

# Study of the Clinical Tolerance of a Wild Food Plant: Case of *Euphorbia Hirta*

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**Abstract** *Euphorbia hirta* is a herbaceous plant, widespread in all tropical and subtropical regions of the world. It is widely used in traditional medicine for a wide variety of therapeutic indications such as gastrointestinal, respiratory and hepatic infections; it is also used orally for its galactagogue effects in breastfeeding women. In order to enhance the *Euphorbia hirta* plant, studies on the prolactin level and clinical signs in rats force-fed with the aqueous extract of this plant were carried out. The study was carried out experimentally on 18 adult female Albino Wistar rats divided into three (3) groups of six (6) rats. The first batch received by gavage (twice a day for 4 days) distilled water, the second received by gavage a galactogil and the third batch received by gavage the aqueous extract of *Euphorbia hirta* at 0.2 g/mL. The results showed that the prolactin level ( $15.22 \pm 0.67$  ng/ml) in the rats force-fed with the aqueous extract of *Euphorbia hirta* is significantly higher ( $p < 0.05$ ) than that of the female rats having received distilled water ( $10.41 \pm 0.11$  ng/ml). However, the prolactin level in rats force-fed with the aqueous extract of *Euphorbia hirta* is not significantly different ( $p > 0.05$ ) from that of female rats having received galactogil ( $15.26 \pm 0.84$  ng/ml). All the animals survived for the duration of the experiment and showed no clinical signs. This shows that the aqueous extract of *Euphorbia hirta* is well tolerated by rats. These results open up interesting perspectives relating to the use of the *Euphorbia hirta* plant in the form of a food that can constitute an effective and rapid means of combating the hypogalactia in breastfeeding women.

**Keywords:** female rats, gavage, clinical signs, prolactin

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## 1. Introduction

The plants of the African pharmacopoeia are generally used as therapeutics [1,2]. Thus they are used in the treatment of various affections and diseases [3]. Among the therapeutic plants recorded against ailments and diseases, *Euphorbia hirta* occupies a prominent place. It is a small herbaceous plant, widespread in all tropical and subtropical regions of the world. It is widely used in traditional medicine for a wide variety of therapeutic indications such as gastrointestinal, respiratory and hepatic infections; it is also used for its diuretic and galactagogue effects. Its uses as galactagogues are often put to good use in countries such as Cameroon, Côte d'Ivoire, Mali, Senegal and Togo [4]. Research carried out on lactation indicated the induction of lactation by the plant *Euphorbia hirta* [5]. In this context, work has shown that extracts of lactogenic plants increase milk production by stimulating the production of prolactin [6].

However, the lack of knowledge of the toxicological properties of plants used in traditional medicine exposes

populations to real risks of therapeutic accidents. Thus this oral use could cause poisoning, hence the interest of conducting an experiment including the dosage of the biochemical indicator of lactogenic power, which is prolactin, and evaluating the clinical tolerance in rats in the oral intake of aqueous extracts of the plant *Euphorbia hirta*. Our work proposes to achieve this goal through the dosage of prolactin associating a clinical tolerance test. This study is carried out with a view to the valorization of *Euphorbia hirta* to fight against hypogalactia in breastfeeding women through its transformation into a food.

## 2. Material and Methods

### 2.1. Material

The plant material used to obtain the aqueous extract consists of *Euphorbia hirta* plants. The *Euphorbia hirta* plant material was collected from the spontaneous flora on the Bingerville site (southern Côte d'Ivoire) from March to May, the period and site at which the *Euphorbia hirta*

plant is available. It was then dried and treated for the extraction of the aqueous fraction intended for animal experimentation.

The animal experimentation were conducted on 18 adult female rats of the Wistar strain. Their average weight is  $255 \pm 5$  grams and they are divided into 3 homogeneous groups of 6 rats in metabolic cages. During this period water and pellets are served. After this period the female rats were weighed again and divided into three homogeneous batches.

## 2.2. Methods

### 2.2.1. Aqueous Extraction of the Plant *Euphorbia hirta*

The extraction is based on the solubilization of the pectin with distilled water [5,6]. Ground plants are subjected to an aqueous extraction, with a quantity of 100 g of plant matter for 1.5 l of distilled water. The whole is heated to  $80^{\circ}\text{C}$  for 45 min. The homogenate, cooled for 5 minutes, is filtered through a fine-mesh poplin cloth. To the residue obtained, 1 l of distilled water is added. The whole is heated to  $80^{\circ}\text{C}$  for 30 min and then filtered. The total filtrate constitutes the aqueous extract. It is freeze-dried to obtain the dry aqueous extract.

### 2.2.2. Animal Experimentation

The duration of the experiment was four days during the test period.

