

# **Abortifacient Efficacy of *Moringa oleifera* Leave: An Experimental Study on Adult Female Wistar Rats**

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## **Abstract**

It is the aim of this study to investigate the abortifacient potential of *Moringa oleifera* leaves indicated by weight changes on pregnant Sprague-Dawley rats. In a bid to achieved this objective, fifteen adult albino rats (5 males and 10 females) were obtained from the animal holding of Ambrose Alli University, Ekpoma. Female rats (M1 – M5) served as the experimental group while female rats (C1 and C5) served as the control group. Each rat in both groups was given 20g of normal rat chow and water *ad libitum* throughout the experiment. After the confirmation of pregnancy, 3g of *M. oleifera* was added to 17g of normal rat chow to form the experimental diet for M1 – M5 from the 5<sup>th</sup> day to 15<sup>th</sup> day. Our results showed progressive body weight gain in the control from the 6<sup>th</sup> day to 21<sup>st</sup> day. On the other hand, the test group (fed *M. oleifera* leaves) showed a reduction in body weight after mating to about the 7<sup>th</sup> day and started gaining weight from the 8<sup>th</sup> day to the end of the 3<sup>rd</sup> trimester. At the end of the 23<sup>rd</sup> day, only the control produces litters while the test did not produced any litter. This finding revealed that *M. oleifera* leaves may be abortifacient and it abortifacient potential occur in the 1<sup>st</sup> trimester of pregnancy.

## **Keywords**

*Moringa oleifera*, Abortifacient, Female Rats

## **1. Introduction**

Birth control, also known as contraception and fertility control, are methods or devices used to prevent pregnancy (Taliaferro et al., 2011). Planning, provision and use of birth control is called family planning (Rang et al., 2012). Safe sex, such as the use of female condoms, can also help prevent sexually transmitted infections (Chin et al., 2012). Birth control methods have been used since ancient times, but effective and safe methods only became available in the 20th century (Hanson et al, 2012). Some cultures deliberately limit access to birth control because they consider it to be morally or politically undesirable (Sitruk-Ware et al, 2007). Although family planning has been promoted through several methods of contraception, but due to serious adverse effects produced by synthetic steroidal contraceptives, attention has now been focused on medicinal plants for possible contraceptive effect (Ahmed, et al., 2002). Nigerian adolescents and single women with unwanted pregnancy have resort to the use of concoction made from venom herbs, and deaths have been reported in Nigerian Newspapers to occur in some of these

women.

Of interest is the now popular plant of scientific importance whose consumption is on the increase. The indiscriminate, irresponsible or non-regulated use of several herbal medicines has been documented to put the health of their users at risk of toxicity (Nnorom et al., 2006; Kloucek et al., 2005; Abt et al., 1995; Bury and Fullinaw, 1987). In addition, there is limited scientific evidence from studies done to evaluate the safety and effectiveness of traditional medicine products and practices (WHO Media Centre, 2011). Adverse reactions have been reported to herbal medicines when used alone (Oshikoya et al., 2007) or concurrently with conventional or orthodox medicines (Langlois-Klassen et al., 2007).

*Moringa oleifera* (*M. oleifera*) is the most widely known and utilized plant of the family Moringaceae, with 14 known species (Raml et al., 1994); especially because of its medicinal qualities. It is a fast growing, deciduous and drought resistant tree reaching up to 3 meters in height just after 10 months of cultivation (Valial et al., 1993). The tree has sparse foliage and often planted in compounds or used as fence in Northern Nigeria, and grows up to 8 meters in height

(Keay, 1989). Oludoro and Adeniyi (2007) report that the seed has the ability to cause biological coagulation in drinking water and can be employed for water purification (Olsen, 1987; John, 1988).

The consumption of the leaf of *Moringa oleifera* has been alleged to balance or boost the energetic, soothing ability, prevent ulcer, inflammation, pain, skin problems, detoxify the blood and gastrointestinal tract, promote wound healing and promote immune functions (Siddhuraju and Becker, 2003; Carrasco et al., 2009). In Nigeria, medicinal plants preparations are widely used in folklore as abortifacient. However, paucity of study has actually documented *Moringa oleifera* to modulate the activities of contraceptive. Therefore, the objective of this study was to investigate the abortifacient potential of *Moringa oleifera* leaves on pregnancy, using the Sprague-Dawley rats. This study is restricted to the observation of the abortifacient effect of *Moringa* (leaves) on pregnancy as indicated by weight changes, presence or absence of fetus at the end of the gestational period.

