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# PHYTOSTEROL (PS) ENRICHED NUTELLA SPREAD FROM YAM BEAN MILK -A REVIEW

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## Abstract

In this article, different methods were referred for the preparation of phytosterol (PS) enriched 'Nutella' spread prepared by yam-bean extracted milk. Yam bean (Jicama) is popularly known as sank alu in Bengals which is good for preventing risks of hypertension and high blood cholesterol is mostly available in market in winter season. Yam bean milk product is also helpful for lactose intolerance people. Nutella is a chocolate spread product and friendly to our gut. It can be prescribed for adults as well as children. In a combination with phytosterols this product might be associated with reduced cholesterol levels and a lower risk of certain types of cancers. In this review an initiative has been made to develop PS enriched Nutella and to enlighten the optimised method parameters for preparation of this product.

***Keywords :*** *Phytosterol , Yam bean , Nutella , Anti cholesterolemic, Lactose-intolerance*

## Introduction:

Nutella is a sweet and creamy spread composed primarily of milk, hazelnuts, chocolate, and sugar. It serves as a delightful and convenient breakfast option or school snack when spread on bread, paired with a glass of milk, or used as a dip for fruits like banana, apple, and strawberry (Jillian Kubala, MS et al., 2023) .This delectable combination of roasted nuts and cocoa has gained worldwide recognition, establishing Nutella as a household favourite in Europe, particularly in Germany, Italy, and France. The origins of Nutella can be traced back to the 1940s when cocoa was scarce due to wartime restrictions, and chocolate was considered a luxury. In response, Pietro Ferrero devised a profitable chocolate spread by blending cocoa with roasted hazelnuts, cocoa butter, and vegetable oil, which he initially named "Pasta Gianduza." The product gained popularity quickly, with 660 pounds sold in February 1946. To meet the growing demand, Ferrero collaborated with local farmers to enhance hazelnut cultivation. In 1949, Ferrero introduced an even creamier and more

spreadable version called "Supercrema Gianduzha," leading to the emergence of "The smearing" service in Italian shops. Finally, in 1964, Supercrema Gianduzha was rebranded as Nutella. The first jar rolled off the production line in Alba on April 20, 1964, marking the beginning of its international marketing efforts. Nutella is certified kosher and labelled with a "sell by" date. It can be stored for up to a year at room temperature, whether the jar is open or sealed. Refrigeration is discouraged, as it makes Nutella less spreadable, and excess heat may cause the oil to separate, which can be remedied by stirring with a spoon (Jillian Kubala, MS *et al*., 2023).

Despite its deliciousness, Nutella is high in calories and fat, primarily due to its sugar content. Overconsumption can lead to health issues such as obesity, diabetes, heart disease, liver disease, and cancer (Poli A et al., 2021). To mitigate these concerns, it's advisable to consume Nutella and other sugary foods in moderation. Additionally, there are healthier ways to enjoy Nutella, such as using brown sugar in limited quantities and substituting whole milk with yam bean milk, a rich source of phytosterols (Köhler J *et al*., 2017).

Nutella does offer some health benefits, including its fibre content, which helps regulate cholesterol levels and reduce the risk of heart diseases. It also contains iron and calcium, supporting the production of red blood cells and strengthening bones and teeth, respectively. While traditional Nutella is made from high-fat milk like cow's milk, buffalo milk, and goat's milk, this may not be suitable for individuals with lactose intolerance. Fortunately, Nutella can be prepared using lactose-free milk alternatives like soy milk, almond milk, rice milk, oats milk, yam bean milk, and coconut milk (Ostlund Jr *et al*., 2007), (Köhler J *et al*., 2017).

In this review article an initiative has been made to refer the preparation of Nutella from yam bean milk that provides a lactose-free alternative for individuals with lactose intolerance and others who need to avoid whole milk due to specific health conditions such as hypothyroidism, polycystic ovarian diseases, celiac disease, and gastritis (Katan M. B *et al*., 2003),( Jayaraman *et al*., 2021)

**Health benefits of phytosterol:**

Phytosterols have a long history of safe usage and are recognized for their effectiveness in reducing cholesterol levels. They have been employed for this purpose for a significant period and have also been linked to anti-inflammatory, antioxidant, and other positive effects (Matsuoka R., 2022). While some studies have indicated that phytosterols may have an impact on the reproductive system, primarily through their influence on estrogenic activity, it's important to note that no adverse reactions have been reported in healthy individuals. Moreover, there is a lack of studies examining the effects of phytosterol ingestion on postmenopausal women to date. In this review article an initiative has been made to refer the method parameters for the preparation of Nutella enriched with phytosterol (PS) and to draw the awareness about the significance of PS enriched Nutella (Katan M. B *et al*., 2003).

Phytosterols have a well-established safety record and are acknowledged for their efficacy in reducing cholesterol levels (AbuMweis S. S *et al*., 2008) They have been utilized for this purpose for a substantial period and have also been linked to additional health advantages, including anti-inflammatory and antioxidant properties. While some studies have suggested that phytosterols may affect the reproductive system, particularly through their influence on estrogenic activity, it is important to note that there have been no reported

adverse reactions in healthy individuals (Engel, R *et al.*, 2005). Additionally, there is limited research on the effects of phytosterol consumption on postmenopausal women to date (Trautwein, E. A *et al.*, 2003) This reviews article aims to delineate the methodology for preparing Nutella enriched with phytosterols (PS) and to bring attention to the potential benefits of PS-enriched Nutella.


