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Assessment of Crude Oil Extract from *Citrullus lanatus* (Water Melon) for Pharmaceutical Application

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Abstract:-

- ***Purpose***

To examine crude extract from Citrullus lanatus (water melon) seed oil for pharmaceutical application. In addition determine the functional groups in the seed oil using infrared spectroscopy.

- ***Methods***

The seeds of C. Lanatus was collected, dried at room temperature, seed, coat removed, pulverized, and extracted exhaustively using n-hexene in soxhlet extractor. Extract was concentrated using rotory evaporator. The oil stored in amber container physicochemical parameters were evaluated using titrimetric methods and the functional groups of chemical constituents were identified using IR.

- ***Results***

The physicochemical analysis showed good iodine value, perioxide value and saponification value that falls within the acceptable range as recommended by FAO and WHO. The FTIR spectrum showed the presence of hydroxyl groups, carbonyl compounds, saturated compounds which includes CH2CH3 at specific range of absorption brands.

- ***Conclusion***

The oil from C. Lanatus is excellent for human consumption and contains high amount of unsaturated fatty acids which gives it a better potential for pharmaceutical use.

I. INTRODUCTION/ LITERATURE REVIEW

Watermelon (C. *lanatus*) is an annual crop which belongs to the family of Cucurbitaceae. It has yellow or brown hairs and 3meters (10 feet) long. 60 to 200 millimetres long and 40 to 150 millimetres wide are the dimension of the leaves. The first growth is thickly woolly, with yellowish hairs that fades as plant becomes older. Watermelon has branching tendrils, their flowers are white or yellow and are borne on 40 millimetres long hairy stalk on unisexual plant (Madhavi *et al.,* 2012).

Watermelon is cultivated for its large and juicy edibility especially, when reopened. Watermelon seeds are the commonly discarded oil seeds. The seeds has been recorded to have nutritional values that has often compared favourably as well as soyabean and groundnuts (Gabriel *et al.,* 2018) fruits and vegetables has been investigated to have beneficial effects on blood cholesterol and prevents large diseases (Godwin *et al.,* 2008).

Ethnobotanically, C. *lanatus* has been used for the treatment and management of urinary tract infections, bed wetting, kidney stones, diabetes, gonorrhoea and ulcer using the seeds (Akinyama *et al.,* 2001). Watermelon as a popular fruit, is a cash crop which is rapidly acquiring economic importance both income production and nutritional value provision. The flesh of watermelon other than antioxidant effect, it is also crucial on human metabolism and prevents other human diseases (Maynard, 2001).

The chemical composition of natural products such as watermelon (C. *lanatus*) are responsible for preparation of pharmaceutical products which can be used internally or externally. Some of the compounds, thiamine, riboflavin, L-Arginine and Niacin (Zafar *et al.,* 2018).

The utilization of seed oils in various applications is characterized by their yields, compositions, physical and chemical properties. This characteristics of oil from various sources depends largely on their composition (Tsuchiya, 2010). This paper tends to report the assessment of crude oil extract from *Citrullus lanatus* seed for pharmaceutical applications.

II. MATERIALS AND METHODS

- *Sample Collection and Preparation*

Citrullus lanatus fruit was harvested from agricultural demonstration farm community secondary school, Omagwa Ikwerre Local Government Area, Rivers state. The fruit was taken to University of Port Harcourt's Herbarium, department of Pharmacognosy and Phytotherapy, Choba, Rivers state Nigeria, where it was authenticated. The seeds were extracted, air dried, blended and stored in a screw tight jar until the time of use.

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➢ *Extraction*

The powdered seed was exclusively extracted suing soxhlet extraction using n-hexene as a solvent. 180g of the coarse powdered was extracted using 1800ml of n-hexene at 65-67^{o}c and oil yield noted. The percentage determined after the evaporation of n-hexene. The extracted oil stored in an amber container.

➢ *Physicochemical Analysis*

The physicochemical analysis of the crude oil extract from *Citrullus lanatus* seed were determined using standard analytical methods. The values are expressed in percentages, mean ±standard deviation.

