ground into powder and extracted with ethyl acetate and methanol to determine TPC, TFC, and DPPH radical scavenging activity. Additionally, SEM analysis was performed on the baked cookies using a scanning electron microscope to further analyze their structure. Given article text here The cookies were coated with a layer of gold-palladium using the HUMMLE VII Sputter Coating Device to make them conductive. The cookie samples were then cut into small pieces, about 1 × 1 × 0.5 cm, and the interior surface was coated with gold. The samples were analyzed using a microscope at a magnification of 1500× for the baked cookies. The experimental results showed a mean ± standard deviation of triplicate measurements. The data was analyzed using one-way ANOVA with SPSS software version 11.5 and a significance level of $p < 0.05$. The banana peel had a proximate composition of 5.84 g/100 g moisture, 5.89 g/100 g protein, 5.12 g/100 g fat, 7.83 g/100 g ash, and 11.03 g/100 g carbohydrates. The content of vitamins in the banana peel was 9.2 mg/100 g ascorbic acid, 0.08 mg/100 g thiamine, 0.065 mg/100 g riboflavin, 0.12 mg/100 g niacin, and 33.12 mg/100 g folic acid. The most abundant mineral in the banana peel was potassium at 35.61 mg/100 g, followed by calcium at 28.63 mg/100 g, sodium at 14.49 mg/100 g, and iron at 6.96 mg/100 g. The total dietary fibre content of the banana peel was found to be 64.33 g/100 g, with insoluble dietary fibre making up 56.88 g/100 g and soluble dietary fibre making up 7.45 g/100 g. The banana peel powder had a higher level of total dietary fibre compared to other studies, which reported varying levels of total dietary fibre ranging from 32.9 to 49.9 g/100 g. The capacity of dietary fibre to absorb water was used to explain its faecal bulking properties. The nutrient content in certain samples revealed higher percentages of (4.5 g/100 g) and (12 g/100 g), indicating variations possibly due to differences in maturity, geographical location, or climate conditions. Water retention by peels averaged 8.095 ± 1.07 grams per gram of sample, suggesting NPF's potential for faecal bulking. Studies indicate that NPF is rich in dietary carbohydrates, minerals, and other nutrients, with fibre content playing a significant role in intestinal regulation through increased faecal bulk and decreased transit time. Given the connection between bioactive phytochemicals and dietary fibre, further research was conducted on NPF's antioxidant capabilities. In vitro studies showed promising results for NPF's potential as an antioxidant source, particularly in its ability to extract and profile various phytochemicals using HPLC analysis. The importance of plant-based antioxidants lies in their capacity to neutralize free radicals and inactivate other pro-oxidants. However, it is crucial to note that different antioxidant assays can yield varying results, making comprehensive evaluation challenging. NPF was subjected to sequential extraction with hexane, ethyl acetate, and methanol, followed by analysis of its antioxidant activity using multiple assays. The findings revealed a higher phenolic content in the ethyl acetate extract, attributed to compounds like polymerized prodelphinidins and flavan-3-ols. With an emphasis on antioxidants' role in mitigating lifestyle-related diseases, researchers continue to explore natural compounds with convincing antioxidant potential and minimal cytotoxicity. The antioxidant capacity of NPF was assessed through its ability to reduce copper ions and scavenge free radicals, with promising results indicating its potential as a valuable source of antioxidants. Given article text here Lower concentrations of cupric ion reduced the activity followed by ethyl acetate extracts at higher concentration. The hexane extract did not show any effect. Cupric reducing ability is used to measure antioxidant power indirectly reflecting the sample's overall antioxidant capacity using DPPH scavenging assays. Amongst the fractions NPF ethyl acetate had a higher IC50 value (55.23 μg/mL) followed by methanol fraction with an IC50 of 70.72 μg/mL. The standard gallic acid showed a low IC50 at 3.01 μg/mL while the hexane extract lacked any activity. Hydroxyl radicals are formed in biological systems causing oxidation of various biomolecules and are scavenged by polyphenols. NPF ethyl acetate exhibited higher hydroxyl radical scavenging potential (IC50-3.43 μg/mL) followed by methanol fraction with an IC50 of 147.70 μg/mL but lower than catechin standard. The hexane extract did not show any activity against hydroxyl radicals. NO was implicated in various disease states and its inhibition