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Studies on Phytochemical Screening and Antimicrobial Activity of *Dioscorea Hispida* Dennst. (Kurot) Tuber Extract

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ABSTRACT

Dioscorea hispida Dennst, is a bitter and wild yam that is locally known as 'kurot' in Northern Samar, Philippines. It is not cultivated but just grows in the forest. People have learned to remove the bitter taste of kurot and are considered not just as food in time of crisis but also used as medicine for human ailments. In this study, the phytochemical characteristics like alkaloids, steroids, tannins, saponins, and phenols of kurot extract were analyzed and the antimicrobial activity of the tuber extract was determined based on their used as traditional medicine for the treatment of various ailments, local residents used as antifungal activity and ethnomedical used for microbial infections. Based on the phytochemical screening results the tuber extract of kurot may have potential application in variety of antimicrobial products. The results gathered in this study would help the communities better understand the diversity and potential of kurot leading to further scientific investigation and thus, more effective conservation and utilization of the plant.

Keywords: Antimicrobial, kurot, Northern Samar Philippines, phytochemical screening, utilization.

INTRODUCTION

Yams (Dioscorea species) are perennial trailing rhizome plants, which belong to Dioscoraceae family [1-4]. The crops serve as an important staple food in many parts of the Country and the world indicated that the yam tubers could be source of energy, primarily, as their dry material predominantly consists of carbohydrates, crude protein, fat, fiber and ash [4].

Northern Samar has a rich assortment of plants distributed in different geographical and ecological conditions widespread in the province. Plants have been used since prehistoric times for treatment of various ailments [5]. The traditional systems of medicine together with folklore systems continue to serve a large portion of inhabitants, particularly in rural and tribal area regardless of the dawn of modern medicine. Nowadays there are many drugs available as anti-inflammatory, antioxidant and antimicrobial agents; however they have undesirable effects and adverse reactions [6-8]. Since, the modern medicines have some limited use the traditional plants are now becoming the promising approach for the treatment of

several diseases. Medicines are becoming expensive. People in the community cannot afford to buy medicines. Although, there were studies to use alternative sources of medicines but most of their findings were focused on plants. Only few are on wild yam.

The bioactive components of kurot extract have been paid more attention by researchers however there have been few investigations on the secondary metabolites of kurot tuber extract. Studies on the properties of Dioscorea hispida are very important due to their ready availability and their utilization in food and non-food applications. In this study, to make full use of the resources and to widen its application, the secondary metabolites and antimicrobial properties of kurot tuber extract were determined.

MATERIALS AND METHODS

Plant material and extraction: Fresh tubers and bulbs of Dioscorea hispida (450 g) was collected in UEP Catarman N. Samar. Fresh peeled rhizomes were extracted with 500 mL of methanol using blender. The liquid was centrifuged for 15 min and the supernatant was filtered. The residue was extracted twice with 100 mL of methanol for 24 h, centrifuged and filtered. The extracts were combined evaporated and lyophilized. The total extract was 29 g.

Phytochemical Screening of Kurot tuber extract: The kurot extract was subjected for chemical analysis to identify and characterize some of the secondary metabolites. The standard procedures for phytochemical screening described by Guevarra [9] were adopted to screen the methanolic extracts of Kurot for secondary metabolites such as alkaloids, tannins, phenolic compounds, steroids and saponins.

Test for antimicrobial property of Kurot tuber extract: Three replicates of the kurot tuber extract was inoculated with the test microorganism (S. aureus and E. coli) was placed on each tube with saline solution. The test tubes were swirled for 15 min to disperse the cells of the microorganisms. 1mL aliquot of the prepared saline solution where the extract was inoculated with microorganism was placed on each Petri dish. These plates where then poured with the media. The medium was allowed to solidify and the plates were incubated for 24 h. The number of colonies of the viable cells that grew on the surface of the medium in the plates were counted and compared.

