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ANTIMICROBIAL EFFECTS OF PALM KERNEL OIL AND PALM OIL

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ABSTRACT

Traditionally extracted palm oil and palm kernel oil were obtained from *Elaets guineensis* (Jacquin). Both oils have been used in the South Eastern Nigeria for the treatment of various diseases and skin infections. Five microorganisms namely; *Staphylococcus aureus, Escherichia coli, Pseudomonas areuginosa, Candida albicans* and *Aspergillus niger* known to cause some infections treatable with these oils were investigated. The results showed that there was no inhibition on the five microorganisms by *dura* and *tenera* varieties of *Elacis guineensis* when tested individually. When the mixed extracts were tested, only *Escherichia coli* was minimally inhibited.

KEYWORDS: *Dura*, *Tenera*, Palm oil, Palm Kernel, Antimicrobial

1. INTRODUCTION

The African oil palm (*Elaeis guineensis* Jacquin) produces two different kinds of oil namely, palm oil and palm kernel oil. Palm oil is extracted from freshly mesocarp of the fruit, which contains 45-55% oil, but varies from light yellow to orange-red in color, and melts at 25 ^{0}C. The palm kernel oil is obtained from the kernels enclosed in the endocarp. Palm oil is obtained from the kernels enclosed in the endocarp. Palm oil contains saturated palmitic acid, oleic and linoleic acid, giving it a higher unsaturated acid content than palm kernel or coconut oils [1].

According to Duke and Wain [2], palm kernel oil contains about 50% oil. Similar to coconut oil with high content of saturated fatty acids, mainly lauric, it is solid at room temperatures in temperate areas, and is nearly colorless varying from white to slightly yellow. Palm oil has also been reported to be anodyne, antidotal, aphrodisiac and diuretic. It is folk remedy for headaches, pains, rheumatism, cardiovascular diseases, arterial thrombosis and an atherosclerosis [3]. The palm oil is known to be effective against many forms of intestinal disorders, especially diarrhea and dysentery in infants [4]. Palm kernel oil has a fatty acid make up similar to that of coconut oil and has similar use pattern [5].

Most rural dwellers in Nigeria depend on traditional medicine for most of their health-care needs. This involves the use of assorted local herbs, oils and local gin [4]. According to Hartwell [6] the palm oil and palm kernel oil are used as a liniment for indolent tumors.

Palm oil provides a rich source of beta-carotene and vitamin E, namely tocopherols and tocotrienols which are well known nutritional antioxidants that act as scavengers of the oxygen atom or free radicals. The oxygen atom or free radicals can arise during the body's normal oxidative metabolism or from the action of toxic pollutants that contaminate our food and have been implicated in ageing, heart disease and cancer.

Unsaturated fatty acid soaps are more effective against gram-positive bacteria while soaps of saturated fatty acids are more active against gram-negative bacteria [7]. Antimicrobial studies of the traditionally extracted palm kernel oil (Mmanyanga) and two other oils; palm oil and coconut oil, on some microorganisms revealed that "Mmanyanga" was active against *Escherichia coli*, alpha and beta hemolytic streptococci, *Aspergillus fumigatus* and *Staphylococcus aureus* [4]. No report is available on the inhibitory effects of palm oil and palm kernel oils extracted locally

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fom *Elaeis guineensis dura* and *tenera* on microorganisms in spite of its effectiveness in the treatment of some diseases earlier mentioned. The present study therefore compared the inhibitory effects of palm oil and palm kernel oil from *Elaeis guineesis dura* and that of *Elaeis guineensis tenera* varieties of *Elaeis guineensis* Jacquin in an attempt to establish the basis for the use of these oils in the treatment of aspergillosis, candidiasis, urinary tract infection, wound infection, purulent arthritis and diarrhea and dysentery in infants associated with the 5 microorganisms chosen for study.

2. MATERIALS AND METHODS

Oil Palm Samples

The palm oil and palm kernel oil were extracted traditionally from fresh fruits and seeds. Both palm oil and palm kernel oil were obtained from *Elaeis guineensis dura* and *Elaeis guineensis dura* and *Elaeis guineensis* Jacquin. Each sample of *dura* and *tenera* varieties were obtained from Uzuakoli, Abia state and Umudike, Imo State respectively.

Microorganisms

Escherichia coli, Pseudomonas aeruginosa, Candida albicans and *Staphylococcus aureus* were obtained from the Federal Medical Centre, Umuahia. *Aspergillus niger* was obtained from the microbiology laboratory of the Michael Okpara University of Agriculture, Umudike. The identity and confirmation of these test microorganisms were carried out in the collection centres.

Extraction of Palm Oil and Palm Kernel Oils from the Mesocarp and Endocarp of Oil Palm varieties

The fruits were separated from the bunches and boiled in a large container or basin for about one hour and crushed in a mortar to separate the pulp from the nuts. The oils were separated from the pulp by immersing the latter in water. The whole mass was stirred and the crude oil was skimmed off. The fibers were then sifted out of water and finally the nuts were collected and separated from the remaining fibers. The crude oil obtained was boiled in smaller vessels where any fiber still present sank to the bottom. The oil was decanted into a sterilized reagent bottle and used for the microbial tests without further purifications.

