Qualitative Phytochemical Screening of *Rosmarinus Officinalis* Leaves Extract

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Abstract
Nigeria is endowed with savannah and tropical rainforest ecosystems, which together provide a vast variety of unusual medicinal plants. The indigenous people of Nigeria are researching and using a range of herbs for the efficient treatment of various diseases. From Nigerian medicinal plants, several studies on ethnobotany, ethnopharmacology, and phytochemistry have been conducted. In this research, qualitative phytochemical analysis was carried out on *Rosmarinu sofficinakis*. The leaves of *Rosmarinus officinalis* were collected from Gashaka and Donga Local government of Taraba state. The plant was taxonomically identified and authenticated in herbarium, Biological Science Department of Taraba State University, Jalingo. Plant leaves were ground after being air dried for a week at room temperature. Testing for various phytochemicals was subsequently carried. Results of this study revealed the presence of the following phytochemicals; glycosides, tannins, saponins, alkaloids and flavonoids. The qualitative phytochemistry of *Rosmarinus officinalis* extract showed that cold water extracts of the fresh leaves had higher composition of tannins, saponins, alkaloids and flavonoids while hot water extracts of dry leaves had less composition of the phytochemical compounds. Steroids and cardiac glycosides where not detected in any of the extracts. The phytochemical constituents of the plant extract were alkoloids, saponins, flavonoids and tannins. In conclusion, the bioactive compounds revealed in *Rosmarinus officinalis* is an indicative of the fact that *Rosmarinus officinalis* could be useful in traditional medicine.

Keywords: *Rosmarinus officinalis*, Phytochemicals, Bioactive compounds, Extract, Qualitative

1. Introduction

Indigenous people have employed medicinal plants all across the world, and they have a significant role to play in the treatment of both human and animal diseases. Based on their ethno pharmacological use, the majority of contemporary medications have more recently been created from isolated components of medicinal plants [1]. Recently, many cities around the globe especially China and India have created their own traditional medical pharmacopoeas since the World Health Organization fully supports this development. According to estimates from the World Health Organization, traditional medicine serves the majority of the basic healthcare needs of around 80% of the planet's population[2].

Nigeria is endowed with savannah and tropical rainforest ecosystems, which together provide a vast variety of unusual medicinal plants. The indigenous people of Nigeria are researching and using a range of herbs for the efficient treatment of various diseases. From Nigerian medicinal plants, several studies on ethnobotany, ethnopharmacology, and phytochemistry have been conducted. All across the world, medicinal plants have been used to cure a variety of illnesses, such as cancer, heart disease, infections, inflammation, and other ailments [3]. These plants are commonly utilized both as food and for therapeutic purposes. Plants fulfill these roles because phytochemicals and minerals are present.

Tannin, flavonoids, saponins, terpenoids, and alkaloids are only a few of the phytochemicals that are important in the fight against many diseases [4].

The Lamiaceae family includes the therapeutic herb *Rosmarinus officinalis*. It is a perennial, evergreen bush. It stands 1-2 meters tall. It is a bush with many branches. This plant has cylindrical branches and fibrous, light brown bark. This plant has opposite, evergreen leaves that are 1–1 1/2 inches long, blunt at both ends, and heavily coated in white stellate hairs [5]. This plant has flowers that are tubular and deeply cut into two lips. The flowers are enormous and placed in opposing pairs, with short, sharp bracts. Corolla has a small tube with a pronounced 2 lipped lip. There are two sections of the upper lip. The filamentous stamens [6].It features curving edges, a dark green upper side with tomentous granulesa and page bottoms, a pronounced midrib, and a very distinctive odor[1]. The bioactive components of *Rosmarinus officinalis* extracts, such as phenolic compounds, prevent the growth of both gram-negative and gram-positive bacteria[6]. Because of these biological qualities, rosemary has gained potential as a new medicinal agent for the treatment of numerous ailments [5]. Certain antioxidant phenolics found in *Rosmarinus officinalis* have been shown to offer protection against oxidative stress caused by oxidizing substances and free radicals. Research conducted in vitro and in vivo has mainly been used to determine the antioxidant potential of rosemary and its components [7].

The advent of diseases and the expansion of scientific understanding of herbal remedies as significant alternatives or additional forms of therapy for illnesses provide justification for the therapeutic substances produced from plants [8]. However, the use of synthetic drugs as therapeutic agents is restricted because of a number of issues, including poor drug solubility, stability, adsorption, and high toxicity. Additionally, several of these medications are exorbitant and typically unavailable to people living in developing countries, particularly those in remote areas [9] Therefore, this study will attempt to analyze the phytochemical constituents of *Rosmarinus officinalis* leaves extract in order to decipher how potent and significant the plant can be in traditional medicine.

2. Material and Methods

2.1 Plant collection, identification and pre-treatment

The leaves of *Rosmarinus officinalis* were collected from Gashaka and Donga Local government of Taraba state. The plant was taxonomically identified and authenticated in herbarium, Biological Science Department of Taraba State University, Jalingo. Plant leaves were ground after being air dried for a week at room temperature. Testing for various phytochemicals and antibacterial action was done on plant leaves. In order to identify phytochemical 1000 ml of aqueous and ethanol were combined with 100g of dried powdered plant extract, held for 24 hours, and then filtered.

2.2 Plant extraction preparation

In 1000ml of ethanol and 1000ml of aqueous, 100 grams (100g) of powdered leaves were added, respectively. Each were allowed while standing for three days at room temperature (28±2°C). Each extract was filtered through a Whatman (no. 1) filter paper, sieved through a muslin cloth, then poured into a clean evaporating dish and set on a water bath at 50 °C until the solvent evaporated completely. Until they were needed, the dried extracts were preserved in a sterile MacCatney bottle and kept at 4°C in the fridge.