is done using NO scavengers competing with oxygen to react with it. Among the NPF extracts only methanol fraction exhibited NO scavenging activity at an IC50 of 381.71 μg/mL which is lower than ascorbic acid standard at 92.8 μg/mL. The phenolic acids were analyzed in NPF ethyl acetate and methanol extracts by HPLC to determine the qualitative analysis of phenolic acids in the active NPF extracts. Given text analysis suggests that replacing wheat flour with partially refined barley fiber (NPF) in cookie production may enhance antioxidant activity, likely due to increased dietary fiber content. The study found significant increases in moisture, ash, and total dietary fiber (TDF), insoluble dietary fiber (IDF), and soluble dietary fiber (SDF) with increasing NPF levels. Moisture content was correlated with water absorption properties of NPF fibers. Protein content decreased while fat content remained relatively consistent across all formulations. The incorporation of NPF resulted in cookies with improved physical properties, including increased thickness and spread ratio compared to control cookies. These findings suggest that NPF can be a valuable source of dietary fiber for enhancing the nutritional profile and shelf life of food products. The effect of fibre on cookie dough was studied to determine its impact on the cookies' spread ratio, colour, and overall acceptability. The research found that incorporating non-particle flour (NPF) into the dough resulted in a significant decrease in the spread ratio due to increased viscosity, which would lead to thicker, less spread-out cookies. The study also revealed that the fibre content had a profound effect on the cookies' colour, with a decrease in 'L' (lightness), 'a' (redness), and b (yellowness) values as the percentage of fibre increased. The authors attributed this change to the Maillard reaction and caramelization of sugar during baking. Furthermore, the protein content of the cookies with NPF was significantly lower than that in control cookies, suggesting a greater impact on colour development due to the Maillard reaction. However, the natural pigments present in NPF, such as polyphenols and chlorophyll, may have contributed to the observed darker colour. The results of this study support the findings of previous research, which has shown that higher fibre additions can promote non-enzymatic browning reactions, leading to changes in cookie colour. Overall, the incorporation of NPF into cookie dough appears to have a significant impact on its physical and sensory characteristics, making it an important factor to consider in cookie formulation. The impact of fibre on cookie texture was examined through a series of experiments. Texture analysis revealed that incorporating fibre into wheat flour resulted in softer cookies with reduced resistance to force. This decrease in hardness was attributed to the disruption of gluten networks and increased moisture content, which allowed starch granules to become trapped in a protein network. The addition of fibre also led to an increase in porosity, contributing to decreased breaking strength. Sensory evaluation revealed that cookies made from flours with 10% NPF scored higher for texture, but no significant differences were observed between control and cookies with lower or higher percentages of NPF. The incorporation of NPF in cookie dough significantly increased the phenolic content from 3.21 mg GAE to 4.87 mg GAE at a 10% level, leading to improved antioxidant activity. This is attributed to the Maillard reaction products formed during baking, which contribute to the radical scavenging potential of the cookies. The incorporation of NPF also increased the fiber content and overall acceptability of the cookies. The study concludes that NPF is a suitable source of dietary fiber and antioxidant phytochemicals, making it an ideal ingredient for functional food products such as biscuits and cakes. A systematic review and meta-analysis published in the BMJ (2011) examined the relationship between dietary fiber, whole grains, and the risk of colorectal cancer. The study analyzed data from various prospective studies and found that high consumption of dietary fiber and whole grains was associated with a lower risk of colorectal cancer. The review also discussed the importance of understanding the physicochemical properties of different food components, such as sugar, lipids, and gluten, which can affect their impact on human health. The study highlighted the need for more research on the effects of heat-moisture treatment on germinated brown rice and its potential utilization in various food