ISSN: 0976-3031

Available Online at http://www.recentscientific.com

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 13, Issue, 12 (A), pp. 2760-2763, December, 2022

International Journal of Recent Scientific Research

DOI: 10.24327/IJRSR

Research Article

OZOROA INSIGNIS OIL TOXICITY STUDY FOR POTENTIAL USES IN COSMETICS AND DERMATOLOGY

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DOI: http://dx.doi.org/10.24327/ijrsr.2022.1312.0566

ARTICLE INFO

Article History:

Received 22nd October,, 2022
Received in revised form 10th November, 2022
Accepted 12st December, 2022
Published online 28th December, 2022

Keywords:

Acute toxicity, vegetable oil, cosmetics, dermatology, conservation

ABSTRACT

Ozoroa insignis oil, extracted from the mesocarp of fruits, arouses interest in cosmetics and dermatology because of its richness in polyunsaturated fatty acids, which could give it remarkable biological properties. To use this oil in cosmetics and dermatology, a study of its acute toxicity was conducted. The method used by Lorke (1983) was employed in this study. *NMRI* mice aged 8 to 12 weeks, with a weight between 31 and 33 g for females and between 42 and 50 for males, were used. The single dose of 2000 mg/Kg/bw was administered to the animals orally. The animals were followed for 14 days with weight measurement on day 0, day 7, and day 14. Symptomatic disturbances were noted. All animals were sacrificed on day 15 and autopsied. Macroscopic observation of the organs was performed to assess the effect of the oil on the liver, spleen, kidneys, lungs, and heart. The results showed that no symptomatic disorder was noted. No mortality was recorded during the test. Growth performance was greater in the mice tested. Body weight gains of 4.95 g and 7.94 g were noted on day 7, respectively, in females and males tested. No organ damage was observed in the mice tested. These results suggest that the oil of *O. insignis* has no acute oral toxicity, and it opens up great prospects for the socio-economic valuation of its oil and its conservation by the populations.

INTRODUCTION

In sub-Saharan Africa, several plants with significant socio-economic potential are sometimes overlooked (Ouoba *et al*., 2006; Ouattara *et al*., 2018; Ouoba *et al*., 2018). However, knowledge of their socio-economic potential can contribute to the conservation of these plants whose populations are in strong regression in sub-Saharan Africa vegetation. *O. insignis* belongs to this category of plants whose socio-economic valuation can open up interesting prospects for its domestication and conservation. Indeed, it is an oleaginous plant whose fruit mesocarp oil was extracted and studied for the first time in 2018 (Ouattara *et al*., 2018). In view of the richness of this oil in unsaturated fatty acids, the authors have suggested its use in dermatology and cosmetics. Indeed, the richness of the oil in polyunsaturated fatty acids can give it important biological properties (Nuto *et al*., 2020). According to Aké-Assi *et al.* (2015), before introducing a plant into the society, the test on toxicity has to be done. Our study, therefore, aimed to study *O. insignis* oil toxicity so as to make it possible to be used in dermatology, cosmetics, and even animal nutrition.

MATERIAL AND METHOD

Characteristics of oils used for toxicity test and for control

O. insignis fruits oil is the oil to be tested for toxicity. The crude oil was extracted from the mesocarp of the fruits. The fruits (Photo 1) were harvested in Bobo-Dioulasso savannas. The extraction process consisted of drying the fruits in the laboratory at room temperature (29°C-35°C). The dried fruits were then crushed with a Retsch GM-200 type grinder. The crushed material was then used for oil extraction. For extraction, soxhlet (NF EN ISO 659, 2009) was used with petroleum ether as solvent. The oil gotten was used for toxicity test.

Furthermore, the oil used for control was corn oil, which was purchased from a supermarket. Corn oil was used as a control because of its remarkable nutritional properties. It is very rich in monounsaturated and polyunsaturated fatty acids (Table 1). Similarly, the fatty acids composition of *O. insignis* oil was highlighted by Ouattara *et al.* (2018) (Table 1).

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Photo 1 Fruits of *O. insignis*

Table 1 Characteristics of the oils used for the control and the test

Fatty acids	Proportion of fatty acids (%) in oils	
	Corn oil	*O. insignis* oil
Linoleic acid	53,515	16,1
Oleic acid	27.333	32,9
Palmitic acid	10.579	19,3
Stearic acid	1.848	3,2
α-linolenic acid	1.161	1
Erucastic acid	0.129	0,4
Palmitoleic acid	0.114	1,7
Myristic acid	0.024	
Vaccenic acid		23,6
Behenic acid		0,4
Lignoceric acid		0,6
Arachidic acid		0,7

