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A COMPARATIVE STUDY OF A LOCAL PLANT EXTRACT AS A POSSIBLE POTENTIAL MEDICATED AGENT IN THE SOAP INDUSTRY

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ABSTRACT

This experimental study compared the extracts from an indigenous plant (*Chromoleana odorata*). The extraction was carried out using ethanol and distilled water as solvents. The extracts obtained using both solvents were separately applied on three microorganisms namely *Staphylococcus aureaus*, *Echerichia coli* and *Aspergillus niger*. The results showed that *Chromolaena odorata* leaf extracts were effective in inhibiting the microorganisms used for the study at concentration ranging from 0.06 to 0.12 g/ml for the extract with ethanol as solvent and 0.07 to 0.10 g/ml for the extract with distilled water as solvent. From the results both extracts could be applied as potential medicated agents in the production of soap.

KEYWORDS: Extraction, ethanol, water, microorganisms, soap agent

INTRODUCTION

Microbes that cause diseases are called pathogens. They are specific to infecting body tissues where they reproduce and cause damages that give rise to the symptoms of the infection. The body fights back by mobilizing its immune system to fight the infection but modern medicine has also developed many successful treatments to assists the body natural defense. Medicated soap for external use is only employed in cases of skin ailments as prophylactic washes and as disinfectant soaps. They are generally based on good quality toilet soap. The earliest medicated/antiseptic soap was 'carbolic soap'. This contained up to 5 percent phenol, cresylic creosote, cresylic acid or high boiling tar acids due to the pungency of the phenolic soap, refined chlorinated phenols such as parametaxylenol, dichrometaxylenol and hexachlorophene substituted became more popular. Fears about the safety of these chemical components on the skin brought about a ban on some of these chemical components. Currently, the antibacterial agents most widely used in soaps are trichlorocarbonilide, trichlorofluorocarbonilide and trichlorosalan etc. The later development of medicated/antiseptic soaps was highly efficient and less pungent thus allowing the addition of a suitable perfume to cover any disinfectant odour (Kirk Othmer, 1983).

Plants extracts have been known to be incorporated into soap productions by very many manufacturers because of their efficacies particularly on human body infections.

The plant *Chromolaena odorata* is known in some part of the world as Siam weed, Christmas bush, Triffid weed and Bitter bush. Also, in Latin it is known as *Eupatorium odorata.* The plant *Chromolaena odorata* is from the family Asteraceae and it is a scrambling shrub (Howard, 1989 and Liogier, 1994). It is actually a native of Central and Northern South America as well as Africa (Weed Management Guide, 2005).

In Nigeria, *Chromolaena odorata* is popularly called Awolowo weed and it grows mainly in the southern part of the country. It is locally used in treating fresh wounds. The marsh leaf water extract is used locally for stomach upset (Ayodele, 2005).

In herbal medicine, the leaf extract with salt is used as cure for sore throats and cold. It is used as scent in aromatic baths (Liogier, 1994). Extracts of *Chromolaena odorata* have been shown to inhibit or kill *Neisseria gonorrhoea* (the organism that causes gonorrhea) in vitro (Caceres et al., 1995) and to accelerate blood clothing. It also has its benefits agriculturally. During fallows between cultivation, *Chromolaena odorata* adds copious amounts of organic matter to the soil and may reduce the population of nematodes (M'Boob, 1991). It is also useful as mulch for fresh crops (Swennen and Wilson, 1984).

A qualitative chemical analysis of the extract and fractions showed the presence of biologically active constituents such as some conmarins, flavonoids, phenols, tannins and sterols (Ngono et al, 2006).

The aim of this study is to show the antiseptic property of a local plant extract and hence it's possible potential application as a medicated soap agent in the soap production industry.

MATERIALS AND METHODS

Collection of analytical organisms

The analytical organisms used were identified using cultured, morphological and biochemical tests.

Culture media

The media used for the antimicrobial analysis was nutrient agar for bacterial and potato dextrose agar for fungi.

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Preparation of leaves

The matured leaves used for the purpose of these analyses were collected from Oluku Village near Benin City, Nigeria.

