CURRENT RESEARCH

APPLICATION OF MELON SEED OIL IN METHYL SALICYLATE LINIMENT AND SALICYLIC ACID LOTION FORMULATIONS

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Abstract

Melon seed oil was obtained by soxhlet extraction using petroleum ether (40 - 60°C). The oil was processed by filtration, dewaxing, degumming, refining, bleaching and winterization.

The physico-chemical properties of the oil and the constituent fatty acids were determined. The melon oil was used to formulate batches of methyl salicylate liniment and salicylic acid lotion respectively. The products obtained were compared with similar B. P. C. formulations of these drugs where arachis oil was the oily component used.

The liniment and lotion formulations containing melon oil performed better than those containing arachis oil in terms of the amount of the drugs remaining at determined time intervals after storage.

Introduction

Melon oil is obtained from the seeds **Colocynthis vulgaris** (egusi), a common food plant found growing widely in the eastern and western parts of Nigeria. The cake obtained from the dehauled seeds is used as a thickener in soup. The seeds can be obtained in local markets under the names - 'egusi' (Yoruba) 'Ogili (Ibo), and 'agushi' (Hausa) (1).

Some of the properties of vegetable oils have been exploited in their use in products like varnishes and paints. Processing of the oils lead to an enhanced quality and stability, through the removal of waxes and other impurities (2,3,4). In pharmaceutical formulations, vegetable oils are employed in the preparation of injections, liniments, lotions creams and emulsions, where they act as oily vehicles or demulcent.

No work has hitherto been reported on the pharmaceultical applications of melon seed oil. This work is therefore aimed at processing, and using the oil as a substitute for Arachis oil in methyl salicylate liniment and salicylic acid lotion respectively.

Materials

The following chemicals of analytical grades were used as procured from their manufacturers: petroleum ether (40-60°c)[1], methyl salicylate[2], salicylic acid[3], ethanol (95%)[4], arachis oil[5], orthophosphoric acid[6], and n-hexane[3].

Methods

Extraction: A 1kg quantity of dehauled melon seed was pulverized in a mill[7], and extracted in batches with 500ml of petroleum ether (40 - 60°C) At the completion of the extraction, the petroleum ether was evaporated, and the oil recovered using a rotary evaporator[8].

Processing:

The extracted oil was filtered with filter paper (Whatman-4, dewaxed by boiling with n-hexane, degummed by warming to 35°C with orthophosphoric acid, and refined by warming to 35°C with 0.1N NaOH. The oil was bleached by treating with double it's weight of activated charcoal. Winterization was by chilling in a refrigerator overhigh, and filtering out the unwanted crystals.

Physico-Chemical porperties:

The standard procedures for the determination of the physico-chemical contants were followed. Specific gravity was determined by use of a pycnometar viscositywith an Ostwald viscometer[9], surface tension with a tensiometer[10], and the thermal properties by heating the oil on a heater in an evaporating dish. Specific heat capacity was determined using Worshop and Flint method(5), while iodine value was by wij's method(6).

The acid, peroxide, and saponification values were determined using standard procedures(7). Some fatty acids present in the oil were identified by thin layer chromatography using authentic samples as standards.

Pharmaceutical formaulations:

The formula for the methyl salicylate liniment consisted of 25%v/v methyl salicylate in arachis or melon oil. The salicylic acid lotion consisted of 800g salicylic acid power, 0.4ml arachis or melon oil and the volume mae up lto 40ml with 95% v/v ethanol.

The percentages of methyl salicylate remaining in the formulations after 1,2,4,6 and 8 weeks were determined by withdrawing samples, adding 2 drops of ferric chloride, and reading the absorbance at 540mm in a colorimeter[11]. The equivalent concentrations were then obtained from a standard Beer's Plot. The percent of salicylic acid remaining in the salicylic acid percentages of salicylic acid remaining in the salicylic acid preparations were measured at weekly interval for 4 weeks, by mixing 5ml of the lotion with 95% ethaonl, and titrating with 0.5N Naoh, using phenol red as indicator.

RESULTS AND DISCUSSIONS

The physico-chemical propertis of the oil are sown in table1.

Physico-chemical properties of melon seed oil

Property	Value	Property	Value
Oil yield (%)	41.6	Specific heat capacity (Cal/g)	O.7954
Specific gravity at 29°C	0.9253		
Density (g/cm³)	0.9049	Iodine value	84.4
Refractive index ($n^{29}D$)	1.4497	Acid value	8.4
Viscosity (Cp)	18.17	Ester value	211.52
Melting Point (°C)	3.00	Saponification value	219.92
Smoke Point (°C)	143.0	Peroxide value	
Flash Point (°C)	247.5	Non saponifiable	
Fire Point (°C)	297.5	matter (%)	1.81
Boiling Point(oC)	267.5	Saturated acids (%)	25.69
Surface tension (dyne/cm)	32.17	Unsaturated acids (%)	74.31

The result shows an oil yield of 41.6% which is a little lower than those reported by Anon 48.1%[8], Girgis and said 51.0%[1], and Oyolu 53.0%9; but higher then those reported for a related melon specie - **Citrullus colocynthis**, 12.7% and 16.7% 10,11.

The other physico-chemical properties shown, indicate that the oil is full of unsaturation, and is semi-drying. The extracted oil was found to be freely miscible with chloroform, petroleum ether and toluene; fairly miscible with hexane, diethyl ether, and acetone upon heating; while absolutely immiscible with methanol, 96% ethanol, and distilled water. Linoleic, Oleic, Palmitic and Myristic acids were found to be present in the oil. This is congruent with those also reported by Girgis and Said1.