➢ *Relative Density*

This is determined using Relative Density bottle (25cm^3), weight of the oil was gotten and the density of oil sample calculated using standard method (AOAC, 1993)

$$\text{Density} = \frac{\text{weight of oil sample in (g)}}{\text{volume of RD bottle in (cm3)}}$$

➢ *Acid value*

Acid value was determined using titrimetric method according to (AOAG, 1993). 5g of oil sample was taken in a 250cm^3 conical flask and 25cn^3 of ethanol was added and heated on water bath, phenolphthalein as indicator, then the solution was titrated while hot against standard KOH solution, a faint Pink colour which persisted for £0 seconds showed at endpoint (Ekwu & Nwagu, 2004).

$$\text{Acid value} = \frac{\text{VM} \times 56.1}{\text{W}}$$

V – Volume of standard KOH in cm^3
M – Molarity of Standard KOH in (mol/dm^3)
W – Weight of oil sample in (g)

➢ *Saponification Valve*

1.0g of oil sample was measured and 25cm^3 of 0.5M was used to guarantee the complete dissolution, alcoholic KOH was added and heated for 30minutes and condensed. 1cm^3 of indicator (phenolphthalein) was added and titrated against 0.5M HCl. A pink colour showed at endpoint (AOAC, 1993)

$$\text{Saponification value} = \frac{\text{RAM} \times 56.1}{\text{W}}$$

B – Amount of HCl needed by the blank in (cm^3)
A – The amount of acid needed by the oil sample in (cm^3)
M – Weight of oil Sample in (g)

➢ *Iodine Value*

1g of oil sample taken into a conical flask, 15cm^3 CCl_4added. Then 10cm^3 of iodine monochloride solution was added, the mixture allowed to stand for 30minutes in the dark. 10cm^3 of 10% KT solution and 50cm^3 distilled water was added to the mixture and rinsed down any iodine that was still available. The iodine was titrated with a standard $Na_2S_2O_3$ solution, until a yellow precipitate becomes nearly colourless. A few drops of starch indicator was added, and then titration repeated until blue colour was no longer visible. The KI solution caused the bottle to shake vigorously. The amount of $Na_2S_2O_3$ in a given volume used was recorded. A blank experiment was conducted along with the sample. Percentage iodine absorbed by the oil sample was determined.

$$\text{Iodine value} = \frac{\text{BAM} \times 0.127}{\text{W}} \times 100\%$$

B – Volume of 0.1M $Na_2S_2O_3$ required by blank in (cm^3)
A – Volume of 0.1M $Na_2S_2O_3$ required by the oil sample (cm^3)
M – Molarity of $Na_2S_2O_3$ (moldm^{-3})
W – Weight of oil sample in (g)

➢ *Peroxide Value*

1g of the oil sample was dissolved in ethanoic acid and carbontetrachloride in the ratio 2:1 and saturated KI was then added to the mixture. The mixture was titrated with 0.2M $Na_2S_2O_3$ and starch solution as indicator, amount of iodine free from KI by oxidative action of peroxide actionof peroxides contained in the oil was quantified. The blank was titrated as recommended by (Marinova *et al.,* 2012)

$$\text{Peroxide value} = \frac{\text{ABM}}{\text{W}}$$

A – Volume of $Na_2S_2O_3$ consumed by oil sample in (cm^3)
B – Volume of $Na_2S_2O_3$used by the blank in (cm^3)
M – Molarity of $Na_2S_2O_3$ in moldm^{-3}
W – Weight of the oil sample in (g)

➢ *Refractive Index*

This is determined using an automated machine called refractor.

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III. RESULTS

Physicochemical Evaluation of crude oil extract of C. *lanatus* seed.

Table 1: Physical Properties

S/N	PARAMETERS	VALUES
1.	Colour	Pale Yellow
2.	Smell	Odourless
3.	Relative density	0.89
4.	Percentage yield	30.30%

R.D and % yield were conducted in mean triplicate

Table 2: Chemical Properties

S/N	PARAMETER	VALUE	STANDARDS (NHO & FAO)
1.	Acid value	4.30 ± 0.001	0.34mg KOH/g
2.	Saponification value	85.20 ± 0.56	5.58-24939 mgKOH/g
3.	Peroxide value	6.20 ±0.025	0.45 – 290 Meg/O_2/kg
4.	Iodine value	7.00 ± 0.01	2.7650 -153g_2 I_2 of Na
5.	Refractive index	1.42 ± 0.00	1.4 -1.45