Toxicity assessment

The method used by Lorke (1983) was employed in this study. *NMRI* mice aged 8 to 12 weeks with a weight between 31 and 33 g for females and between 42 and 50 for males were used. The single dose of 2000 mg/Kg/bw was administered to the animals orally. The control was treated with corn oil. Changes in animal behavior were tracked for over 72 hours. The number of dead mice as well as symptomatic disorders (agitation, lack of appetite, muscle disorder and dyspnoea) were noted. In case of death, the animal was autopsied and a macroscopic examination of the internal organs is carried out to detect any anomaly. Animals were followed for 14 days with weight measurement on day 0, day 7, and day 14. All animals were sacrificed on day 15 and autopsied. Macroscopic observation of the organs was carried out to assess the effect of the oil (possible damage) on the liver, spleen, kidneys, lungs, and heart. Data analysis was done with Excel 2019. *Student*'s test at the 5% threshold was used to compare mouse body weights and organ weights (lungs, heart, kidneys, spleen and liver) between groups tested and the control groups.

RESULTS AND DISCUSSION

Symptomatic disorders after administration of O. insignis oil

A few moments after the administration of the oil of *O. insignis*, at the single dose of 2000mg/kg/bw, no symptomatic disorder (lack of appetite, muscle disorder, dyspnoea, agitation) was observed.

Changes in the general appearance of the mice (hair, skin, appearance of the eyes, ears and mouth) were not observed during these fourteen days of observation. In summary, no symptomatic disturbance was noted in comparison with the control group. This experiment shows that the oil of *O. insignis* does not show signs of severe acute toxicity.

Table 2 Evolution of the body weight (g) of the *NMRI* mice during the 14 days of treatment

Mice Sex	Mice ID	Day 0 (D0)	7th Day (D7)	14th Day (D14)	Mouse Mortality	Weight gain (D0-D 7)	Weight gain (D0 -D14)
Females	Control	32,06±0,59[a*]	36,13±1,90[a]	35,62±2,19[a]	0	4,07±1,31	3,56±1,6
	Tested	32,87±0,43[a]	37,82±0,25[a]	37,83±2,22[b]	0	4,95±0,18	4,96±1,79
Males	Control	48,09±2,5[b]	53,37±4,43[b]	47,3±1,65[c]	0	5,28±1,93	-0,79 ±0,85
	Tested	44,54±1,87[b]	52,48±3,61[b]	49,66±4,44[c]	0	7,94±1,74	5,12±2,57

* Means followed by the same letter are not significantly different.

Table 3 Organs weights (g) of *NMRI* mice after 14 days of treatment

Mice Sex	Mice ID	Heart	Liver	Lungs	Kidneys	Spleen
Females	Control	0,145±0,005[a*]	2,512±0,04[a]	0,357±0,05[a]	0,576±0,099[a]	0,185±0,04[a]
	Tested	0,148±0,007[a]	2,332±0,37[a]	0,308±0,06[a]	0,462±0,06[a]	0,201±0,03[a]
Males	Control	0,274±0,009[b]	3,725±0,559[b]	0,518±0,07[b]	1,101±0,131[b]	0,771±0,518[b]
	Tested	0,268±0,04[b]	3,356±0,45[b]	0,454±0,03[b]	0,953±0,28[b]	0,252±0,006[b]

* Means followed by the same letter are not significantly different

Constitution of the mice groups for the evaluation of the toxicity of the oil

The animals were divided into two groups of 6 mice divided into four groups:

Group 1: 3 female mice receiving corn oil (control group)
Group 2: 3 female mice receiving *O. insignis* fruits oil
Group 3: 3 male mice receiving corn oil (control group)
Group 4: 3 male mice receiving *O. insignis* fruits oil

Groups of 3 mice were formed for the various tests according to the recommendations of Lorke (1983) based on the number of animals necessary to detect the toxicity or non-toxicity of a substance.

Effect of oil administration on mice mortality

No mortality was recorded during the 14 days after administration of *O. insignis* oil to mice. The results have also shown that there is a much greater gain in body weight and organ weight (Heart, liver, spleen and lungs) in mice treated with *O. insignis* oil.

Thus, on the 7th day, there was a gain of 4.95 g in body weight in the females tested against 4.07 g in the control group (Table 2). In the males tested, the weight gain reached 7.94 g on the

7th day. These results prove that the oil of *O. insignis* has no acute toxicity when taken orally.

Effect of oil administration on mice organs

Autopsy of the organs to detect possible lesions did not show any lesions on the heart, liver, kidneys, and lungs (Table 3). Thus, these results confirm the safety of *O. insignis* oil on mice.

