



Lapai Journal of Science and Technology, Vol. 10, No. 1 (2024)

PHYTOCHEMICALS AND ANTIBACTERIAL ACTIVITY OF *Boswellia dalzielii* STEM BARK AND *Pyllanthus amarus* ROOTS AGAINST SOME CLINICAL ISOLATES

***Hamza, U. I., ²Adisa, M. J., ¹Saidu, H., ³Ibrahim, J. A., ⁴Danlami, H., ⁵Kaila, M., ¹Muhammed, H. M., ¹Usman, H., ⁶Abdulkadir, A. R. and ¹Yahaya, I.**

^{*1}Department of Biology, Ibrahim Badamasi Babangida University, Lapai, Nigeria.

²Department of Chemistry, Ibrahim Badamasi Babangida University, Lapai, Nigeria

³Department of Applied Biology, Federal University of Technology, Babura, Nigeria

⁴Department of Biological Sciences, Kaduna State University, Kaduna, Nigeria

⁵Department of Science Laboratory, Binyaminu Usman Polytechnic, Hadejia, Nigeria

⁶Department of Plant Sciences, Federal University Dutse, Nigeria

***Corresponding Author's e-mail:** uihamza@yahoo.com

ABSTRACT

Plant materials have been used for various purposes which include but not limited to medicinal, industrial and ornamental purposes. The present study aims to examine the combine effect of *Boswellia dalzielii* and *Pyllanthus amarus* extracts against some clinical isolates. The plant extracts were obtained using methanol and water as solvent using simple distillation apparatus. The extracts were subjected to phytochemical and antibacterial screening. The result of phytochemical screening revealed the presence of Saponins, Flavonoids and Terpenoids. However, the antibacterial screening showed no effect on the clinical isolates; *Escherichia coli*, *Staphylococcus aureus*, and *Salmonella typhi*. The results of this study indicated that the plant extracts possess Saponins, Flavonoids and Terpenoids. However, when combined, no activity against the tested organisms was recorded.

Keywords: Combined activities, Extract, Flavonoid, Phytochemicals, Saponin, Terpenoids

INTRODUCTON

The use of drugs derived from plants has been in practice for a very long time because of the high rate of mortality caused by bacterial infections and other diseases in human population and its significance cannot be over emphasized with the recent trend of high percentage of bacteria resistance to the present day antibiotics (Adebayo and Adegoke, 2008). Medicinal plants are considerably useful and economically important. They contain many active constituents which are used in the treatment of many diseases (Ahirrao and Patil, 2010). *Boswellia dalzielii* (family: Burseraceae) is a tree of the savannah forest



Lapai Journal of Science and Technology, Vol. 10, No. 1 (2024)

recognizable by its papery bark peeling off in ragged manner (Nwiniyi *et al.*, 2004). It is commonly known as frankincense tree that grows up to 13m high and it is found mainly in the savannah region of West Africa (Umar, 2018). The plant is locally called “arrarabi” in Hausa; “kaafikafi” in Kanuri; “debro” in Babur/Bura; “mofu” in Marghi all in Nigeria languages (Mamza *et al.*, 2018). The plant product (such as the gum resin) and different parts of the plant are widely employed in traditional medicine (Nwiniyi *et al.*, 2004). Its aqueous stem bark extracts is used as antidiarrhea (Eteuk *et al.*, 2006). The bark is boiled in large quantities to make a wash for fever, rheumatism and also taken internally for gastrointestinal troubles (Nwiniyi *et al.*, 2004).

Phyllanthus amarus is one of the ancient medicinal plants cultivated for its highly priced fruits and other parts (Mansi and Vaghela, 2019). It belongs to the family of *Euphorbiaceae*, is one of the largest genera of flowering plants that consist of about 800 species which are distributed in a wide range of habitats such as annual or biennial herbs, shrubs and trees throughout the tropical and subtropical regions of both the hemispheres (Mansi and Vaghela, 2019). The name ‘Phyllanthus’ means “leaf and flower” (Kumar *et al.*, 2011), and it is named so because of its appearance where flower, fruit and leaf appear fused. Different species of *Phyllanthus amarus* are considered to be very effective and rich in biochemical compounds used in health care, food and cosmetic industry (Mansi and Vaghela, 2019).

There are some among herbs that pose serious danger to the body system when combined. Their consumption in great deal could damage sensitive organs like kidney and liver who functions as body detoxifiers. These plants on the other hand, help to cure some diseases or illnesses but when combined their side effect is more damaging than the benefits. The manner in which herbal practitioners formulate their local herbs raises great concerns. This has posed tons of queries on the local formulation and also combination of different plant extracts. This research was therefore, carried out to understand the result of combining these two plants extracts against some clinical isolates.