Fresh Awolowo leaves **(***Chromolaena odorata*) were gently washed with distilled water. They were sun dried and then ground to fine powder.

Preparation of ethanol extract

Varying masses of the dried C*hromolaena odorata* leaves ranging from 1.5 to 6.0g (with the increase of 0.5g i.e. 1.5, 2.0, 2.5g etc) were each placed into a sterile conical flask and 50ml of 95% ethanol was dispensed into the flask. The preparation was allowed to stand for 24 hours and filtered.

Preparation of aqueous extract

Varying masses of the dried plant *chromolaena odorata* leaves ranging from 1.5 to 6.0g (with the increase of 0.5g i.e. 1.5, 2.0, 2.5g etc) were each placed into a sterile conical flask and 50ml of sterilized distilled water was dispensed into the flask. The preparation was allowed to stand for 24 hours and filtered.

Antimicrobial analysis of *Chromolaena odorata* leaves extracts on the microorganisms

The method used was the Agar dilution method (European Society of Clinical Microbiology and Infectious Diseases, 2000).

RESULTS AND DISCUSSION

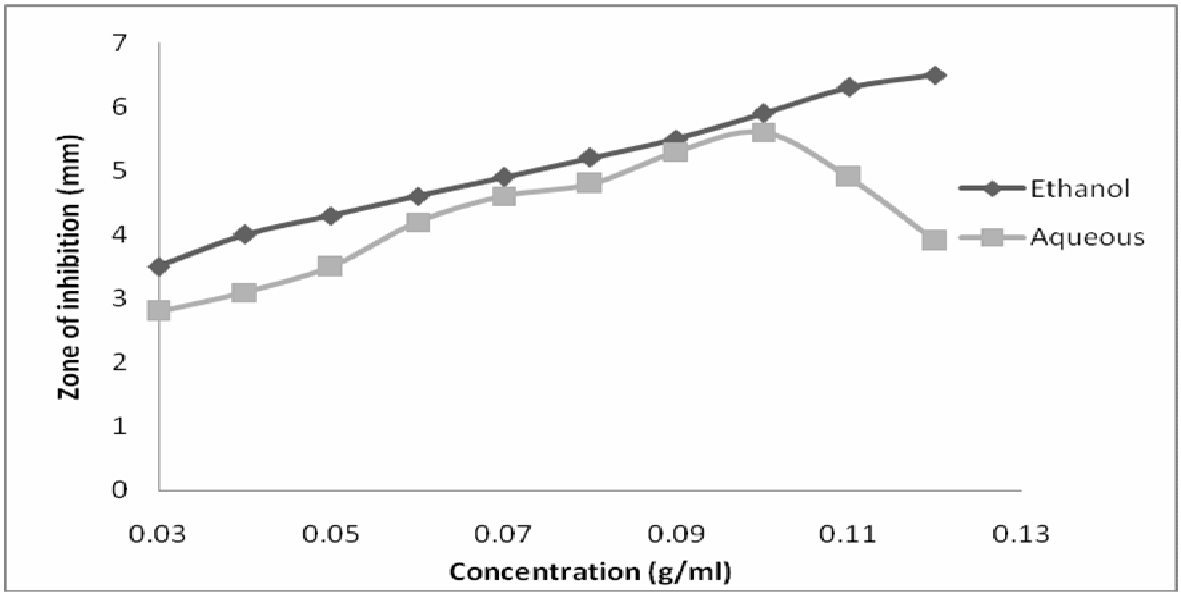

Figure 1: Graph of ethanol and aqueous extracts against zone of inhibition for *Escherichia coli Sp.*