## 2. Materials and Method

### 2.1. Collection of Plant Material

The leaves of *Moringa oleifera* plant were purchased from a local market in Uromi, Edo state. The plant was authenticated in the Department of Botany, Faculty of Natural Sciences, Ambrose Alli University, Ekpoma, Edo State. The fresh leaf was rinsed in clean tap water and dried in the shade for 14 days. The dried leaf was grounded to fine powder, using a domestic electric grinder. The grounded *Moringa oleifera* was then measured into stored in sealed pack.

### 2.2. Procurement and Rearing (Maintenance) of Experimental Rat

A fifteen adult apparently healthy albino rats (5 males and 10 females) were obtained from the Animal house of the Department of Physiology, Faculty of Basic Medical Sciences, Ambrose Alli University, Nigeria, for the study. The Rats were allowed to acclimatize to their new environment for two weeks at Anthonio Service, Ekpoma.

These Rats were housed in well ventilated cages made of wood and wire gauze. Wood shavings were used as beddings to keep each compartment dry.

### 2.3. Mating Behaviour

The male albino rats were starved of sex for two weeks before mating. The Female rats were randomly divided into five groups of two rats per cage and a male was introduced

into the five groups of female rats in the ratio 2:1 (two females and a male) and the males were separated from the females after four days and after the confirmation of pregnancy. During the mating period normal rat chow was fed to the rats.

### 2.4. Dosage Administration

Three grams of measured grounded *Moringa oleifera* was mixed in 7g of normal rat chow and fed to the test groups from the 5<sup>th</sup> day of mating to the 10<sup>th</sup> day after removal of the male rats. On the other hand, the control received normal rat chow throughout the study.

### 2.5. Sample Collection

Body weight was measured using electronic weighting scale and recorded. This was determined and documented before mating, after mating, 1<sup>st</sup> trimester (on 3 days after mating), 2<sup>nd</sup> trimester (9 days after mating) and 3<sup>rd</sup> trimester (14 days after mating) of pregnancy.

### 2.6. Statistical Analysis

Data was analyzed using statistical package for social sciences (SPSS) version 20. The results were expressed as mean  $\pm$  standard deviation and the student t test was performed to test for significant difference at 95% level of confidence. Values were considered statistically significant at  $p < 0.05$  and presented in suitable table and chart.

## 3. Results

### 3.1. The Abortifacient Potential of *Moringa Oleifera* Leaves Ingestion Indicated by Changes in Mean Body Weight in Pregnant Rats

Table 1 shows the mean changes in body weight of pregnant rats treated with *Moringa oleifera* leaves for 5 days compared with control. It was observed that mean body weight decreases at the end of the 1<sup>st</sup> trimester (183.80  $\pm$  54.09g) compared to weight after mating (188.80  $\pm$  54.71g) in the group fed *Moringa oleifera*. On the other hand, the control group presented a mean body weight gain that progresses throughout the experiment. Comparatively, the test group had higher mean body weight before and after mating but the control group became higher at the end of the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> trimesters. Although the test group presented lower mean body weight during the end of the trimesters of pregnancy, the difference were not statistically significant ( $p > 0.05$ ) compared with the control

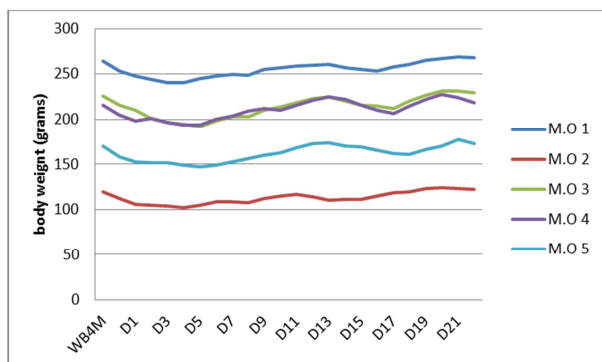
**Table 1.** Mean body weight changes in pregnant rats fed with *Moringa oleifera* leaves compared with control.