Data are mean triplicates determinations ± S.D

Table 3: Interpretation of Infared Spectrum of *C. Lanatus*

S/N	Absorption bands (Frequency v cm^{-1})	Nature of bands	Description of brand	Inference
1.	2958:7152	Broad	O – H stretching	Contains O – HFunctional Group
2.	1757: 4465	Strong Sharp	C = O deformation	presence of carbonyl
3.	1479: 3697	broad, sharp	C – OH deformation	presence of carboxylic acid
4.	992: 0889	broad, sharp	OH deformation	presence of Aliphatic OH Compound
5.	750, 2788	weak, sharp	CH out of deformation	indicates the presence of Unsaturated compound

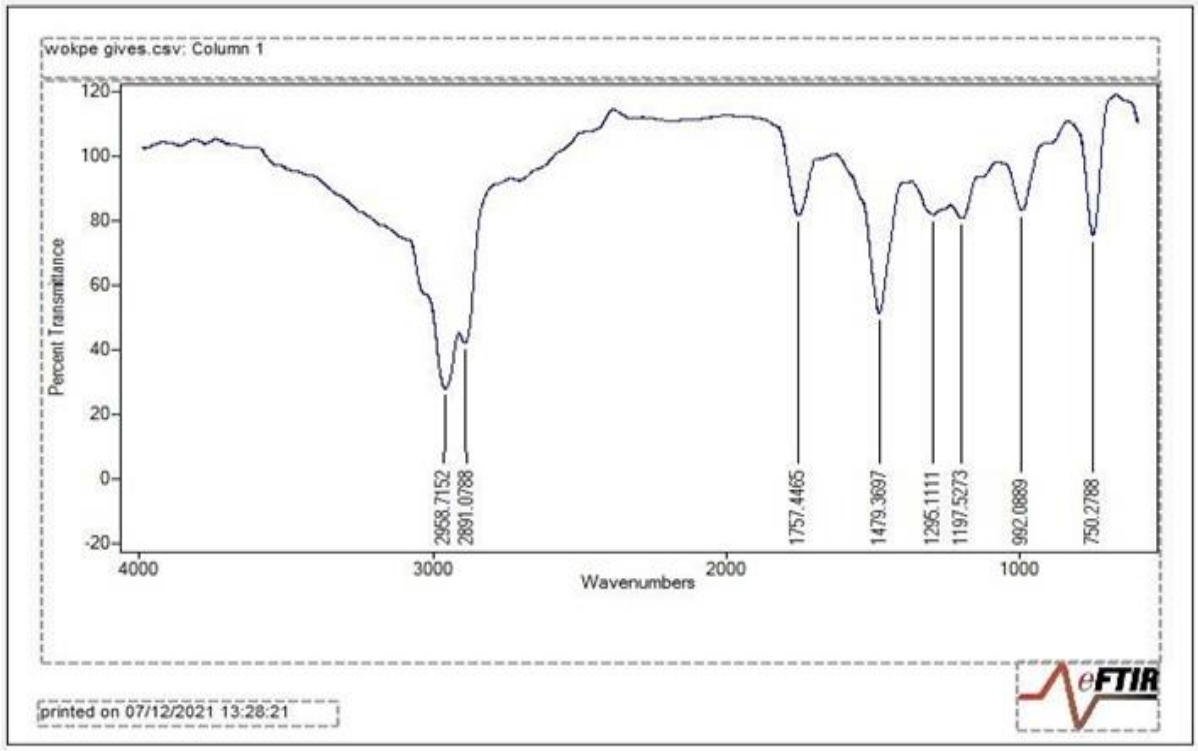

Fig 1 IR SPECTRUM of *Citrullus lanatus*

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IV. DISCUSSION

From (Table 1), the physical properties of crude oil from C. *lanatus* showed percentage yield of 30.30%, relative density of 0.89g/cm^3. However, crude oil from C. *lanatus* been a liquid at room temperature could be as a result of unsaturated fatty acids composition.

The chemical properties as shown in (table 2) revealed that the acid value 4.30±0.00 mgKOH/g which is within the range of standard as stated by FA), as a result, the higher the acid value of an oil the higher the storage quality and vice versa, indicating that the crude oil from C. *lanatus* seeds has an excellent storage quality. Saponification value of the crude oil was found to be 85.10±0.56mgKOH/g which is also within the range of standard, this means that the oil has the potential for soap production. The peroxide value was found to be 6.20±0.025MoqO_2/g which also falls within the standard range, this indicates that the oil, iodine value of 7.00±0.001 gI_2/g which is within the standard range, this means that there are quite degree of unsaturated fatty acids which shows that the oil is fit for human consumption.

