

## PHYTOCHEMISTRY OF METHANOLIC AND AQUEOUS EXTRACTS OF EUCALYPTUS CAMALDUNENSIS LEAVES, SEEDS AND STEM BARK

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### ABSTRACT

Phytochemicals are bioactive secondary metabolites in plants responsible for most of the medicinal activities of plants. *Eucalyptus camaldulensis* is an aromatic plant that possessed several Phytochemicals and acted as medicinal plant. The study was aimed to investigate the phytochemical constituents of *Eucalyptus camaldulensis*. The Phytochemicals constituents of leaves, seeds and stem bark of the plant were investigated using standard methods of Phytochemicals screening in both aqueous and methanolic extracts. The result of the phytochemical screening showed the presence of tannins, steroid, terpenoid, saponin, Flavonoid, phenol, Glycoside, Alkaloid and Anthraquinone. The phytochemical constituents of the leaves are found to be higher than that of the stem bark and seeds. The occurrence of these biologically active chemicals in *Eucalyptus camaldulensis* plants may justify their wide medicinal uses.

### INTRODUCTION

Plants are considered as largely complicated chemicals factories which can turn the relatively simple ingredients of air and water into so many compounds including liquids and oils (Mabley, 1997). Medicinal plants have been identified and used throughout human history and ethno botany is recognized as an effective way to discover future medicines (Shayoub *et al.*, 2015). Plants have the ability to synthesize a wide variety of chemical compounds. These compound in addition to basic metabolites include, phenolic compounds, terpenes, steroids, alkaloids and other chemicals substances which is known as “secondary metabolites” which have prominent effect on the animals systems and some possess important therapeutic properties which can be and have been utilized in the treatment and cure of human and other animals diseases for many centuries, and to defend themselves against attack from predators such as insects, fungi and herbivorous mammals (Mabley, 1997). At least 12,000 such compounds have been isolated so far; a number estimated to be less than 10% of the total (Tapsell *et al.*, 2006). The plants which produce and accumulate constituents have medicinal values are generally designated as “medicinal plants” (Mabley, 1997).

The River Red Gum (*Eucalyptus camaldulensis*) is a tree of the genus *Eucalyptus*, it is one of around 800 in the genus and it is a plantation species in many parts of the world, but it is native to Australia, where it is widespread, especially beside inland water courses (Slee *et.al* , 2006). *Eucalyptus* trees are well known for the medicinal properties of the oil contained in their leaves. The oil was used in traditional aboriginal medicines to heal wounds and fungal infections. Teas made of *Eucalyptus* leaves were also used to reduce fevers. *Eucalyptus* soon spread to other traditional medicine systems, including Chinese, Indian and Greek and European. *Eucalyptus* oil is believed to possess a wide variety of healing properties. It works very effectively as an antibiotic that is particularly successful against

some strains of bacteria. The oil also possesses anti-inflammatory properties. It can help stimulate the flow of blood and works to ease muscle and joint pain. *Eucalyptus* oil also acts as an antiseptic and works well in treating sore throats, mouth sores, gum disease and gingivitis. The essential oil from the leaves is used as a disinfectant and in medicinal applications. Although *Eucalyptus* oil has been used orally to treat some conditions, the oil is toxic when taken by mouth and must be diluted (Musa *et al.*, 2011).

*Eucalyptus* is used in many medicines to treat coughs and the common cold. It can be found in many lozenges, cough syrups, rubs, and vapor baths throughout the United States and Europe. Herbalists often recommend using fresh leaves in teas and gargles to soothe sore throats and treat bronchitis and sinusitis. Ointments containing eucalyptus are also applied to the nose and chest to relieve congestion (Shaigal *et al.*, 2012).

The aim of this study was to investigate the phytochemical composition of the crude methanolic and aqueous extracts of *Eucalyptus camaldulensis* leaves, seeds and stem bark.

## **Materials and Methods**

### **Collection, identification and Preparation of Plant Materials**

Fresh leaves, stem-barks and seeds of *Eucalyptus camaldulensis* were collected from Tamburawa irrigation area in Tamburawa town - Dawakin kudu local area, Kano State, Nigeria. Identification and Authentication of the plant materials was done at Pharmaceutical department of School of Technology, Kano. The plant materials were air dried at room temperature under shade for two weeks. The dried leaves, stem-bark and seeds of the plant were grinded into powder form using sterile pestle and mortar under laboratory condition. 10g of powder in each case was then dissolved in 100ml of methanol and distilled water separately and then filtered using filter paper and solvent was evaporated under reduced pressure using rotary evaporator apparatus. This extract was used for phytochemical screening

### **Phytochemical screening**

The phytochemical screening was done according to the methods reported by Sofowora, (1993) and Harborne, (1998)

#### **Test for alkaloids**

Exactly 0.5g of the plant extract was dissolved in 5ml of 1% Hydrochloric on steam bath. 1ml of the filtrate was treated with two drops of Dragendorff's reagent. Turbidity or precipitation was taken as indicative of the presence of alkaloids.