Groups	Weight changes in grams				
	Before mating	After mating	1 <sup>st</sup> trimester of pregnancy	2 <sup>nd</sup> trimester of pregnancy	3 <sup>rd</sup> trimester of pregnancy
Control group	177.40 $\pm$ 9.50	177.40 $\pm$ 18.50	214.40 $\pm$ 21.50	233.00 $\pm$ 20.00	272.40 $\pm$ 45.50
Test group	199.20 $\pm$ 55.51	188.80 $\pm$ 54.71	183.80 $\pm$ 54.09	196.00 $\pm$ 56.73	204.80 $\pm$ 56.22

Values are mean  $\pm$  Standard deviation;

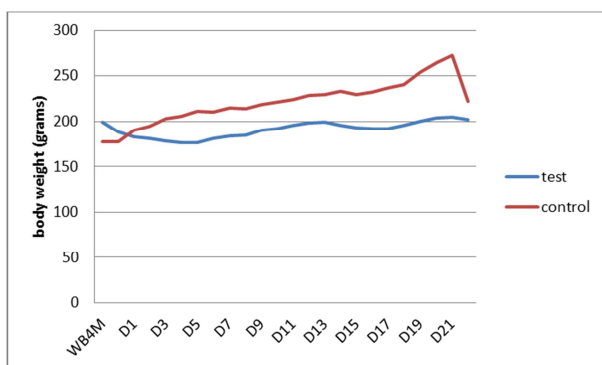
### 3.2. Comparative Daily Body Weight Pattern in Pregnant Rats Fed *Moringa oleifera* Leaves and Control Pregnant Rats

Figure 1 shows the pattern of daily weight change in rats fed *Moringa oleifera* leaves for 5 days. The highest reduction in mean body weight was observed at end of the trimester. All rats started gaining weight again after the 8<sup>th</sup> day after mating and this progress to the end of the 2<sup>nd</sup> and 3<sup>rd</sup> trimesters (see figure 1 for detail).



**Figure 1.** Shows the pattern of daily weight changes in the group fed *Moringa oleifera* leaves. (Key: M.O= *Moringa oleifera*, 1 to 5 represent rat 1 to rat 5; D=day; WB4M= weight before mating).

Figure 2 compares the average mean body weight pattern between the control and the group fed *Moringa oleifera* leaves. While the control presented steady body weight increase to the 21<sup>st</sup> day, the test group (fed *Moringa oleifera* leaves) showed a decreasing body weight after mating to about the 7<sup>th</sup> day and started gaining weight from the 8<sup>th</sup> day to the end of the 3<sup>rd</sup> trimester (see figure 2).



**Figure 2.** Compares the average mean body weight gain pattern between the control and the group fed *Moringaoleiferaleaves*. (Key: test = fed *Moringaoleiferaleaves*, D1 to 21 number of days; WB4M= weight before mating).

## 4. Discussion

This study to investigate the abortifacient potential of the ingestion of *Moringa oleifera* leaf showed that daily ingestion of *Moringa oleifera* leaves produce a reduction in body weight that is different from the weight gain observed in the control.

The impact of *Moringa oleifera* leaf on body weight was observed during the 1<sup>st</sup> trimester, indicating the *Moringa oleifera* leaves to induce abortion in the 1<sup>st</sup> trimester of pregnancy (see table 1 and figure 1 and 2). These results are in agreement with those of Zade et al. (2010) who had previously reported *Moringa oleifera* to present abortifacient activity in female rats. In fact, aqueous extracts of the roots of both plants *Moringa oleifera* and *Moringa coneansensis* and of the bark of *Moringa oleifera* have been reported to be effective in preventing implantation in rats (Shukla et al., 1988).

According to Nath and Sethi (1992), aqueous and 90% ethanol leaf extracts of *Moringa oleifera* was found to be 100% abortive at doses equivalent to 175 mg/kg in rat. This report is in line with the finding of this study as at the end of the 3<sup>rd</sup> trimester no rat fed crude *Moringa oleifera* leaves produces any litter. Also in accordance with this finding, alcoholic stem bark extract of *Moringa oleifera* has been reported to be 100% abortive at the dose of 200 mg/kg (Zade et al., 2010). The finding that crude *Moringa oleifera* leaf is abortifacient in this study is in line considering that the anti-fertility activity of ethanolic root extract of *Moringa oleifera* at a dose of 200mg/kg led to foetal resorption in 60% female pregnant rats (Prakash and Mathur, 1976). Thus, the weight lost at the end of the first trimester compared to that after mating and at the 1<sup>st</sup> trimester and compared to the control may be due to the resorption of fetus. Hence, the absence of litter at the end of the 3<sup>rd</sup> trimester as observed in this study.

## 5. Conclusion and Recommendation

The present investigation revealed that *Moringa oleifera* leaves is abortifacient and it abortifacient potential occur in the 1<sup>st</sup> trimester of pregnancy. Based on the findings from this study, ingestion of *Moringa oleifera* leaves is harmful during pregnancy and is capable of aborting pregnancy in the first trimester. It is therefore recommended that this information be made available for women considering getting pregnant and are devotees of *Moriga* herbal medicine; popularly known as tree of life.

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