The FTIR spectrum as rationalized in table 3 Hydroxyl group was suggested by medium and broad vibrational frequency in the area 2958cm^{-1} typically for alcohol. This confirms presence of fatty acids seed oil sample. Other features (functional groups) discernible from the FTIR spectrum are C-O deformation at the region (1757/cm-1) which confirms the presence of Carbonyl compounds this also shows the presence of carboxylic acid, C-OH deformation at the region 1479cm1 confirms alcohol functional group presentence and CH out of deformation. The region 750 indicates the presence of CH_2 /CH_3, C-C at the region (1655cm-1) indicates Olefinic functional groups.

V. CONCLUSION

The oil from C. *lanatus* showed physicochemical properties in line with the set standard which makes it excellent for human consumption and a great amount of unsaturated fatty acids which gives it a better potential to be used in the formulation of pharmaceutical products in the pharmaceutical industries and custimatic industries.

Based on these chemical properties, crude oil from *Citrullus lanatus* seed oil can be applied in the pharmaceutical industries as excipients, microensulation, extractive solvent for broactive compounds and self-emulsifying agents in drug delivery system. In addition, unsaturated fatty acids are known to have antimicrobial, and antifungal which makes the oil good for the formulation of antimicrobial and antifungal creams and soaps for external use.

REFERENCES

[1]. Adelani, A., Tabitha Lilian (2015). Antibacterial activity of watermelon seeds against selected microorganisms. *Biotechnology*, 14(14): 1224-1226

[2]. Ahmed Hassan, Hasnah, m. Ahemd Yagi, and abdelwahab (2011). *In vibro* Antimicrobial activities of chloroformic, hexane and ethanolic extracts of *Citrullus lanatus* var. citroides (Wild melon). *Journal of Medicinal Plants Research* 5(8), pp. 1338-1344.20.

[3]. Alok, BRk., Vivek, and Niyaz, A. (2012). Evaluation of anti-ulcer activity of *Citrallus lanatus* seed extract in Wistar rats. *Journal of Pharmacy Sciences* ISSN-0975-1491. Vol 4, suppl 53.

[4]. AOAC (Association of Official Analytical Chemistry) 1993. Official methods of analysis. AOAC international methods, 934,988,920,942. *Artington*, USA: AOAC international.

[5]. AOAC (Association of Official Analytical Chemists) (1999). Official methods of analysis. AOAC international methods, 934.01, 988.05. *Artington. VA. USA: AOAC international.*

[6]. Ayenus, E.S. (1972). Medicinal plants of West Africa References, publication, *Inc. Algonac Michigan USA.*

[7]. Baker T.P., Corwin B and jett L.W. (2002). Watermelon Bacterial Fruit Blotch. University of Missouri Extension. http://extension.missouri.edu/p/IPM1011Accessed 18.4.

[8]. Bawa, A.s & Bains, G.S (1977). Integrated processing of watermelon for juice and seed. *Indian Food Pucker*, 31:12.

[9]. Boakye, A.A., Wireko-Manu, F.D., Agbenorhevi, J.K, Oduro, I. (2015). Antioxidant Activity, Total Phenols and Phytochemical Constituents of four Underutilised Tropical Fruits. *International Food Research Journal*, 22(1): 262-266.

[10]. Braide, W., Odiong, I.J., S. (2012), Phytochemical and Antibacterial properties of the seed of watermelon (*Citrullus lanatus). Prime Journal of Microbiology Research*, 2(3): 99-104

[11]. Burkill, H.M. (1985). The useful plants of West Tropical Africa. Families, *Royal Botanical Gardens. Kew. Great Britain, 3:177-266.*

[12]. Chebil, L., Humeau, C., Falcimagine, A., Engasser, J., Ghoul, M. (2006). Enzymatic acylation of flavonoids, *process biochemistry*, 41 (11): 2237-2251.

[13]. Chej. R. (1984). Enclopedia of Medicinal plants. MacDonald ISBN 0-356-10541-55.

[14]. Chilpa, R., Baggio, C.H., Solano, A.D., Muniz, E., Kauffman, F.C., Sanchez, R.I. (2006). Inhibition of gastric H^+, K^+ ATpase activity by flavonoids, coumarins and xanthones isolated from Mexican Medicinal Plants. *Journal of Ethnopharmacology*, 105: 167-172.