The palm nuts obtained as a by-product in palm oil production were cracked to obtain the kernels. These were washed, dried and heated in a pot until the oil was extracted from the kernels and was decanted from the pot into a sterilized reagent bottle and used for microbial tests without further purifications as in palm oil extraction [4].

Preparation of Impregnated Paper Discs

The palm oil and palm kernel oil extracts of *Elaeis guineensis dura* and *Elaeis guineensis tenera* varieties of *Elaeis guineensis* Jacquin respectively were used. Paper discs (5mm in diameter) were sterilized by autoclaving for 15 minutes.

A 0.04 ml of 100% concentration of the palm oil and palm kernel oil extracts was impregnated into the discs [4]. The impregnated discs were left to dry for 24 hours in the incubator at 37 ^{0}C. After drying, the discs were transferred back into the reagent bottle and stored in the refrigerator at 4 ^{0}C.

Sterility test was carried out by taking random samples of the prepared discs and placed aseptically on sterile nutrient agar and Sabouraud dextrose agar (SDA) plates and incubated for 48 hours to determine bacterial and fungal growths.

Antimicrobial Sensitivity Test

The disc diffusion method of Brauer *et al.* [8] was adapted using nutrient agar, Sabouraud dextrose agar (SDA) and the impregnated discs. Antimicrobial experiments on *Staphylococcus aureus, Pseudomonas aeruginosa, Candida albicans* and *Escherichia coli* were carried out on nutrient agar plates whereas that on *Aspergillus niger* was carried out on SDA plats.

The test microorganisms which had already been maintained on slant on appropriate media at 4 ^{0}C were streaked on the test plates using sterile wireloop and allowed to dry for 15 minutes. Sterile forceps were used to pick sterile impregnated discs onto the inoculated plates. The plates were then incubated at 37 ^{0}C for 24 hours for bacteria and 72 hours for fungi.

Zones of inhibition were assessed after the certain period of incubation.

3. RESULTS AND DISCUSSION

The results showed that palm oil and palm kernel oil extracts of *dura* and *tenera* had an inhibitory effect on the five microorganisms tested. Table 1 shows that out of the five microorganisms tested only *Escherichia coli* was inhibited by the palm kernel oil of *dura* and *tenera* whereas the palm oil extract did not inhibit any of the microorganisms. The mean zones of inhibition was 5 mm for *Escherichia coli* only (Figure 1), these results suggest that the inhibitory effect exhibited by the palm kernel oil extract of the mixed varieties of *Elaeis guineensis* (Jacquin); may be attributable to the combined effects of the constituent fatty acids of *dura* and *tenera* varieties [4].

Table 1 Antimicrobial activity of *tenera* palm oil and palm kernel extracts
Oil extracts microorganisms

	Escherichia coli	*Staphylococcus aureus*p	*psudomonas aeruginosa*	*Asperglas niger*	*Candida albicans*
Palm	-	-	-	-	-
Kernel	+ 5mm	-	-	-	-

Data are given as mean of inhibiton (mm) of three readings
Keys
-, indicates no inhibition
+, indicates inhibition

4. CONCLUSION

In conclusion, this study has been able to show that the traditionally extracted palm kernel oil extract a black viscous non-drying liquid, derived from mixed varieties of *Elaeis guineens* (Jacquin) showed least antimicrobial activity against *Escherichia coli* compared to *Pseudomonas aeruginosa, Staphylococcus aureus, Candida albicans* and *Asperigillus niger* with no sign of inhibition.

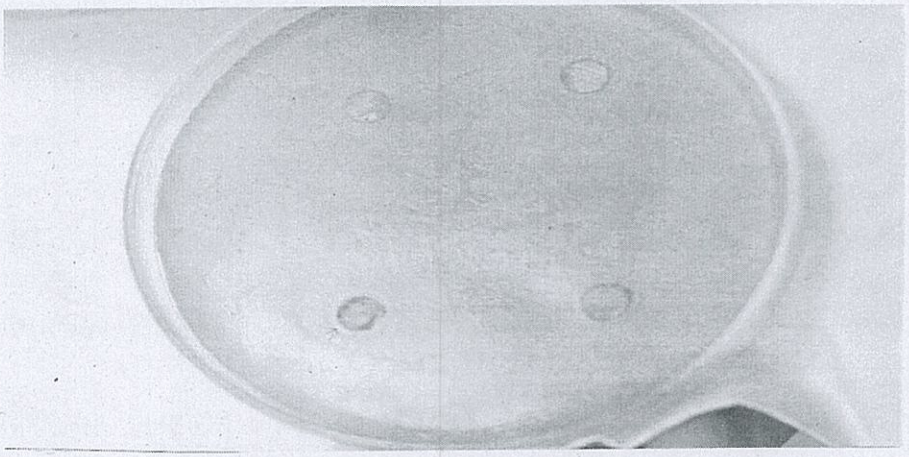

Figure 1 Inhibition of *Escherichia coli* by mixed palm oil and mixed palm kernel oil of Ojukwu and Osukwu. Arrow shows zone of inhibition measuring 5 mm in diameter.

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