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THE EFFECT OF ANTIMICROBIAL ACTIVITY OF CINNAMON EXTRACT AGAINST SOME BACTERIA.

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ABSTRACT

The increasing prevalence of antibiotic-resistant bacterial strains has necessitated the search for alternative antimicrobial agents. This study investigated the antimicrobial activity of cinnamon extract against two common bacterial pathogens, *Escherichia coli* and *Staphylococcus aureus*. The antimicrobial properties of the cinnamon extract were evaluated using the disc diffusion method. The results showed that the cinnamon extract exhibited significant antimicrobial effects against both *E. coli* and *S. aureus*, with zones of inhibition ranging from 2.50 mm to 4.10 mm. The largest zone of inhibition was observed against *E. coli*, with a diameter of 4.10 mm. These findings suggest that cinnamon extract could be a potential natural antimicrobial agent against bacterial infections, particularly those caused by *E. coli* and *S. aureus*. The study highlights the importance of exploring traditional herbal remedies as alternatives to conventional antibiotics, which could help mitigate the growing problem of antibiotic resistance.

Keyword:

Cinnamon, antimicrobial activity, Inhibition herbal, Resistance

1.0 INTRODUCTION

Cinnamon is native to India and Sri Lanka. It is now cultivated in many tropical countries. This plant has been used in Ayurvedic (Indian traditional medicine) and other medicinal traditions in Asia. In the Americas, most of the original uses are still prevalent, mainly as a treatment for diarrhoea, stomach upset, respiratory ailments, and externally as a skin antiseptic and vulnerary (Aquilar, 2019; Gonzale, 2018; Linaus et al., 2014). The plant is used in medicinal therapy because it contains several components believed to cure various infectious diseases. The biodiversity of plants provides an important source of chemical compounds, which have many therapeutic applications such as antiparasitic, antibacterial, antifungal, and anticancer activities (Pereira et al., 2020).

Aromatic and medicinal herbs have acquired particular attention in intensive research on natural antimicrobial and antifungal properties (Alzareky and Nakahora, 2021). Cinnamon (Cinnamomum burmannii) is one of the herbs commonly used as a spice in food preparation and as traditional medicine. Nowadays, cinnamon is also used as a raw material in functional foods and drinks. The parts of the cinnamon plant usually used are the stem, the bark, cinnamaldehyde, and eugenol. Research on extracts studies the ability of cinnamon stem extract to inhibit the growth of Bacillus cereus, Staphylococcus aureus, and Escherichia coli, and to observe the effects of extracts on the cell wall and cell morphology (Sarmauli, *et al*., 2021).

There has been a constant increase in the search of alternative and efficient components for food preservation aimed at a partial replacement of antimicrobial chemical additives (Iraj, *et al.,* 2016). Extract from many plants used as flavoring and seasoning agent in food and beverages have been used therapeutically for centuries (Lucy, *et al.,* 2019).

However, there is a little data on antimicrobial activities most medicinal (Prisale, *et al.*, 2016). The antimicrobial activities of garlic. Cinnamon, onion and doves have been studied since the end of

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the lastcentury and the active compounds in these herbs were determined (Ajagedeesh, *et al.,* 2022). Cinnamon contains 0.5 to 1.0% volatile oil composed mainly ofcinnamydehyde (50.5%), eugenol (4.7%), cinnamic acid, methoxy cinnamaldehyde (MOCA) and cinnamy (acetate 8.7%) (Choru, *et al*., 2021). The active thiosuffinate compound reported for its antimicrobial activity (Chung, I., 2016).

The antibacterial activity of spices may differ between steins within the samespices. Moreover, the antimicrobial properties of spices may differ depending onspices added, such as fresh, dried or extracted forms (Nanasombat, *et al*., 2020) and also differ depending on the harvesting seasons (Arres, *et al*., 2016). However,there is evidence that the essential oil of spices are more strongly antibacterial major antimicrobial component, major components to play significant role (Latteoui, *et al*., 2014).

Most of the microbial resistance today which is now making it difficult to treats some infectious diseases which are of generic origin of transferable between species and genera of bacteria it is also due to the extensive use of antimicrobial drugs which have favored the emergence of resistance stains. As a result of this WHO recommend research on herbs and this is why we embarked on this research. Most antibiotics sold in the market are substandard and expensive which cannot afford by common man; therefore, herbal medicinal will be an important replacement for the antibiotics.

This research considering cinnamon dark sold in Maiduguri Monday market and is limited to some selected micro-organisms causing diseases (such as *E-coli, klebsiella species, Bacillus cereus, Bacillus cereus,* and *Staphylococcus aureus*). To treat upset stomach and diarrhea (Skinmore Roth, 2021). For treatment of gastric juice ulcer (Tanako, *et al*., 1989).. Cinnamon back may possess a potentiating effect on insulin (Khen et al., 1990) and can be useful in the treatment of type 2 diabetes as well as lowering triglyceride levels and serum cholesterol (Khan, *et al*., 2021; Broadhurst, *et al*., 2019).