The 3 batches of rats, L1, L2 and L3 receive by gavage, twice a day, respectively 1 gram of freeze-dried aqueous extract of *Euphorbia hirta* dissolved in 5 milliliters of distilled water, 1 gram of galactogil dissolved in 5 milliliters of distilled water as positive control and 5 milliliters of distilled water which constitutes the negative control for four (4) days. Force-feeding is carried out in the morning at 8 a.m. and in the evening at 4 p.m. The rats receive the daily food in the form of pellets every day at 4 p.m.

### 2.2.3. Blood Sample

Blood samples of at least 2 ml are taken, on an empty stomach, from the rats the day after the fourth day of treatment at the level of the jugular vein in dry hemolysis tubes of 4 ml capacity just after having sacrificed the animals. The dry hemolysis tubes are kept in a cooler containing ice beforehand. The collected blood is centrifuged at 3000 rpm for 10 min using a JOUAN centrifuge. The evaluation of plasma prolactin concentrations is carried out on the serum obtained. Plasma prolactin concentrations are calculated using a VIDAS-type automaton.

During the experimental phase, the parameters related to the clinical signs in female rats, which are: survival, variation in body mass, variation in the color of the sense organs, stools, urine and sleep disorders were evaluated.

## 3. Results and Discussion

The plasma concentration of prolactin evaluated in rats treated with aqueous extract *Euphorbia hirta* is  $15.22 \pm 0.67$  ng/ml,  $15.26 \pm 0.84$  ng/ml in rats treated with galactogil and  $10.41 \pm 0.11$  ng/ml in rats treated with distilled water. The plasma concentration of prolactin ( $15.22 \pm 0.67$  ng/ml) of spleens treated with aqueous

extracts of *Euphorbia hirta* is significantly different from the plasma concentration of prolactin ( $10.41 \pm 0.11$  mg/ml) found in rats treated with distilled water and does not show any significant difference compared to the plasma concentration of prolactin ( $15.26 \pm 0.84$  mg/ml) found in rats treated with galactogil. The results show that the aqueous extract of the *Euphorbia hirta* plant significantly increases prolactin stimulation. This would suggest the presence of a lactogenic active ingredient in *Euphorbia hirta*. Prolactin is the main milk production hormone in mammals [7].

Although the *Euphorbia hirta* plant is effective in inducing prolactin in wet nurses in urban and rural areas, the clinical tolerance study is important because of the possible presence of toxicity in wild food plants [8].

The clinical signs are a medical examination by sight or touch or the visible manifestations observed during a medical examination. The life parameter is the first tool used to assess the tolerance test [9]. In the study conducted, all test animals survived the 1 gram amount of product. Also, the study on the parameter related to body mass did not vary. Indeed, the body mass of female rats having received the aqueous extract and those having received distilled water is not significantly different. This second parameter also makes it possible to evaluate the clinical tolerance with respect to the aqueous extract of the *Euphorbia hirta* plant. It is an important indicator for the toxicity study [10]. Faeces analysis did not reveal any significant difference over the duration of animal experimentation. It is noted throughout the duration of the experiment the absence of insomnia, of the redness of the sense organs which constitute the symptomatic disorders of the clinical observation in the rats.

The dose of 1 gram from animal experimentation remains lower than the non-lethal dose of 5000 mg/kg in rats. Indeed, the acute oral toxicity of *Euphorbia hirta* was evaluated in female rats. The dose of 5000 mg/kg did not produce signs of treatment-related toxicity in the animals tested during the observation period [11].

Although very common prescribed in traditional medicine and in many countries, *Euphorbia hirta* has been the subject of a number of studies, both in terms of its acute and chronic toxicity on laboratory animals, and in level of its good tolerance in humans.

Table 1. Plasma prolactin concentrations of rats

Substances administered	Plasma prolactin concentration (ng/ml)
Distilled water	$10.41 \pm 0.11^a$
Galactogil (0.2 g/mL)	$15.26 \pm 0.84^b$
Aqueous extract of <i>Euphorbia hirta</i> (0.2 g/mL)	$15.22 \pm 0.67^b$

Means bearing different superscripts within columns (a, b) differ significantly  $P \leq 0.05$ .

Table 2. Parameters studied relating to clinical tolerance

Parameters related to clinical signs	Answers
Survival	-
Body mass	-
Color of sense organs	-
Skin reaction	-
Sleep disorders	-
Color and texture of stool and urine	-

- There is no variation for the parameter concerned.

## 4. Conclusion

This study confirmed that the aqueous extract of the plant *Euphorbia hirta* remains at both effective at 0.2 g/ml and well tolerated in the treatment of hypogalactia. In addition to a high prolactin production rate which characterizes the rapidity of its action, there is also an excellent tolerance which could make *Euphorbia hirta* a health food for the fight against hypogalactia in rural areas in the vulnerable population made up of breastfeeding women. In short, these results give hope for the possible use of the *Euphorbia hirta* plant in food and probably constitute an effective means of combating insufficient milk production in breastfeeding women.

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