[15]. Chopra, RN. (1958). Indigenous drugs of India: Academic Publishers.6.

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[16]. Cos, P., Vlietinck, A.J., Berghe, D.V. (2006). Anti-infective potential of Natural Products: How to develop a stronger *in Vitro* 'proof-of concept. *Journal of Ethnopharmacology* , 106: 290-302.
[17]. Costa, M.A., Zia, Z.Q., Davin, L.b., N.G. (1999). Chapter Four: Toward Engineering the Metabolic Pathways of Cancer-Preventing Lignans in Cereal Grains and other Crops. In Recent Advances in Phytochemistry, Phytochemicals in Human Health Protection, Nutrition and Plant Defense, ed. *JT Romeo, New York,* 33:67-87.
[18]. Cushnie, T.P., lamb, A.J. (2005). Antimicrobial activity of flavonoids, *International Journal of Antimicrobial Agent*, 26(5): 343-356.
[19]. De Conto, L.C., Gragani, M.A.L., D., Ambiel, H.C.l., Chiu, M.C., Grimaldi, R., Goncalves, L.A.G. (2011). Characterisation of crude 62 watermelon seed oil by two different extraction methods, *Journal of American Oil Chemists' Society,* 88:1709-1714
[20]. Deng Jia-gang, Wang Shuo, Guo Li-cheng & Fan Li-li (2010), Anti-inflammatory and Analgesic effect of extract from roots and leaves of *Citrullus lanatus. Researches in Medical Education,* 2(3):231-235.
[21]. Duke J.A. Ayensu ES (1985). Medicinal plants of China: Reference Publication.7.
[22]. Edwards, A.J. (2003). Consumption of watermelon juice increases plasma concentration. J. Nutr. P. 1043.
[23]. Elujoba, A.A., Odeleye, O.M and Ogunyemi, C.M. (2005). Traditional Medical Development for medical and dental primar healthcare delivery system in Africa J. Traditional, Complementary and Alternative Medicine.2(1): 46-61.8.
[24]. Fahey, K.K Stepehnson, K.L Wade, P. Talalay (2013) urease from helicobacter phylori is inactivated by sulforaphane and other isothisocynates biochem res commun, 435: 1-7
[25]. Farnsworth, N.R. (1994). The role of Medicianal Plants in drug development. In: Krogsgaard-Larsen, S., Brogger-Christensen, S., Kofod, H. (Eds). *Natural products and Drug Development Munkdgaard, Copenhagen.*
[26]. Firdous, N,h, Ansari, I Fatima, A Malik, N, Afza (2012) ophiamides A-B, new potent urease inhibitory sphingolipids from heliotropium ophioglossium. Arch pharm res. 35 (7) pp, 1133-1137
[27]. Francis S.O., Morufu E. B and Adedeji, G.T. (2013). Anti-secretory Effects of Watermelon (*Citrullus lanatus*) juice in Male Albino Rats. Annual Review & Research in Biology. 3(4): 358-366.9.
[28]. Fursa, T.B., (1981). Intra specific classification of watermelon under cultivation. Kulturpflanze 29:297-300.10.
[29]. Gabriel, A.F., Igwemmar, N.C., Ilodinke, E., Omoniyi, A.O, Adeyemo, B., (2018). Effect of preservation on the physicochemical properties of watermelon. *Direct research Journal of Agricultural and food science*, 5(10): 333-337.
[30]. Godwin, C. Ojieh, O.M.O., Yetunde, R.O., Kayode, E.A, George, O.E., Reginah, T.O (2008). Compositional studies of *Citrullus lanatus* (Egusi) seed. *The international Journal of Nutrition and wellness* ISSN, 1937-8297.
[31]. Maynard, D.N (2001). Watermelons: Characteristics and production and marketing. American society for horticultural science (ASHS) press. Horticulture crop production series. *Alexandra, V.A United states.* P. 227.
[32]. Tsuchiya, T., (2020). Utilization of seed oils base on their compositions *journal of food science and technology* 2:790-797
[33]. Zafar, B.S. (2018) Traditional uses of medicinal plants practiced by the indigenes. *Journal of Ethnobiology* and Ethnomedicine 4: (14-17)