

PHARMACOGNOSTIC ANALYSIS OF PALM OIL [*Elaeis guinensis* LINN. (ARECACEAE)] AND IT'S USE IN TREATING NASAL CONGESTION

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ABSTRACT

The use of palm oil in Nigeria can be traced to time before 19th century. Since then, it has found its use in cooking, soap making, cream making, and additives to drugs in pharmaceutical industries. This recent study was undertaken to analyse the Pharmacognostic parameters of palm oil and then evaluate its use in traditional medicine for treating nasal congestion. Numerical properties of palm oil (fixed oil) such as saponification value, acid value, iodine value, melting point, ester value, acetyl value as well as saturated and unsaturated bonds percentage were determined. *In vivo* experiment using six laboratory mice were conducted to know if palm oil can produce total clearance of nasal congestion in the animals. Results showed that saponification value was greater than other values by having 248.1, iodine value was 13.7, melting point was 30^oC, and others fall within the standard values. Topical applications of palm oil in nasal cavity of five laboratory mice produced total nasal clearance of mucous membrane after four days of application, and induced normal breath in the mice. This was however statistically significance different from mouse 6 that was treated using procold[®] tablet 5 mg/kg (PT Kable Farma Tbk, Indonesia) at P≤0.05 (ANOVA). Increase in temperature was reduced to normal after clearance in the nasal cavities; hence anti-inflammation of mucous membrane was therapeutically affected by palm oil application. The study showed that palm oil can be used to treat both chronic and acute nasal congestion in traditional medicine.

Keywords: Palm oil, Nasal congestion, Treating, Clearance, Therapeutically, Traditional medicine.

INTRODUCTION

Palm oil is obtained by streaming and expression of mesocarp of the fruits of *Elaeis guinensis* Linn (Arecaceae). World production amounts to over 11.5 million tonnes per annum; over half of which is produced in Malaysia^[1]. In terms of world consumption, it has now overtaken sunflower and rapeseed oils. Palm oil is yellowish-brown in colour, of a buttery consistency and of agreeable odour. Palmitic and oleic acids are the principal esterifying acids^[1].

In Africa it is widely distributed in tropical zones like Southern Nigeria, Ivory Coast, Cameroun and Guinea. The

tree range between 30 m-100 m tall and can live up to an average of 20-30 years under favorable environmental conditions^{[2], [3]}. Apart from its use in making soaps, creams, additives, and various pharmaceutical formulations, its oil was reported to have certain medicinal values in treating common cold, boils and sinuses and acute or chronic nasal congestion. The study was undertaken to analyse some of the Pharmacognostic properties of palm oil, and its role in clearing nasal congestion of any type by traditional medicine practitioner.

MATERIALS AND METHODS

Preparation of Palm oil from its fruits

Oil palm fruits that are ripped are cooked to done in a cooking pot that was filled with water, until a temperature of 180^oC was reached. The palm fruits are then poured from the pot and left to cool. Palm oil is then obtained by streaming and expression of the mesocarp of the fruits. Palm oil obtained was stored in a bottle under pure hygienic condition for future use.

Determination of the Numerical Properties of Palm oil^[4].

Using standard procedures, various numerical properties of palm oil were determined in order to analyse its medicinal value in treating nasal congestion.

Saponification Value (SV):

2 g of oil was accurately weighed into a 200ml flask and 25ml of alcoholic Potassium Hydroxide solution (KOH) was added. The content was reflux frequently; rotating the contents for 1 h. To the hot solution, 1ml of phenolphthalein solution was added. Excess alkali was titrate with N/2-HCl, and the volume of acid 'a' required was recorded. The experiment was repeated without oil and the volume required was designated 'b'. Saponification value of the oil was calculated from the formula:

$$\text{Saponification value (SV)} = \frac{b-a \times 0.2805 \times 100}{\text{Weight of oil}}$$

Ester value (EV):

It is the number of mg of KOH needed to saponify the ester in 1g of the sample of oil. By formula:

$$EV = SV - \text{Acid value}$$

Iodine value (IV):

It gives the average degree of unsaturation of a lipid or oil. The higher the value, the higher the number of carbon to carbon bonds (C=C). It is expressed as the grams of iodine absorbed per 100g of lipid or oil.

Acetyl value (AyV):

It gives the number of mg of KOH needed to neutralize the acetic acid of 1g of acetylated fats or oils.

Melting Point (MP):

It gives the temperature at which solid particle changes to liquid. It varies from one substance to another.

Inflammation of Mucous Membrane (Catarrh) by *In vivo* Method ^{*SM}

Six(6) laboratory mice 6-8 weeks old weighing averagely 29-35 kg were bought from the animal house Department of Pharmacology and Clinical Therapeutics, Faculty of Pharmaceutical Sciences, Ahmadu Bello University Zaria, Nigeria. The animals were fed with water on the first day, kept in a cage and allowed to acclimatize. On other days, they were fed maize flour. Five (5) of the animals were administered with 10ml Vega 100 tablet (Bharat Pharmacy, India) by intraperitoneal (i.p) route to induce inflammation of mucous membrane (catarrh) in the animals for three consecutive days. The remaining mice was not given any drug but used as control. These animals were observed for development of nasal congestion as a result of inflammation of mucous membrane induced by drug administration (i.p) for three days (72 h). Nasal congestion was recorded by evidence of mucous that either flows from the nasal cavities of the mice or blocking the nasal cavities.