For treatment of bronchitis, coughs and other respiratory ailment (Martinez, 1989).
Against nervous disorder.
For loss of appetite and dyspepsia (Blumenthal, 2018).
To promote conception, cinnamon is sometimes used alternately with diamilana (turnera diffusa wild) (Adame, 2019)
For the treatment of hypertension (high blood pressure). As an invigorating tonic
Externally as a poultice to treat minor bacterial and fungal infection of the skin.
The essential oil is employed in aroma therapy as a rub to promote bloodcirculation (Tisserad, 1995).
Some of the plant constituents have proven value against bacterial and including the mold that produce the carcinogenic aflatoxin (Greenwood, 2020; McCann,2021).
Cinnamon constituents poses antioxidants action and may prove beneficial against free radical damage to cell membranes (Dragland *et al*., 2021; Loc and Shibamoto, 2002).
It is essential oil contains both antifungal and antibacterial principles that can be used to prevent food spoilage due to bacteria contamination (Fabio, 2021; Mall, 2001).

2.0 MATERIALS AND METHODS

Sample Collection

The sample were bought from Maiduguri Monday Market, then was grinded into a fine powder using pestle and mortar immediately the sample was transferred to the laboratory.

Procedure

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Extraction

i. 10g of grinded cinnamon were mixed with 50ml of methanol and distil water separately into round-up bottom flask.
ii. The flask was then introduced to the condenser and inserts it inside the heating mantle.
iii. The extractor was set at 30°C was allowed to run for one hour.
iv. The flask was removed and allows the temperature to fall down.
v. Used filter paper and funnel to filter the mixture. vi. Then transfer the extract into a clear container.

Preparation of Culture Media (Nutrient Agar)

Twenty-eight (28) grow of commercially prepared powdered nutrient agar (ovoid) was weighed and transferred into a conical flask. IL of distilled water added and boiled to dissolve and later sterilized by autoclaving at 121°C for 15 minutes. It was allowed to cool before being poured into plate.

Determination of Antimicrobial Activity

A disc of blotting 6mm paper is impregnated with a known volume cinnamon extract and placed on a plate of sensitivity testing agar uniformly inoculated with the test organisms and placed in an incubator 24hours. The extract diffuses from the disc into the medium and the growth of the test organism is inhibited at distance disc that is related (among other factor) to the sensitivity of the organisms. Extract is inhibited at a distance from the disc whereas resistance strains have small zones of inhabitations or grow up to edge of the disc (Monocacheesbrous, 2020).

3.0 RESULTS AND DISCUSSION

Table: Result presentation antibiotic sensitivity test using ***E. coli***

S/N	Sample	Antimicrobial sensitivity disc	Zone of inhibition	Result (Sensitivity or resistance)
1	*Escherichia coli*	CN	3.50 mm	S
		AU	0.00 mm	R
		CPX	0.00 mm	R
		SxT S	0.00 mm	R
		PN	0.00 mm	R
		OFX	0.00 mm	R
		NA	4.10 mm	S
		PIF	0.00 mm	R
			2.80 mm	S

Table 2: Staphylococcus

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2	*Staphylococcus aureus*	CN APX Z AM R CPX AZ LCV C	2.50 mm 0.00 mm 0.00 mm 5.50 mm 3.50 mm 0.00 mm 2.70 mm 3.60 mm 0.00 mm	S R R S R S R S R

Key: R= Resistant isolate

Mm= Zone of Inhibition in millimetre S= Mean Sensitive

4.0 Discussion of the result

This study reports the antimicrobial activity of cinnamon extract against isolated bacteria, namely *E. coli* and *Staphylococcus aureus*. The results of the antimicrobial activity of the investigated extract are shown in Tables 1 and 2.
In this study, the extraction of E. coli showed a higher concentration of 4.10 mm of antibiotic sensitivity disc, CN 3.50 mm, Au 0.00 mm, CPX 0.00 mm, SXT 0.00 mm, $
0.00 mm, PN 0.00 mm, CPX 0.00 mm, SXT 0.00 mm, S 0.00 mm, PN 0.00 mm, NA

0.00 mm, and PIF 2.80 mm.

The higher concentration of Staphylococcus aureus showed 3.60 mm of Lev antibiotic sensitivity disc, C 0.00 mm, AZ 0.00 mm, CPX 2.70 mm, R 0.00 mm, Am 3.50 mm, 2019 mm, Apx 0.00 mm, and CN 2.50 mm.
Based on the results, the cinnamon extract showed a clear antimicrobial effect by inhibiting the growth of the bacteria isolated, such as *E. coli* and *Staphylococcus aureus*.
The plant material depends on the types of solvents used in the extraction procedure. According to Alzareky and Nakahora, (2021). the methanol and water are the most commonly used solvents for determining the antimicrobial activity of plants.

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5.0 Conclusion

From the result obtained the antimicrobial activities of cinnamon and have mic cinnamon extract were to be effective against *E. Coli* and Staphylococcus, cinnamon extract was effective as an antibacterial against staphylococcus aureus an E. Coli invitro. Mbc cinnamon extract act cinnamon burmannii against staphylococcus aureus was 50 % with moderate zone inhibition zones, MBC inhibition extract (cinnamon burmannii) to *E.*
Coli is 10% with moderated zone inhibition zone.

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