RESULTS AND DISCUSSION

The wide acceptance of traditional medicine as an alternative form of healthcare and the alarming increase in the incidence of new and re-emerging infectious diseases bring about the necessity to investigate the secondary metabolites from the kurot tuber extract. Secondary metabolites are compounds that are not essential for growth or survival of the producing organism [10]. The medicinal value of plants lies in the bioactive compounds such as alkaloids, tannins, saponins, steroids and phenolic compounds that produce a definite physiological action on the body. The results of the phytochemical screening of the kurot tuber extract were presented in table 1. The results revealed that the extract of kurot tuber was found to be positive in secondary metabolites such as phenols, tannins, alkaloids, and steroids. The result could be the basis wherein the kurot extract could also be used as an additive for the development of drugs.

Quantitative antimicrobial test: The quantitative determination of antimicrobial activity of *S. aureus* and *E. coli* were investigated in this study. It was observed from the plates after 24 h incubation that *S. aureus* did not grow over the kurot extract, since there were no colonies that were formed. The 100% reduction in colony growth, imply that kurot tuber extract exhibited bactericidal property.

Table 1. Analysis of secondary metabolites of Kurot Tuber Extract

Secondary Metabolites	Kurot extract	Interpretation
	Results	
Alkaloid	Dragendorff's reagent orange precipitate formed	Positive
Tannins	Yellow precipitate formed	positive
Phenolic compound	Green colored solution	positive
Saponin	higher than distilled water capillary tube	negative
Steroids	yellowish colored solution	positive

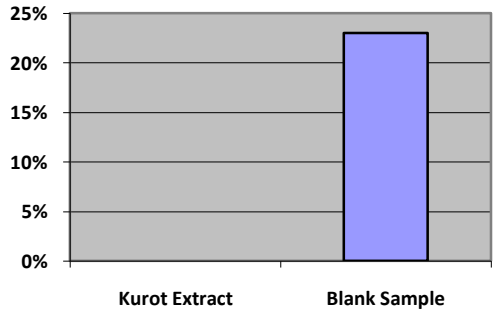

Figure 1. Percent inhibition growth of S. aureus colonies against Kurot extract.

A Gram-negative bacterium was used in this study, *E. coli* an aerobic and facultative anaerobic [10]. Two samples were dispersed in the media; the blank sample dispersed in the media demonstrates colony growth of *E. coli* on the blank sample after 24 h. On the kurot extract, no 5% *E. coli* growth was observed after the 24 h incubation period. The 90% decrease in colony growth implies that the kurot extract exhibited bactericidal property. Based on the antimicrobial results showed in figures 1 and 2 using pour plate method, the percent colony for *E. coli* is and for S. *aureus* implies that the extract has an antibacterial property.

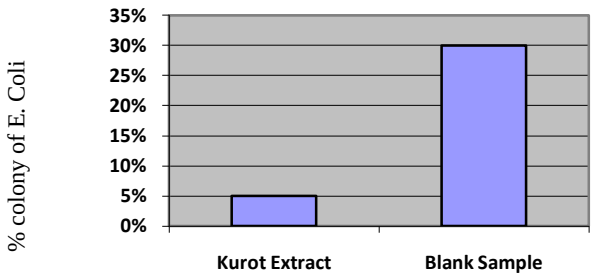

Figure 2. Percent inhibition growth of E. coli

APPLICATIONS

The results of this study can be made available to researchers interested to do further studies on the preparation and safe use of kurot tuber extract as an effective antimicrobial agent and possible pharmacognistic value of kurot plant extract, since kurot is utilized as traditional medicine, since up to this day it is still an under-explored area in the research field.

CONCLUSIONS

This study focused on the extraction of the kurot tuber and the determination of the different secondary metabolites like flavonoids, tannins and alkaloids. The effects of these different metabolites on the microbial activity were also investigated in this work. The kurot tuber extract was subjected to antimicrobial studies. Kurot extract exhibited bactericidal properties against *S. aureus* (100% decreased in colony growth), *E.coli* (90% reduction in *E.coli* colony growth). The results presented in this study bring new dimensions that could contribute to a better characterization of kurot extract. This point is very interesting for the development of different applications based on kurot tuber extract, with its cidal properties, the fabricated extract could be applied as an effective biocidal surface for its possible application in medical devices.

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