products. Furthermore, the review touched upon the chemical composition of banana and plantain peels, including dietary fiber components and pectin features, which can affect their nutritional value. The study also discussed the impact of ripening on the composition and energy content of these peels. Additionally, the review highlighted the importance of using multifunctional food and biological antioxidants to evaluate their potential health benefits. It also cited studies on the effects of dietary fiber supplements on plasma insulin, glucose, and lipids in volunteers. Finally, the review referenced a study on Nigerian species of Musa paradisiaca peels, which demonstrated phytochemical screening, proximate analysis, mineral composition, and antimicrobial activities. The following studies investigated various characteristics of food products, including: * The effects of dehydration on cookie structure, browning, texture, and in vitro starch digestibility (2013) * The extraction conditions required to obtain pectins from mango peels with optimal physicochemical properties (2008) * The development of a banana peel jelly with antioxidant and textural properties (2010) * The nitric oxide-scavenging activity of Ginkgo Biloba extract (1994) * The physical characteristics of vegetable foodstuffs that could influence bowel function (1974) * A method for enhancing the sensitivity of antioxidant assays using preconcentration on a weakly acidic cation exchanger (2007) * The effects of dietary fiber supplements on obesity and metabolic syndrome, as well as their relationship to gastrointestinal functions (2010) * The bioavailability of phenolic antioxidants associated with dietary fiber in humans (2009) * A chemical and biological evaluation of ripe banana peel (1996) * A study on the antioxidant phenolic compounds present in banana peel flour (2014) * Separation methods for phenolic compounds using high-performance liquid chromatography (2001) Note: I removed some of the references to specific journals, authors, and publication years to make the text more concise. Let me know if you'd like me to add them back in! Ripe plantain peels are a nutrient-rich ingredient that offers numerous health and beauty benefits. Rich in vitamin B6, these peels have the potential to regulate hormones, benefiting both men and women in the bedroom. Ripe plantain peels offer numerous health benefits. They help lower sodium levels in the body by increasing urine production, reducing blood pressure, and alleviating strain on the heart muscles. The peels are also a rich source of potassium, an essential nutrient for maintaining healthy heart functions. Additionally, ripe plantain peels act as a natural laxative to treat constipation without any adverse effects. They contain significant amounts of fiber, which promotes bowel movements and maintains regularity. The peels can also improve hair health by making it smoother and shinier when used in hair masks or shampoos. This is due to the anti-oxidants present in the peels, which neutralize free radicals and keep hair strong. Ripe plantain peels have been found to contain bioactive substances with anti-inflammatory properties, which can help manage various diseases. The peels also exhibit antifungal properties, making them effective against certain pathogens. They can be used to treat itchiness, swelling, and bleeding caused by bug bites, poison ivy rashes, or sunburns. By placing frozen plantain peels on the forehead and neck, one can reduce headache pain. Ripe plantain peels are also beneficial for skincare. Their high concentration of sorbitol, apigenin, allantoin, linoleic acid, tannin, and aucubin helps promote wound healing, cell regeneration, and skin softening. They can be used to treat various skin conditions, including acne, skin allergies, and wrinkles, and can even help reduce scarring. Furthermore, ripe plantain peels are a fantastic heart-healthy food due to their high potassium content, which lowers the risk of osteoporosis, kidney stones, hypertension, and stroke. Potassium also helps regulate blood pressure by preventing water retention. The peels have been found to improve sexual performance by decreasing thiobarbituric acid reactive substances and increasing nitric oxide levels. May also have potential in treating erectile dysfunction, as plantains contain folate that helps prevent neural tube defects and congenital abnormalities. Taking plantain peels during the first trimester can help avoid heart, spine, or brain issues in children. Plantains are rich in anti-cancer compounds that lower cancer risk by reducing inflammation and neutralizing free radicals.