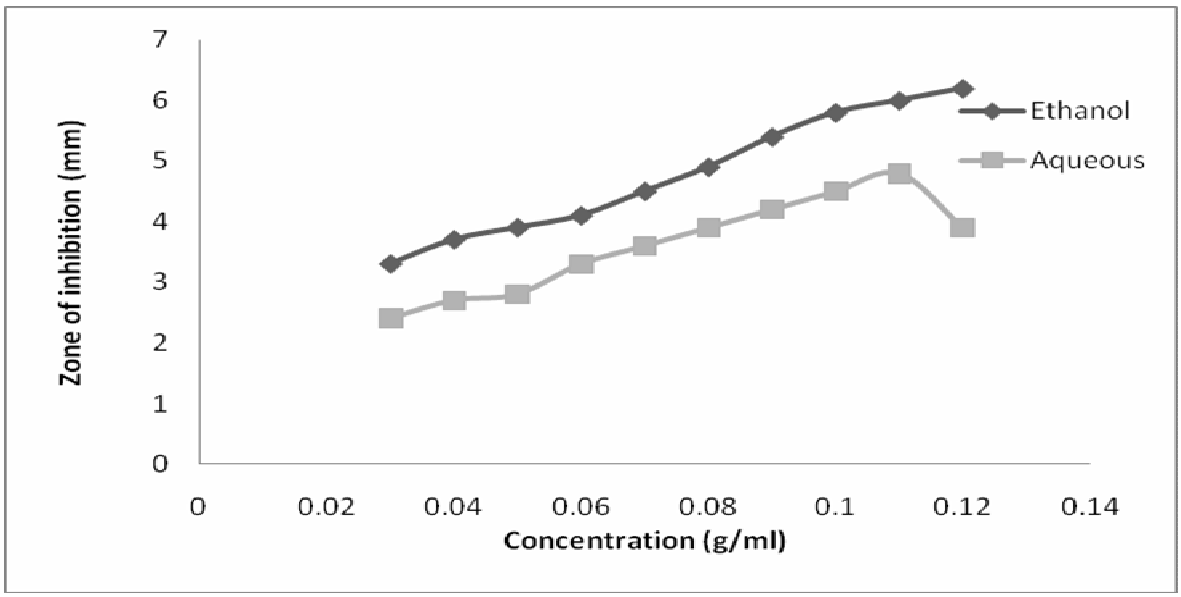

Figure 2: Graph of ethanol and aqueous extracts against zone of inhibition for *Staphylococcus aure*us

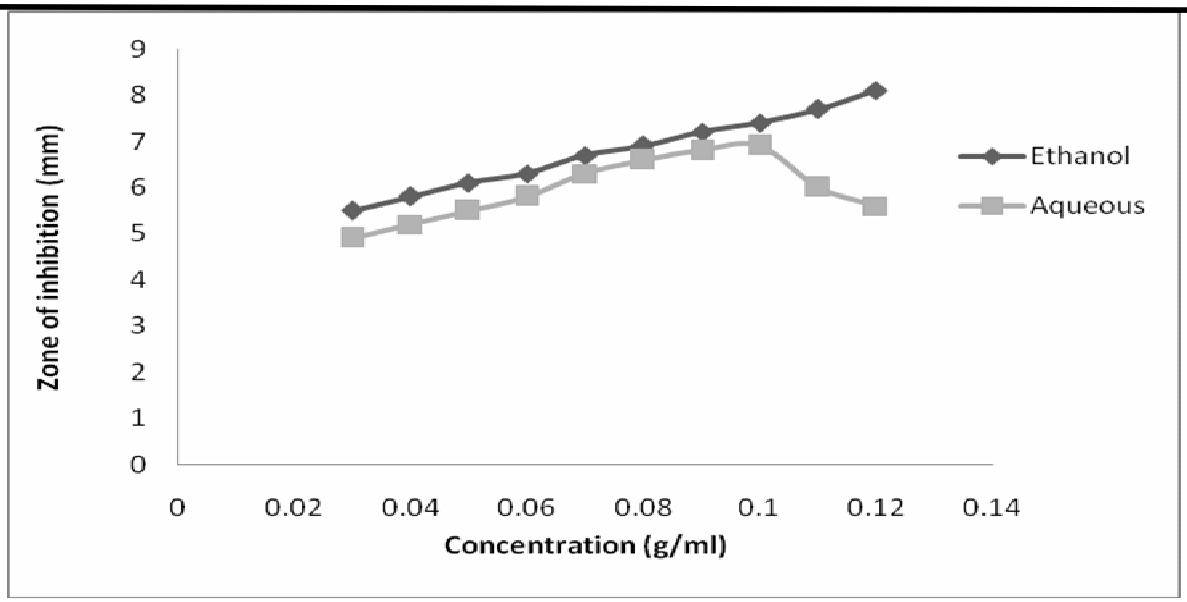

Figure 3: Graph of ethanol and aqueous extracts against zone of inhibition for *Aspergillus niger*