#### **Detection of steroids**

100mg of dry extracts were dissolved in 2ml of chloroform. A few drops of concentrated tetraoxosulphate (vi) acid were added to form a lower layer. A reddish brown colour at the interface was indicative of the presence of steroidal ring.

#### **Detection of Saponin**

Extracts were diluted with distilled water to 20ml which was shaken in a graduated cylinder for 15 minutes. Formation of 1cm layer of foam indicated the presence of saponin.

#### **Detection of Phenols**

100mg of dry extracts were dissolved in ethanol and 2ml of distilled water followed by a few drops of 10% aqueous ferric chloride solution were added. Ten percent aqueous ferric

chloride solution was prepared by mixing 5ml of ferric chloride to 45ml of distilled water. Formation of a blue-green colour indicated the presence of phenols.

#### **Detection of Tannins**

50mg of dry extracts were dissolved in 2ml of distilled water and mixed with 2ml of ferric Chloride. A blue-black precipitate indicated the presence of tannins.

#### **Detection of Terpenoid**

2ml of chloroform and 1 ml of concentrated tetraoxosulphate (vi) acid were added to 1mg of the dry extract. A reddish-brown colour indicated the presence of terpenoid.

#### **Detection of Glycosides**

50 mg of dry extract dissolved in 1ml ethanol was mixed with 1ml of water and then aqueous sodium hydroxide was added. A yellow colour observed indicated the presence of glycosides.

#### **Detection of Flavonoid**

200mg of dry extracts were dissolved in 10ml of ethanol and filtered. A few drops of HCl and magnesium ribbon were added to 2ml of the filtrate. Pink tomato red colour indicated the presence of Flavonoid.

#### **Detection of Anthraquinone**

About 200mg of the extract was placed in a dry test tube and 2ml of chloroform added for 5 minutes. The extract was filtered and the filtrate was shaken with 2ml of 10% ammonia solution. A pink violet or red colour shows the presence of Anthraquinone.

### **RESULTS AND DISCUSSION**

The phytochemical constituent of *Eucalyptus camaldulensis* leaf extracts is presented in table 1. The results revealed the presence of Alkaloid, steroid, Flavonoid, saponin, phenol, Glycoside, Terpenoid and Anthraquinone.

**Table 1: Phytochemical constituents of *Eucalyptus camaldulensis* leaf extracts**

<b>PHYTOCHEMICAL</b>	<b>METHANOLIC EXTRACT</b>	<b>AQUEOUS EXTRACT</b>
Alkaloid	+	-
Steroid	+	+
Flavonoid	+	+
Saponin	+	+
Phenol	+	+
Tannin	+	+
Terpenoid	+	+
Glycoside	-	+
Anthraquinone	-	+

+ =Present of phytochemical; - = absent of phytochemical

The phytochemical constituent of *Eucalyptus camaldulensis* seeds extracts is presented in table 2. The results revealed the presence of Alkaloid, steroid, phenol, Glycoside and Anthraquinone while Flavonoid and saponin are absent in both the extracts

**Table 2: Phytochemical constituents of *Eucalyptus camaldulensis* seed extract**

PHYTOCHEMICAL	METHANOLIC EXTRACT	AQUEOUS EXTRACT
Alkaloid	+	-
Steroid	+	+
Flavonoid	-	-
Saponin	-	-
Phenol	+	+
Tannin	+	+
Terpenoid	+	+
Glycoside	-	+
Anthraquinone	-	+

+ =Present of phytochemical; - = absent of phytochemical

The phytochemical constituent of *Eucalyptus camaldulensis* stem back extracts is presented in table 3. The results revealed the presence of Alkaloid, steroid, Glycoside, tannin, saponin, phenol, and Anthraquinone while terpenoid and Flavonoid are absent in both the extracts.