Clearance of Nasal Congestion by Topical Application of Palm oil (Fixed oil) ^{*SM}

5 mice which were previously induced by administering Vega 100 tablets (10ml for three days) to develop nasal congestion were treated using palm oil. The oil was topically applied to the nostrils of the animals using blunt spatula at intervals of 4 h continuously, and then observed for 72 h. Clearance of nasal congestion and restoration of normal breath in the animals was taken as a sign of recovering from nasal congestion due to inflammation of mucous membrane. The degree of nasal clearance in the animals were compared with a standard drug (Procold[®], PT KAMBLE FARMA Tbk, Indonesia) 5mg/kg administered i.p. Animals were sacrificed at the end of the experiment following international guidelines [5]. (*SM means self-adopted procedures)

Statistical analysis

Data obtained were expressed as means \pm SE of triplicate readings. Significance difference between clearance time of crude drug (Palm oil) and standard drug were compared using one way ANOVA [6].

RESULTS

The results showed that saponification value, acid value, iodine value and melting point value of palm oil falls within the normal range, while other numerical properties were not different greatly (Table 1).

Table.1: Numerical Properties of Palm oil (Fixed oil)

Property	Mean \pm SEM
Saponification value	248 \pm 36.20
Acid value**	25 \pm 11.50
Iodine value	13.5 \pm 6.13
Ester value	223 \pm 24.70
Acetyl value	12.5 \pm 5.13
Melting Point ($^{\circ}$ C)	30 \pm 13.01
Saturated (%)	50 --
Unsaturated (%)	50 *Oi, ln_____

*Oi = oleic acid, ln = linoleic acid, **determines the medicinal property of palm oil [7].

Values of these numeric properties of palm oil were in acceptable range for most fixed oils of medicinal important. Highest value was recorded in SV with 248 \pm 36.20 while the AyV was the lowest with 12.5 \pm 5.13, and these values correspond with those of official books. In table 2, nasal clearance was achieved as the application time increases in the mice. Active metabolic signs were restored fully in 72 h of application of palm oil. However, nasal congestion clearance of palm oil was comparable to that of procold tablets 5mg/kg b.w i.p at $p \leq 0.05$ (ANOVA).

Table.2: Anti-inflammation of mucous membrane by *in vivo* method

Mouse number (n = 6)	Clearance time (h)	Weight of mouse (Kg)	
		W1	W2_____
Mouse 1	70b	29.8	26.3
Mouse 2	68c	31.5	30.5
Mouse 3	48a	35.2	34.4
Mouse 4	48a	30.0	29.2
Mouse 5	49a	29.0	28.0
*Mouse 6	72b	34.0	31.3_____

*Control group was administered procold tablet (5 mg / kg) i.p, numbers followed by the same letter are not statistically significance different at $p \leq 0.05$ (ANOVA), All mice were given equal dose of Vega 100 tablet (i.p) prior to treatment, W1 and W2 are initial and final weights of mouse respectively.

Reduction in weight of the mice was attributed to the effect of the drugs on some organs in the mice. Weight reduction in this experimented groups (1-5) were not different from the initial weights of the mice except in the control (group 6) where the animal was given dosage of procold tablet (Table 2). In all cases, weight reduction do not varied greatly in all the groups at $p \leq 0.05$ using one way ANOVA.

Numerical properties of palm oil such as saponification value, acid value, iodine value, acetyl value, melting point and percentage of saturation and unsaturation of the bonds between its molecules, fall within the acceptable values, and this is unique to all fixed oil^{[8], [9], [10]}. Medicinal property of oil was reported by Morrison *et al.*^[7] due to low value of acid. And this is not different from the function it performs in this present study. In this case, the presence of acids (oleic and linoleic acid) in palm oil clears any form of congestion in the mucous membrane which were created by dust in the air or induced^[10]. This is why nasal congestion in the mice was restored as well as perfect and active metabolic activities.

In vivo experiment also showed that mouse 1 and 6 had the longest during of recovery after treatment with palm oil, while mouse 3-5 responded to treatment within short time, and with minimal weight loss. It should be noted that a good anti-inflammatory agent reduce pains in short time of administration without putting the animal in great weight loss^[11].

Apart from this, a good therapeutic agent must act in organ of interest so as to affect correction in such diseased organs^[12]. Therefore, the use of palm oil to clear nasal congestion in traditional medicine is described as good therapy in herbal medicine, since clearance time was statistically different from the control (mouse 6) which was treated with procold tablet (Table 2).

CONCLUSION

The study showed that palm oil from *Elaeis guinensis* (Arecaceae) tree is use to clear nasal congestion resulting from inflammation of the mucous membrane. Although, the use of palm oil to clear nasal congestion by topical application was potent, purification of the oil is recommended to avoid any form of bacterial or fungi infection. More research is also suggested in the area of formulation of ethnomedicinal prescription that includes palm oil, so as to produce a novel therapeutic agent with short therapeutic durations.

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Conflicts of interest:

Although some numerical properties of palm oil had been determined^[1], yet the use of palm oil to clear nasal congestion had not been reported anywhere by any researcher, this was the first report on the claim.

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