In carrying out the analysis, the results showed that as the concentration of *Chromolaena odorata* ethanol extracts increased, from 0.3 to 0.12g/ml, the zone of inhibition on *Escherichia coli spp* increased too from 3.5 to 6.5mm. Also, as the concentration of *Chromolaena odorata* aqueous extract increased from 0.03 to 0.10g/ml, the zone of inhibition increased from 2.8 to 5.6mm. But with further increase in concentration from 0.11 to 0.12g/ml, the zone of inhibition dropped from 4.9 to 3.8mm as shown in Figure 1.

A similar trend was observed for *Staphylococcus aureus*. As the concentration of *Chromolaena odorata* extracts of ethanol increased from 0.03 to 0.12g/ml the zone of inhibition increased from 3.3 to 6.2mm. Also, this trend is still observed for aqueous extracts of *Chromolaena odorata.* An increase in the concentration from 0.03 to 0.11g/ml showed a corresponding increase in the zone of inhibition from 2.4 to 4.8mm. Figure 2 showed that for a further increase to 0.12g/ml there was a drop to 3.9mm.

Similarly, for *Aspergillus niger* which is a fungus, as the concentration is increased from 0.03 to 0.12g/ml of *Chromolaena odorata* ethanol extracts, the zones of inhibition increased from 5.5 to 8.1mm. This similar trend also shows for concentrations of aqueous extracts of *Chromolaena odorata*. As the concentration is increased from 0.03 to 0.10g/ml, the zones of inhibition increased from 4.9 to 6.9mm. On further increment from 0.11 to 0.12g/ml, there was a drop in the zones of inhibition from 6.0 to 5.6mm as shown in Figure 3.

The drop in the zones of inhibition for aqueous extract concentration of these microorganisms can be attributed to the inactivity of the leaf extract concentration. This is known as the minimum inhibitory concentration (M.I.C.) i.e. the point of which it starts to fall. This results show that extracts of *Chromolaena odorata* have inhibitory effect on these microorganism. The results appear to vary slightly between Gram positive bacteria (*Staphylococcus aureus*) and Gram negative bacteria (*Echerichia coli spp.*).

Similar work done by (Ling et al, 2006) on some fungi – *Pyricularia grisea, Phytophthora nicotianae* and *Pasarium axyserum* showed significant effect on them at 61.44, 29.27 and 14.44% respectively at a concentration of 800 mg/l. This is in agreement with the analysis carried out on this work.

Chromolaena odorata contains tannins, coumarins, flavonoids and phenolic compounds etc which have effect on microorganisms (Franklin and Snow , 1981). The main inhibitory substances such as tannins, coumarins, flavonoids and phenolic compounds are known to be more soluble in alcohol than in water because they are organic compounds. This conforms to the earlier work done by Treese and Evans (1983) in which they showed that alcohol is a better extractor than water.

CONCLUSIONS

Chromolaena odorata leaf extracts showed good sensitivity effect which is the zone of inhibition (lethal effect) on the microorganisms used. The inhibition of the test organisms by the extracts of *Chromolaena odorata* indicates that it has very sensitive antimicrobial properties which when incorporated into soap can be a protective as well as cure for skin diseases.

Ethanol extracts of *Chromolaena odorata* show higher zones of inhibition than aqueous extracts of *Chromolaena odorata.* As such, ethanol extracts give better inhibitory effect and are more potent. The range at which the extracts can be incorporated into the soap is based on the results of the highest effect by the leaf sample which is between 0.06 to 0.12g/ml.

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