DISCUSSION

The administration of crude oil of *O. insignis* did not show any clinical signs in the mice groups constituted during 14 days of observation. Additionally, the oil of *O. insignis* did not kill any mice. Mice fed with the oil of *O. insignis* also had a much greater body weight gain than mice fed corn oil. These results confirm the work of certain authors (Arbonnier, 2002) who mention that the fruits of *O. insignis* are eaten by children. This suggests that the oil extracted from the fruit mesocarp is not toxic. In addition, this oil gives effects comparable to the best edible oils widely consumed in the world, such as corn oil, soybean oil, and olive oil which all have very high fatty acid levels. Finally, the better growth performance observed in the mice tested compared to the control mice could be explained by the particular fatty acid composition of the oil of *O. insignis*. In fact, the oil of *O. insignis*, rich in vaccenic acid (24%) which is a precursor of rumenic acid, intervenes in the absorption of calcium by the intestine (Martin *et al*., 2008). In addition, with regard to this very abundant fatty acid in the oil of *O. insignis*, studies by Lock *et al.* (2004) showed beneficial effects of vaccenic acid on rats fed vaccenic acid as a dietary supplement. These results, which show the absence of acute toxicity in mice, open up important prospects for the use of this oil in cosmetics and dermatology for skin care. The discovery of the usefulness of this species for cosmetics, dermatology, and even nutrition will make it possible to better preserve this species in the vegetation of Burkina Faso. Indeed, according to Weber *et al.* (2010), when a species is deprived of its traditional and economic importance, then it will no longer be able to benefit from protection by the populations. For the future, the domestication of this specie can be an alternative to avoid its disappearance. Domestication proves to be an alternative to protect plant species threatened by extinction (Aké-Assi *et al*., 2007).

CONCLUSION

This study made it possible to establish the toxicological parameters of the crude oil of *O. insignis*. The crude oil, administered orally, did not show toxicity in *NMRI* mice during 14 days of follow-up. The toxicological characteristics are very positive, marked by a total absence of mortality and lesions on the vital organs (Heart, liver, kidneys, and lungs). The mice also gained weight compared to the controls administered with corn oil, among the best-known edible oils today. Therefore, the oil of the plant is not a toxic substance, which is reassuring for the domestication of the plant and its socio-economic use in cosmetics, dermatology, and even animal nutrition.

For future studies, further research should be carried out on subacute and chronic toxicity to see if its prolonged use has no significant harmful effects on health.

References

1. Aké-Assi E, N'guessan K, & Kouassi AF, (2015). Evaluation de la toxicité aiguë de l'extrait aqueux des feuilles de *Thunbergia atacorensi*, une espèce nouvelle. European Scientific Journal, 11(27) : 92-100.
2. Aké-Assi E, Chatelain C, Aké-Assi L, & Traoré D, (2007). *Thunbergia erecta* (Benth.) T. Anders. (Acanthaceae) : L'histoire de sa découverte en Côte d'Ivoire et le paradoxe d'une expansion horticole. Annales de Botaniques de l'Afrique de l'Ouest, ISN : 1726 – 1546.
3. Arbonnier M Ed. Arbres, arbustes et lianes des zones sèches d'Afrique de l'Ouest, CIRAD-MNHN-UICN, (2002).
4. Lock AL, Corl BA, Barbano DM, Bauman DE, & Clement IP, (2004). The Anticarcinogenic Effect of trans-11 18:1 Is Dependent on Its Conversion to cis-9, trans-11 CLA by Δ9-Desaturase in Rats. Journal of Nutrition 134 (10), 2698-2704.
5. Lorke D, (1983). A new approach to practical acute toxicity testing. Archives of Toxicology, 54: 275-287.
6. Martin JC, (2008). L'acide ruménique: un trans particulier. Sciences des aliments, 27: 283-287.
7. Nuto Y, Dossou K, & Kasseney BD, (2020). Valorisation de la graine de *Zanthoxylum zanthoxyloides* (Rutaceae) pour la promotion de l'économie verte et le développement durable. Journal of Applied Biosciences, 155: 16049 – 16059.
8. Ouattara L, Ouoba P, Philippe-Pierre Robichaud PP & Surette ME, (2016). Oilseeds Potential of *Zanthoxylum zanthoxyloides* (Lam.) Zepernick and Timler. Int. J. Pure App. Biosci, 4 (5) : 23-28.
9. Ouoba P, Ouédraogo A, & Traoré S. (2018). Savoirs culinaires et identité socio-culturelle : cas de l'utilisation de *Cissus populnea* Guill. & Perr. le gombo de l'ethnie Bobo au Burkina Faso. Tropicultura, 36(4) : 595-607.
10. Weber N, Birnbaum P, Forget PM, Gueye M, & Kenfact D, (2010). L'huile de *Carapa* (*Carapa* spp., Meliaceae) en Afrique de l'ouest : utilisation et implication dans la conservation des peuplements naturels. Fruits, 65 (6) 343-354.

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