Antibacterial properties studies of trunk barks of terminalia ivorensis (Combretaceae), a commercial and medicinal specie, on some methicillin-resistant Staphylococci spp strains.

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Abstract:

Background: Methicillin-resistant Staphylococcus aureus, Staphylococcus epidermidis and coagulase-negative Staphylococcus infections are a worldwide concern. Terminalia ivorensis, of Combretaceae family plant, is widely used traditional medicinal in Côte d'Ivoire to treat dermal diseases (affection in which Staphylococci are implied) including local inflammation and also to treat voice-loss.

Objectives: This study focused to investigate the effect in vitro of the extracts of trunk barks of Terminalia ivorensis on some methicillin/oxacillin-resistant strains of Staphylococcus aureus, S. epidermidis, coagulase-negative S. and reference strain of S. aureus ATCC 25923.

Methods: Antibacterial activity of aqueous, 70% ethanolic 70% and aqueous residue extracts was assessed using agar disc-diffusion method and liquid medium microdilution method in 96 multi-well micro-titer plates. This method led us to determine minimum inhibition concentration (M.I.C.) and minimum bactericidal concentration (M.B.C.). The presence of chemical groups major was detected qualitatively.

Results: Aqueous and 70% ethanolic 70% extracts showed significant activity against all the bacteria except aqueous residue when compared with the standard antibiotic oxacillin (5µg/ml). M.I.C. for aqueous and 70% ethanolic 70% extracts ranged from 0,83-16,67 mg/ml and 0,156-13,33 mg/ml respectively. Viable cell determination revealed the bactericidal nature of the two barks extracts. The 70% ethanolic 70% extract exhibited the highest activity according to the M.B.C. values. The phytochemical analysis indicates the presence of tannins, saponins, flavonoids, terpen/sterols, coumarins, polyphenols and traces of alkaloid.

Conclusion: The in-vitro antibacterial efficacy shown by the barks of this plant and his lushness in chimical compounds, would justify use of this one in the traditional treatment of some diseases of microbial origin. These compounds could be suggested to provide alternative solution to the development of new therapeutic agents.

Keys words: Terminalia ivorensis, Dermal diseases, Methicillin-resistant, Côte d'Ivoire.

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Introduction

The treatment of the bacterial infections is in general based on the use of antibiotics. Very great often unsuited use of these molecules antibacterial drove the selection of strains multi-resistant bacteria. It is the case for example producing bacteria of penicillinase, resistant to all them penicillin such as the penicillin of group A, G and M. Methicillin/oxacillin-resistant staphylococci infections mainly caused by Staphylococcus aureus and by coagulase-negative staphylococci, as S. epidermidis are considered one of the major man pathogenic, causing infections of the skin and fabrics soft.

In Côte d'Ivoire like in the either developing countries, infectious caused by methicillin/oxacillin-resistant Staphylococcus spp. continues to be a growing public health concern. Numerous cases of multi-resistant

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bacteria were reported1; 2; 3. The Staphylococci are involved in various sicknesses and often responsible for infections most frequently contracted in hospitals in nosocomial infections cases4; starting by simple whitlow to the most serious infections like septicaemias, endocarditis, major pneumonias, cellulites and abscesses5; 6. These bacteria give an important number of toxins and extracellular enzymes, and fights against the action of the methicillin/oxacillin and its by-products. So, the effectiveness of antibiotics, considered as the quasi-universal solution to infections, decreases. Face to the weaknesses of chemotherapy, it is more necessary than and the necessity to find other alternative means in the fight against this resistance. it It is thus significant to direct research towards new ways and especially towards the plants which always have been used as a basis for new drugs.

Terminalia ivorensis A. Chev. (Combretaceae) is a woody species belonging to the category I of the commercial sawlog of Côte d'Ivoire. The trunk barks presents a rhytidom peeling of the tree in sheets (fig. 1). Its common name is Framiré. In Côte d'Ivoire, the root of this plant is used against voice-loss, and as antipyretic7; 8. The trunk barks are We also used
the trunk barks as against woundwort9 and against some cutaneous affection.

Our study consisteds of the research of the antimicrobial activity biological activity of the aqueous, 70% ethanolic and aqueous residue extracts of the trunk barks of Terminalia ivorensis A. Chev. (Combretaceae) against opposite some bacterial methicillin/oxacillin-resistant bacteria strains of Staphylococcus spp., which implied in some dermal diseases,. in other to verify its claimed ethno-medicinal use in the treatment of skin infections. To do with, the different extracts underwent a screening phytochemical.

Materials and methods:

Vegetable materials

The trunk barks part of T. ivorensis was collected in Tiassalé, Côte d'Ivoire, in December 2008, and identified by Pr Aké-Assi of the Laboratory of Vegetable Biology University Félix Houphouët Boigny of Cocody-Abidjan. A voucher specimen (voucher n° 8855) is deposited in the Herbarium of National Floristic Center of Abidjan.

Bacterial strains

Microorganisms were obtained from the Laboratory of Bacteriology-Virology of the Institute Pasteur of Côte d'Ivoire. They consist of:

- 01 strain reference of Staphylococcus aureus ATCC 25923
- 14 strains of S. aureus resistant to oxacillin, cefoxitine, rifampicin, ciprofloxacin, tetracycline, gentamycin and some to vancomycin.
- 01 strain of S. epidermidis resistant to cefoxitine, cotrimoxazol, erythromycin, ciprofloxacin, oxacillin and gentamycin.
- 04 strains of coagulase-negative Staphylococcus resistant to fusidic acid, cefoxitin, erythromycin, fosfomycine, cotrimoxazol and oxacillin.

Preparation of extracts

1. Aqueous extract23 and N'guessan9. affections in which the staphylococci are implied.

The phytochemical screening of the extract of the trunk barks of T. ivorensis has shown the presence of saponins, terpens, tannins, polyphenols. These classes of secondary metabolites are known to possess antibacterial activities24. This would explain the bactericidal action of the trunk barks of T. ivorensis. However, negative results observed with aqueous residue, do not mean absence of bioactive constituents nor is that the-extract inactive. Active compounds may be present but in insufficient quantities in this crude extract to show activity with the dose levels employed25 or it could be that its activity is masked by the presence of sugars26. We could deduce from that the antibacterial substances contained in the trunk barks of T. ivorensis are more soluble in the 70% ethanol at 70% than in water used. The ethanol would then concentrate better the active ingredient27. The presence of those active principles would then justify the use of that plant in the treatment of the skin troubles and local inflammation in the Ivorian traditional pharmacopeia.

Conclusion:

The lushness of the extracts in chimical compounds, would justify their therapeutic effects and overcoat the use of this plant in the traditional treatment of some diseases of microbial origin. Isolation and purification of different compounds could be suggested to provide alternative solution to the development of new therapeutic agents. This study showed us that the aqueous and ethanolic 70% extracts were bactericidal on the whole bacterial strains at the origin of some infections in the human and suggest, these extract can provide alternative solution for the treatment of dermal diseases particularly in Côte d'Ivoire where this pathology is always a public health problem.

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