

Microbiological quality analysis of locally produced soymilk drinks sold in local market in Nagpur

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World Journal of Biology Pharmacy and Health Sciences, 2024, 20(03), 014–017

Publication history: Received on 20 October 2024; revised on 30 November 2024; accepted on 02 December 2024

Article DOI: <https://doi.org/10.30574/wjbphs.2024.20.3.0954>

Abstract

Background: This study was aimed at evaluating the microbial quality and proximate analysis of soymilk produced and sold within local market.

Methodology: Soymilk samples were purchased in pairs from five locations in Nagpur. The samples collected were subjected to microbiological and proximate analysis to ascertain the hygienic standards of the products and nutrient contents.

Results: The result revealed the cultural morphology and microscopic identification of the fungi isolated from the soymilk samples analyzed in this study. The fungi isolated were *Aspergillus* sp, *Rhizopus* sp, *Penicillium* sp and *Mucor* sp.

Conclusion: The results of this study revealed that soymilk samples which is highly consumed in Nagpur were highly contaminated with microorganisms whose source may be traced to poor hygiene of producers, unsanitary conditions of processing equipment and raw materials. These findings show varying public health concerns in the soymilk samples analyzed. The study shows an unacceptable microbiological quality of these products and a dire need for the strict implementation of HACCP protocols during production of these products to prevent the occurrence of food contamination, spread of antibiotic resistant organisms and other serious public health concerns.

Keywords: Soymilk; Contamination; Public Health; Hygiene; Foodborne Illnesses; Fungi

1. Introduction

Soymilk is a healthy satisfying beverage obtained from the water extract of soybeans. It has a smooth creamy texture with an off-white emulsion-like suspension containing proteins, water soluble vitamins and carbohydrates (1). Soybean is a substrate used for the production of a number of fermented products such as fermented beverages, culture drinks, yoghurt-like products, frozen desserts, cheese substitutes, tofu, sauces and other typical Asian products. Microorganisms found in soymilk contribute to its spoilage. In addition to poor handling and unhygienic practices of local producers of soymilk products, the nutrient composition of soymilk makes it an excellent bacteriological medium. These have been implicated in the occurrence and prevalence rate of diseases such as typhoid fever and dysentery among soymilk consumers (2)

The consumption of locally produced cereal foods and drinks are becoming very popular, with acceptability cutting across the various multi-ethnic groups and socioeconomic classes. They have economic potentials especially now that emphasis is on development of local foods. The high cost and scarcity of milk supplies in developing countries has led to the development of alternative milk supplies from vegetable sources such as soymilk. This is a vital substitute when

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solving malnutrition problems in developing countries like Nigeria(1)These beverages are however prone to microbial spoilage if not properly processed, handled and stored.

Health benefits of soymilk include low lactose and cholesterol content, reduced bone loss, prevention and reduction of heart diseases(3) Despite this array of benefits derivable from soymilk, previous studies have reported that it can easily be a route for transmitting foodborne illnesses. Foodborne or waterborne microbial pathogens cause diarrheal diseases, which is a leading cause of illness and death in less developed countries, killing an estimated 1.9 million people annually at the global level(9)This study was therefore aimed at evaluating the microbial quality and nutritive value of soymilk locally produced and sold within Calabar Metropolis.

2. Material and Method

2.1. Sources of soymilk

A total of Ten (10) soymilk samples were purchased two each from five locations in Nagpur market

2.1.1. Collection of Soya Milk

A total of Ten (10) soymilk samples were purchased two each from five locations in Nagpur market namely; Gandhi Chouk market, Budhwar market, Shanichara market, Netaji market and Shaniwar Bazar The samples were properly labelled, placed in plastic containers and transported for analysis

2.2. Microbiological analysis



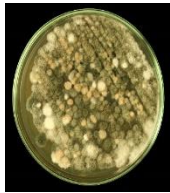

2.2.1. Characterization and Identification of the isolates

. Fungi isolates were characterized and identified according to their cultural morphology and microscopy using the scheme of Samson and Varga(7)and Wantanabe(8) The identification of the fungi was based on the examination of the conidial heads, philiades and conidiospore.

3. Results

The result revealed the cultural morphology and microscopic identification of the fungi isolated from the soymilk samples analyzed in this study. The fungi isolated were *Aspergillus* sp, *Rhizopus* sp, *Penicillium* sp and *Mucor* sp

Table 1 The fungi isolated were *Aspergillus* sp, *Rhizopus* sp, *Penicillium* sp and *Mucor* sp

Sr.No.		Photo plate
1	 <i>Aspergillus niger</i>	 <i>Penicillium</i> sp
2	 <i>Mucor</i> sp	 <i>Rhizopus</i> spp

3.1. Cultural and morphological characterization of fungal isolates

Table 2 Cultural and morphological characterization of fungal isolates

Number of isolates	Colony morphology	Microscopic morphology	Probable organism
4	Growth begins as yellow colonies that soon develop a black, dotted surface as conidia are produce within 26 days. The colony becomes jet black and powdery and the reverse remains cream color	Exhibits septate hyphae long conidiophores that support spherical vesicle that give rise to metulae and phalides from which conidia are produce.	<i>Aspergillus niger</i>
2	Black fluffy coloration with powdery appearance	Non-septate hyphae with sporangiophores	<i>Rhizopus spp</i>
1	Green colonies, surface of colonies becomes powdery due to presence of conidia	Hyphae are septate and produce brush like conidiophores, conidiophores produce metulae from which phalides producing chains of conidia arise	<i>Penicillium sp</i>
3	Growth begins as white to grey colonies that later turn to brown	Non septate with a visualized sporangiophores and sporangia. Presence of branched coenocytic hypha and black spores	<i>Mucor sp</i>

4. Discussion

Soy milk and soybean products have served as an important source of protein in the diet of millions of people for nearly 5,000 years. Its high nutrient value has made it so irresistible that it is recommended very highly by nutritionists as a substitute to cow milk. The increase in the consumption rate of soybean milk due to its high protein content has encouraged low scale production of the soy milk under house hold condition with little or no regard to the quality control measures(12)The results of microbial load of soy milk samples locally produced in Calabar Metropolis revealed that the microbial count and the most probable number of coliform obtained exceeded the acceptable limit for both milk products and non-alcoholic beverages ($<10^4$ cfu/mL This result agrees with the findings of other researchers The contamination of the soy milk is mostly as a result of poor handling, use of contaminated raw materials, unhygienic processing environment and lack of good manufacturing practices(12)

Adebayo-Tayo *et al* and Nazim *et al*(16)reported significantly higher fungal counts in locally produced soy milk products compared to fungal counts obtained in this study. The relatively higher fungal counts observed may indicate a contamination of the products during processing. This could cause the growth of potentially harmful fungi in these products, and may also lead to certain ill health when consumed The occurrence of *Aspergillus sp.* is a cause for concern as it can produce potentially harmful aflatoxins in the products when they are consumed

5. Conclusion

The results of this study revealed that soy milk samples which is highly consumed in State were highly contaminated with microorganisms whose source may be traced to poor hygiene of producers, unsanitary conditions of processing equipment and raw materials. These finding shows varying public health concerns in the soy milk samples analyzed. The study shows an unacceptable microbiological quality of these products and a dire need for the strict implementation of HACCP protocols during production of these products to prevent the occurrence of food contamination, spread of antibiotic resistant organisms and other serious public health concerns.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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