MATERIALS AND METHODS

Study Area

This research work was carried out in the Department of Chemistry Laboratory, Ibrahim Badamasi Babangida University, Lapai, Niger State, Nigeria.



Collection and Identification of Plant Sample

Collection and Identification of *B. dalzielli*

The plant was collected from Babanna, Borgu local government area of Niger State in October, 2021. The plant was identified in the herbarium of Biological Department IBB University, Lapai, Niger State.

Collection and Identification of *P. amarus*

The plant was collected in February, 2022 within Ibrahim Badamasi Babangida University, Permanent Site, Lapai Local Government Area, Niger State. The plant was identified in the herbarium of Biological Department, IBB University Lapai, Niger State.

Sample Preparation

Sample Preparation of *B. dalzielli*

The stem bark of *B. dalzielli* was air dried under shade for seven (7) weeks and powdered using wooden mortar and pestle. Twenty gram (20 g) of the powdered stem bark was taken and packed into a glass container, successive extraction was carried out using two different solvents, 150 cm³ of methanol and water was first added to the stem bark and decanted after 72 h, followed by the addition of 50 cm³ each of the extracting solvents to the chaff and re-extracted respectively. Each of the extract collected was concentrated using simple distillation apparatus then, transferred to a petri-dish and air dried to evaporate the solvent. The concentrated extract was transferred into a sample bottle and kept for further studies.

Sample Preparation of *P. amarus*

The roots were cut off to avoid soil contamination. The whole plants were air dried for about two (2) weeks. The dried leaves were powdered using wooden mortar and pestle. Twenty gram (20 g) of the powdered *P. amarus* was taken and packed into a glass container. Successive extraction was carried out using two different solvents, 150 cm³ of methanol and water was first added to the powdered *P. amarus* and decanted after 72 h, followed by 50 cm³ of these two solvents were respectively added to the chaff after decanted. Each of the extract collected was concentrated using simple distillation apparatus then transferred to a petri-dish and air dried to evaporate the solvent. The concentrated extract was transferred into a sample bottle and kept for further studies.



Sample Preparation of *B. dalzielli* and *P. amarus*

Ten gram (10 g) each of powdered *B. dalzielli* and *P. amarus* was taken and packed into a class container. Successive extraction was carried out using two different solvents. 150 cm³ of methanol and water was first added to the powdered *B. dalzielli* and *P. amarus* and decanted after 72 h, followed by 50 cm³ of these solvents were respectively added to the chaff after decanted. Each of the extract collected was concentrated using simple distillation apparatus then transferred to a petri-dish and air dry so as to evaporate the solvent. The concentrated extract was transferred into a sample bottle and kept for further studies.

Phytochemical Screening

Chemical tests were carried out on methanol and water extracts using standard procedures to identify the constituents as described (Harborne *et al.*, 1993). The phytochemicals screened were saponins, flavonoids and terpenoids.

RESULTS AND DISCUSSION

Table 1: Extraction yield of the sample

S/N	Sample	Weight of Dry Material (g)	Weight of Extract (g)	of Solvent	Yield
1	BDB	20	2.94	Methanol	14.70
2	PAL	20	2.10	Methanol	10.50
3	BDB+PAL	18	2.25	Methanol	12.50
4	BDB	20	0.47	water	2.35
5	PAL	20	1.44	Water	7.20
6	BDB+PAL	20	1.43	Water	7.15
Total		118	10.63		54.4

Legend: BDB: *B. dalzielli* Bark, PAL: *P. amarus* leaves

Table 2: Phytochemical screening of the extracts

S/N	Phytochemical	Test	BDB-M	PAL-M	BDB-W	PAL-W
1	Saponins	Forming	+	-	++	-
2	Flavanoids	Ferric chloride	-	++	+	++
3	Terpenoid	Salkowski	-	-	+	-

Legend: (-) Completely absent, (+) Moderate amount, (++) Appreciable amount.



BDB: *B. dalzielii* Bark, PAL: *P. amarus* leaves, Methanol (M) and Water (W)

Table 3: Microbial Screening of the extracts

S/N	Sample	Solvent	<i>Escherichia coli</i>			<i>Staphylococcus aureus</i>			<i>Salmonella typhii</i>		
			100	75	50	100	75	50	100	75	50
1	BDB+PAL	Methanol	0	0	0	0	0	0	0	0	0
2	BDB+PAL	Water	0	0	0	0	0	0	0	0	0

Legend: BDB: *B. dalzielii* Stem Bark, PAL: *P. amarus* leaves

The determination of extraction yield (%) was calculated as follows:

$$\text{Percentage yield} = \frac{\text{Weight of Extract}}{\text{Weight of Dry Sample}} \times 100$$

The weight of extract was directly proportional to the yield, that is, when the weight of the extracts increases, the yield also, increases. The yield of extraction with methanol was recorded highest in BDB (14.70 %). While the least was recorded in PAL (10.50 %) (Table 1). On the other hand, the yield extraction when water was used as the extracting solvent was recorded highest in PAL (7.20 %) and lowest record was found in BDB (2.35 %) (Table 1).