The percentages of methyl salicylate and salicylic acid remaining in the preparations with arachis and melon oils upon storage at room temperature are represented in figure 1 and 2. From Figure 1, the concentration of Methyl salicylate decreased to 68./8%after storage for one week in the arachis oil formulation. The corresponding concentration in the melon oil formulation was 76.7%. After two weeks or storage however, the value decreased sharply to 31.25% in the arachis oil formulation, while it remained constant at 76.7% in the melon oil formulation. Similar patterns of decompositions of methyl salicylate in arachis and melon oil preparation were 21.9% and 46.7% respectively

The relatively high rate of decomposition of the methyl saalicylate in the formulations could be attribued to acid bydrolysis of meyhl saicylate (an ester) in the presence of the factty acids of the oil. Morrison, had earlier pointed out

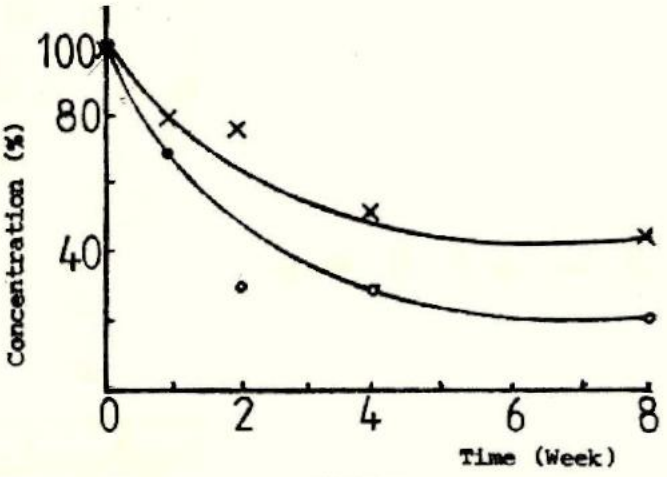

FIGURE 1

Percentage of methyl salicylate remaining in formulations O - Arachis oil, and x - Melon oil.

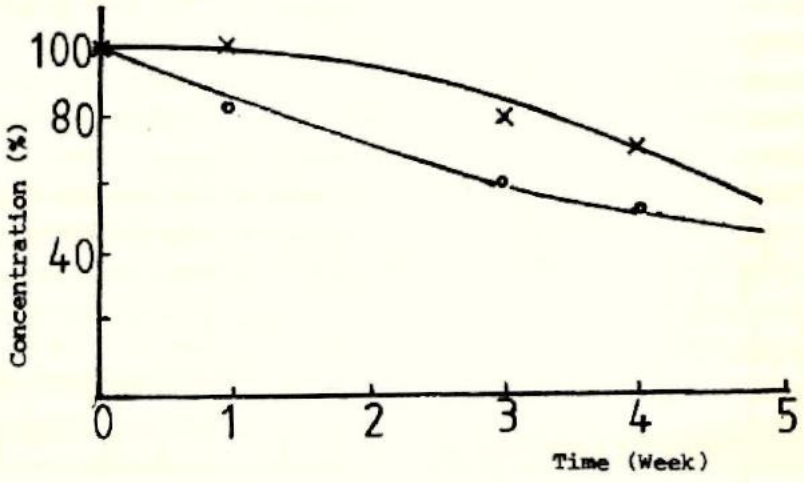

FIGURE 2

Percentage of salicylic acid remaining in formulations containing O - Arachis oil; and X - Melon oil

that hydrolysis of esters is promoted not only by bases but also by acids (12).

From these results, the amounts of methyl salicylate remaining in the melon oil liniments after 1,2,4,6 and 8 weeks of storage were all higher than the corresponding amounts in the arachis oil liniments. Since the degree of stability of any preparation is to some extent, determined by the amount of the active ingredient remaining in that preparation after a given period of storage, it then follows that the preparation in melon oil, which retained more of the active ingredient at all the time will be considered more stable than those in arqchis oil. This was further confirmed by the 50 values which were found to be 2 weeks and 4 weeks for the arachis and melon oil liniments respectively.

In Figure 2, the concentration of salicylic acid in the arachis oil formulation showed a somewhat linear pattern of deterioration from 100% on day 1 to 85.7%, 60.7% and 55.4% on weeks 1, 3 and 4 respectively. The concentration of salicylic acid in melon oil lotion on the other hand was stable at 100% even after one week, but decreased to 80%, and 72% after three and four weeks of storage respectively. These results indicate that the concentrations of salicylic acid were higher in the formulations containing melon oil than in those containing arachis oil at any given time. The 50 values determined by extrapolation were found to be 4.3 and 5.0 weeks respectively for the formulations in arachis and melon oils. These results showed that salicylic acid was retained more in the lotion containing melon oil than in that containing arachis oil.

Conclusion

It has been shown in this work, that melong oil, a local, inexpensive and readily available oil, can substitute arachis oil in the formulations of methyl salicylate liniment and saliclic acid lotion respectively.

Footnotes

1. Riedel-De Haen
2. Mane Fils
3. Merck
4. East Anglia Chem
5. B. D. H. Chem.
6. Vickers
7. Corona Landers
8. Rotavapor R110
9. Technico
10. Du Nouy
11 Bausch and Lomb.

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PRESIDENTIAL QUOTE

"Pharmacy is a profession of friends; no victor, no vanquished. We should all lay down our lives for pharmacy".

— Dr Philip O. Emafo, FPSN President, PSN "Coal City '91"