2.3 Preparation of extract concentration

The extract concentration of *Rosmarinus officinalis* leaves was prepared *a*ccording to the procedure outlined by Yakubu et al. [10].· By mixing 1g of each crude plant extract with 10ml of 10% dimethylsulphuroxide (DMSO), a stock solution of the plant extracts was created. Using the two-fold serial dilution procedure, the following concentrations were created from each of the stock solutions: 500 mg/ml, 250 mg/ml, 125 mg/ml, 62.5 mg/ml, and 31.25 mg/ml. These concentrations had labels and were stored in bijou bottles for further use.

2.4 Phytochemical screening

Phytochemical analysis of *Rosmarinus officinalis* leaves extract was carried out according to method of Egbon [11]. The extracts were specifically tested for the presence of secondary metabolites (flavonoids, steroids, alkaloids, saponins, tannins, terpenoids).

2.5 Test for alkaloids

2.5.1 Wagner's reagent test

A portion of the sample (0.2 g) was boiled in a steam bath with 5 ml of 2% HCl. The filtrates were measured into four test tubes after the mixture was filtered. Each 1 mL filtrate was treated with 2 drops Wagner's reagent, which produced a reddish-brown precipitate indicating the presence of alkaloids.

2.6 Test for saponins

2.6.1 Emulsion test

A test tube containing 0.5 ml of extract and 5 ml of water was forcefully shaken to create an emulsion.

2.7 Test for flavonoids

2.7.1 Ammonium test

Each extract was heated with 10 ml of ethylacetate in boiling water for 3 minutes, and 4 ml of the filtrates were shaken with 1 ml of dilute ammonia solution (1%). Allowing the layers to separate was permitted. The presence of flavonoids was indicated by a yellow coloration at the ammonia layer.

2.8 Test for Steroids

1ml of plant extract, 1ml of chloroform, and 3 drops of concentrated sulphuric acid were mixed together. The presence of steroids was indicated by the formation of a brown ring.

2.9 Test for terpenoids

In a test tube, 5ml of aqueous extract of plant sample was mixed with 2ml of Chloroform, and then 3ml of concentrated H_2SO_4 was carefully added to form a layer. An interface with a reddish brown coloration indicates the presence of terpenoids constituents.

2.10 Test for tannins

2ml of 5% ferric chloride was added to about 1ml of leaf extracts and looked for brownish green or blue-black coloration, which indicated the existence of tannins.

3. Results

3.1 Phytochemical Screening of *Rosmarinus Officinalis* Leaves Extract

Results of this study revealed the presence of the following phytochemicals; glycosides, tannins, saponins, alkaloids and flavonoids. The qualitative phytochemistry of *Rosmarinus officinalis* extract showed that cold water extracts of the fresh leaves had higher composition of tannins, saponins, alkaloids and flavonoids. Hot water extracts of dry leaves had less composition of the phytochemical compounds. Steroids and cardiac glycosides where not detected in any of the extracts as presented in Table 1.

Table 1: Qualitative phytochemical screening of *Rosmarinus Officinalis* leaves extracts

Components	A_1	A_2	B_1	B_2	C_1	C_2
Glycosides	+	++	++	+++	+	++
Steroids	-	-	-	-	-	-
Tannins	+	+++	++	+++	++	+++
Saponins	+	+++	+	+++	++	+++
Alkaloids	+	+	++	+++	++	++
Cardiac glycosides	-	-	-	-	-	-
Flavonoids	+	+++	+	+++	+	++

A_1 = Hot water extract of dry leaves, A_2 = Cold water extract of dry leaves, B_1 = Hot water extract of fresh leaves, B_2 = Cold water extract of fresh leaves, C_1 = Ethanol extract of dry leaves, C_2 = Ethanol extract of fresh leaves

Discussion

In recent years, much interest has been placed on the chemical and pharmacological properties of the plant genus *Rosmarinus* which has long history in folk medicine, especially in traditional Chinese medicine [12], where they have been used in the treatment and management of human diseases and hence have been the fundamentals of human medicine [13]. Plant-derived medicines have been of great importance to millions of people in many African countries, particularly the poor living in rural and peri-urban areas where these medicinal plants are readily available and easily affordable [14].

The presence of tannins, flavonoids, saponin and alkaloids, was discovered in the phytochemical analysis of *R. officinalis* aqueous extracts. The concentration of secondary metabolites varies amongst the extracts evaluated. The presence of these components in this plant suggests that it may have medicinal value. This is most likely due to the fact that each of the identified components has a history of therapeutic use in one form or another. Plants high in saponins, for example, are known to boost the immune system and have anti-inflammatory properties [15]. Steroids and cardiac glycosides where not detected in any of the extracts in this study. Result does not totally agree with the findings of Egbon et al. [16] who reported the presence of flavonoids steroids and other bioactive phytochemicals in his investigation. However the result is in tandem with the report of Chang et al. [17]. The presence of these metabolites suggests great potential for the plant as a source of useful phytomedicines.

Plants that contain tannins have been reported to have antibacterial properties against microorganisms because of their inherent properties that enable them to combine with proteins to generate stable water soluble chemicals, killing the bacteria by directly destroying its cell membrane [18]. The presence of tannins shows that the plant is astringent and helps in wound healing. The astringency from the tannins is what causes the dry and puckery feeling in the mouth following the consumption of unripened fruit or red wine. Tannins are widely distributed in many species of plants,where they play a role in protection from predation, and perhaps also as pesticides, and in plant growth regulation [19].

Conclusion

The results from this study revealed that *Rosmarinus officinalis* contain significant bioactive phytochemicals that are good for human health. It can be concluded that *Rosmarinus officinalis* leaves have a good potential for drug development in pharmaceutical industries..

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