**Table 3: Phytochemical constituents of *Eucalyptus camaldulensis* stem back extract**

PHYTOCHEMICAL	METHANOLIC EXTRACT	AQUEOUS EXTRACT
Alkaloid	+	-
Steroid	+	+
Flavonoid	-	-
Saponin	-	+
Phenol	+	+
Tannin	+	+
Terpenoid	-	-
Glycoside	+	+
Anthraquinone	-	+

+ =Present of phytochemical; - = absent of phytochemical

The phytochemical screening of the plant *Eucalyptus camaldulensis* shows that the leaves, stem-barks, and seeds were rich in Alkaloid, steroid, phenol, Glycoside, Anthraquinone, Flavonoid, saponin and Terpenoid in both aqueous and methanol extracts. As result of the present of these secondary metabolites, they were known to show medicinal activity as well as exhibiting physiological activity. Tannins are present in both the leaves, seeds and stem back and are known to have high medicinal value. They perform many antimicrobial functions (Haslam, 1996). Saponins were present in leaves and stem-barks in aqueous extract and absent in seeds, while in methanolic extracts of stem-barks and seeds were absent. Alkaloids in methanol extract show present in leaves, stem-barks and seeds, while in aqueous extract all the plant section were absent. Flavonoids were absent in both aqueous and methanolic extracts of leaves but absent in the stem back and seeds extracts. The leaves, Stem-barks and seeds contain glycoside in aqueous extract but was absent in methanol

extract. On contrary, glycoside was present in stem-bark of methanol extract and widely used in herbal medication (Harborne, 1998). Leaves stem-bark and seeds were rich in steroids in both aqueous and methanolic extract. Steroidal compounds are of important and interest in pharmacy due to their relationship with such compound as sex hormones (Okwu, 2001). Terpenoid were absent in both methanol and aqueous of stem bark, but present in aqueous and methanolic extract of leaves and seeds. The terpenoid forms most of the essential oil giving *Eucalyptus* foliage its characteristic smell. Anthraquinone is rich in all the parts in aqueous extract but absent in methanol extracts. The finding of this result was inconformity with several studies involving Phyto-chemistry of *Eucalyptus camaldulensis* (Sani *et al.*, 2014; Shayoub *et al.*, 2015).

## CONCLUSION

The result of the present study signifies the use of *Eucalyptus camaldulensis* as exerting various medicinal activities since it contains various bioactive components. The plant could therefore serve as source of bioactive agents for production of new drugs. It is recommended that further studies or investigations on toxicity test on the bioactive ingredients should be carried out.

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## REFERENCES

- Haslam, E. (1996). Natural polyphenols (Vegetable tannins) as drugs possible mode of action. *Journal of Natural products* 59:205-215.
- Harborne, J. B. (1998). *Phytochemical methods –A Guide to modern Technique of plants analysis*. Chapman and Hall, London. pp182-190.
- Mabey, R. (1997). *Plant with a purpose*, 2nd edition, New Hollywood California. Pp53-60.
- Musa, D.A., Nwodo, F.O.C. and Ojogbane, E. (2011). Phytochemical, antibacterial and toxicity studies of the aqueous extract *Eucalyptus camaldulensis*. *Asian Journal of plant science and research* 1(3):1-10
- Okwu, D. E. (2001). Evaluation of the chemical composition of indigenous spices and flavouring Agents. *Global J. pure Appl.sci* 7(3):455-459.
- Osuagwu, G.G.E., Okwuleluie, I.C. and Emenike, J.O. (2007). Phytochemical and mineral content of the leaves of four Nigerian pterocarpus species. *International journal of mol. Med. Adv. Science.* 3(1): 6-11.
- Sani, I., Abdulhamid, A. and Bello, F. (2014). *Eucalyptus camaldulensis*: Phytochemical composition of ethanolic and aqueous extracts of the leaves, stem-bark, root, fruits and seeds. *Journal of Scientific and Innovative Research* 3(5): 523-526
- Shaighal, M.H, Kubrmarawa D., Tadzabia K. Dennis K.I. (2012). Evaluation Phytochemical and antimicrobial potentials of roots, stem-bark and antimicrobials potentials of

*Eucalyptus camaldulensis*. *African Journal of Pure and Applied chemistry*. 6(5):74-77.

Shayoub, M.E., Azza Dawoud Hussien Dawoud, Mona AM Abdelmageed, Ali M Ehassan, Ahmad M. Ehassan. Phytochemical analysis of leaves extract of *Eucalyptus camaldulensis* Dehnh. *Omdurman Journal of Pharmaceutical Science*, ISSN: 1858-506X, Volume 2(1), 64-71

Slee, Andrew, Brooker, M.I.H., Duffy, S.M. and West, J.G. (2006). "River Red Gum". *Eucalyptuscaldulensis* var. obtusa. Centre for Plant Biodiversity Research. Retrieved 2012-06-16.

Sofowara, A. (1993). *Medicinal plants and Traditional medicine in Africa*. Spectrum Books Ltd, Ibadan, Nigeria. p.289.

Tapsell, L.C., Hemphill, I., Cobiac, L. *et al.* (2006). "Health benefits of herbs and spices: the past, the present, the future". *Med. J.* (4 Suppl): S4–24. PMID 17022438