Figure1: Various functions of phytosterol

**Absorption of phytosterol:**

Indeed, there are several types of phytosterols found in nature, primarily in seeds. Among these, notable examples of plant sterols include β-sitosterol, campesterol, and stigmasterol. These phytosterol was initially introduced as a therapeutic agent for the treatment of hypercholesterolemia, a condition characterized by elevated cholesterol levels in the bloodstream. Phytosterols, in general, work by reducing the absorption of cholesterol, as they are not efficiently absorbed on their own. It's worth noting that when phytosterols are consumed orally, they exhibit minimal potential for adverse effects due to their low bioavailability (Richard E. Ostlund Jr., 2007)

**Yam Bean Milk**

Yam Bean also known as Jicama or Mexican planet is a root vegetable, that is both nutritious and delicious. Yam bean rich in potassium and phosphorus these are also rich in magnesium, antioxidant, calcium, iron, zinc but low in sodium and copper. It is high in dietary fibre; this makes a great choice for those looking to maintain a healthy weight. It's also a good source of vitamin C, which is essential for a strong immune system and healthy skin. It contains potassium and important mineral that helps regulate blood pressure and support heart health, also improve digestion. Health benefits of Yam bean are use in weight management, immune system, healthy skin, regulate blood sugar, support heart health, neutralize harmful free radicals thereby offers protection from cancers, inflammation and viral cough and cold.

**Preparation of Nutella from yam bean milk**

**Ingredients**

90gm (1cup) raw hazelnuts, 250gm (1cup) chocolate, chopped form, 50gm (1/4cup) dark chocolate, chopped form, 10ml (2/3tbsp) hazelnut oil or vegetable oil, 80gm (1/3cup) brown sugar, 150ml (1/2cup) yam bean

**Process**

Begin by preheating the toaster oven to 350°F, the hazelnuts were evenly roasted.

It was spread out on a baking sheet, making sure they don't touch each other. It was then roasted for approximately 20 minutes until they turn a golden brown color. To remove the hazelnut skins, wrap them in a handkerchief or cloth and vigorously rub to peel off the skins.

Once the hazelnuts are roasted, it's time to melt the chocolate. Chopped chocolate was placed into a microwave-safe bowl and chopped dark chocolate was taken into another microwave-

safe bowl. It was put in microwave them in 30-second intervals, stirring until all the chocolate is melted, ensuring a complete melting process. A paste was made by blending hazelnuts and oil was added to it. Then, mix this paste with the two bowls of melted chocolate, brown sugar, and the yam bean milk prepared earlier. Continue blending until you achieve a smooth and spreadable consistency. Prepared Nutella was then to be transferred into container.

**Discussion:**

The purpose of this review is to outline the role of dietary phytosterols in human health. Dietary saturated fat, cholesterol and fibre are currently emphasized in the reduction of low-density lipoprotein in cholesterol levels. It has been reported that adding phytosterols to Nutella reduced total serum cholesterol levels and LDL cholesterol levels by about 10%. Plant sterol esters reduce the absorption of cholesterol in the blood and lower circulating blood cholesterol concentrations when included in the regular diet. It is a low-fat spread in which plant sterol esters can be incorporated into a low-fat diet, making it a useful adjunct to the diet of hypercholesterolemia. It has been shown that adding phytosterols improves the nutritional quality of foods and significantly lowers total serum cholesterol levels. Elevated cholesterol levels pose a risk for heart diseases (Rocha V.Z *et al.*, 2016), like arteriosclerosis, myocardial infarction, and cerebral infarction, which can lead to a shortened life expectancy. Thus, it is of paramount importance to manage cholesterol levels.

Recent studies have highlighted the cholesterol-lowering effects of phytosterols. Additionally, phytosterols exhibit anti-inflammatory and anti-diabetic properties, contributing to the prevention of cardiovascular diseases. To optimize dietary cholesterol reduction (Brufau, G *et al*., 2008; Trautwein, E. A *et al*., 2007), blending phytosterols with other ingredients or functional foods has proven to be an effective approach. An example of this is the "Portfolio Diet," which combines phytosterols with other components like psyllium and soy protein.

**Conclusion:**

Phytosterols, reduce serum low-density cholesterol levels, offering protection against cardiovascular diseases, heart attacks, and strokes, as well as assisting in the control of cholesterol levels. Nutella is a fibre-rich product that alleviates constipation and supports cholesterol control. Additionally, it reduces the risk of heart disease and serves as a valuable source of iron and calcium. Iron contributes to the production of red blood cells and boosts the immune system, while calcium strengthens bones and teeth. Nutella made from yam bean is suitable for individuals with conditions such as hypothyroidism, hypertension, PCOD, heart disease, atherosclerosis, celiac disease, gastritis, obesity, lactose intolerance, and fatty liver disease.

**Future Scope:**

This study seeks to promote the incorporation of phytosterol-enriched Nutella into everyday diets as a means of obtaining the health benefits associated with phytosterols, particularly in managing cholesterol levels. Such research can be valuable in promoting healthier dietary choices and potentially reducing the risk of heart-related issues. We wish its extensive adoption in the food industry, food processing, food formulation, and the advancement of innovative food products in the coming years.

**Conflict of Interest**: There is no conflict f interest between the authors in publication of this paper.

**Author's Contribution**: Munmun Ruj undertook the entire literature review. Swaralipi Biswas was responsible for creating all the figures and handling the references. Dr. Rupali Dhara Mitra conceptualized the idea and title of this paper and also provided comprehensive editing for the entire manuscript.

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