The results of phytochemical screening revealed that BDB contained Saponins (**Table 2**). Flavonoids were present in both BDB and PAL, however, when methanol was used as solvent, flavonoids were absent in BDB. Terpenoids were only present in BDB when water was used as a solvent (**Table 2**).

The results of antibacterial activities of the combined methanol and water extracts against *Escherichia coli*, *Staphylococcus aureus* and *Salmonella typhii* showed that there was no activity against the clinical isolates (**Table 3**).

According to Babatunde et al. (2014) *Phyllanthus amarus* has inhibitory effect on the normal facultative anaerobic bacteria found in human gastrointestinal tract. In a separate study carried out by Balarabe et al. (2019) revealed that the stem bark of *Boswellia dalzielii* contain potent phytochemicals, which are capable of inhibiting the growth of the tested



Lapai Journal of Science and Technology, Vol. 10, No. 1 (2024)

clinical isolates, which include some used in this study. Furthermore, Mamza et al. (2018) revealed that *Boswellia dalzielii* possess both antibacterial and antifungal activity.

In the present study, the combination of *B.dalzielli* and *P.amarus* extracts show no activity against *Escherichia coli*, *Staphylococcus aureus* and *Salmonella typhi*. It is worthy to note that the active sites on the phytochemicals evaluated against clinical isolates in the present study had reacted and gave rise to new compounds with no synergistic effects on the isolates. This result is not in consonance with that of Oluwafemi and Debiri (2008) that used *P. amarus* and *Parquetina nigrescens* against *Salmonella typhi*.

CONCLUSION

This study showed that the plant extracts contained potent phytochemicals which showed no any bioactivity against the tested clinical isolates.

REFERENCES

- Adebayo-tayo, B. C. & Adegoke, A. A. (2008). Phytochemical and microbial screening of herbal remedies in Akwa Ibom State, South Southern Nigeria. *Journal of Medicinal Plants Research*, 2(11), 306-310.
- Ahirrao, Y. A. & Patil, D. A. (2010). Indigenous healthcare practices in Buldhana district (Maharashtra). *Indian journal of Natural Products and Resources*, 1:85-88.
- Babatunde, S. K., Abubakare, A. A., Abdulraheem, Y. J and &, E. A. (2014). Antimicrobial activity of *Phyllanthus amarus* on some human intestinal facultative anaerobic flora. *Int J Med Biomed Res*. 3(1), 52-57
- Balarabe, S., Aliyu, B. S., Muhammad, H. & Nafisa, M. A. (2019). Phytochemicals and Antimicrobial activity of *Boswellia Dalzielii* Stem Bark against some Clinical Isolates. *FUDMA Journal of Sciences (FJS)*. 3 (3), 587 –593
- Etuk O., Kati, H., Yayli, N. & Demibarg, Z. (2006). Antimicrobial Properties of *Silenmultifida* Plant Extract. *Turkish Journal of Biology*, 30:17-21.
- Kumar, S., Choudhary, H & Seniya, C. (2011) Invitro antibacterial study of aqueous and methanolic extracts of some selected medicinal plants. *Journal of Chemical and Pharmaceutical Research*. 3:854.



Lapai Journal of Science and Technology, Vol. 10, No. 1 (2024)

- Mamza, U. T., Sodipo, O. A., Abdulrahman, F. I and Khan, I. Z. (2018). Phytochemical Analysis and In vitro Antimicrobial Assay of the Methanolic Stem Bark Extract of *Boswellia dalzielii* Hutch. (Burseraceae). *Chemistry Research Journal*, 3(4):161-168.
- Mansi, G & Vaghela, J. S. (2019). Recent Advance in Pharmacological and Phytochemistry Studies on *Phyllanthus amarus*.
- Nwinyi, F. C., Binda, L., Ajoku, G. A., Ariagu, S. O., Enverem, N. M., Orisadipe, A., Kubmarawa, D. & Gamaniel, K.S. (2004). Evaluations of the aqueous extract of *Boswelliadalzielii* stem bark for antimicrobial activities and gastrointestinal effects. *African Journal of Biotechnology* 3(5): 284 – 288.
- Oluwafemi, F & Debiri, F. (2008). Antimicrobial Effect of *Phyllanthus amarus* and *Parquetina nigrescens* on *Salmonella typhi*. *Afr J Biom Res.*, 11, 215-219.