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Abortifacient Eficacy of *Moringa oleifera* Seed Powder on the Trimesters of Pregnancy in Albino Wistar Rats

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Abstract

This study investigated the abortifacient effect of *Moringa oleifera* (*M. oleifera*) seed powder [MSP] on pregnant albino Wistar rats. Phytochemical screening was performed using standard methods. Acute toxicity carried out using Lorke's method. Sixty albino Wistar rats of reproductive age were used for the study. Pregnant rats were grouped (n=6) and graded doses of MSP (100, 200, 500, 1000, 2000 mg/kg), and control (1 ml/kg normal saline) was administered orally from day 2 to day 8 of confirmed pregnancy. Histological screening was carried out on the brains, hearts, kidneys, and lungs of the rats. Phytochemical screening results revealed the presence of alkaloids, flavonoids, saponins, carbohydrates, and steroids. Acute toxicity results showed no mortality up to 5000 mg/kg. The control and low-dose group (100 mg/kg) recorded normal pregnancy outcomes, while the higher-dose groups (200 mg/kg and above) exhibited no litters. Significant reductions in body weight were observed in the treated groups compared with the control group ($p < 0.05$). 100% abortion rate was recorded at the higher dose (200 mg/kg and above). Litter size was reduced in a dose-dependent manner. The findings indicate that MSP possesses abortifacient properties and histological abnormalities, particularly during the first trimester of pregnancy.

Keywords: *Moringa oleifera*; abortifacient; Pregnancy Trimesters; Wistar rats.

Abbreviations: MSP (*Moringa oleifera* Seed Powder).

INTRODUCTION

The abortion properties of plants have been exploited, especially in underdeveloped and developing countries (Adebayo *et al.,* 2021). There are cultures whose practice is to restrict access to contraception, claiming they are politically and morally inappropriate (Situm-Ware *et al.,* 2007). Teenage girls and unwed women in Nigeria that are pregnant have taken herbal concoctions leading to numerous deaths (Elhatar & Osifo, 2015).

Moringa oleifera (M. oleifera) is an annual drought-resistant tree that occurs naturally in tropical and sub-tropical regions worldwide (Anwar *et al.,* 2020). M. oleifera is widely distributed in India, Nigeria, and Latin America due to their environmental adaptability and numerous applications in nutrition and medicine (Fahey, 2021). Different M. oleifera plant parts are widely applied in the preparation of different natural medications for the treatment of different illnesses, such as infections, inflammations, diabetes, high blood pressure, and gastrointestinal problems (Gopalakrishnan *et al.,* 2019; Saini *et al.,* 2021).

Firstly, it is necessary to note the richness of this plant's composition. Indeed, numerous research papers prove the existence of bioactive substances in M. oleifera, such as alkaloids, flavonoids, tannins, saponins, terpenoids, phenols, and glycosides. For instance, according to the study conducted by Ajibade et al. (2013), M. oleifera seed methanolic extracts contain a high percentage of saponins, tannins, terpenes, alkaloids, flavonoids, carbohydrates, and cardiac glycosides. Later, the analysis showed that other active ingredients exist in the studied plant species, such as glucosinolates and isothiocyanates, known as strong antioxidants and anti-inflammatory agents (Falowo *et al.,* 2021; Lin *et al.,* 2023).

Despite these various benefits, however, there have been concerns about the adverse toxicological and reproductive effects of M. oleifera due to its consumption at high amounts or concentrations (Abdullahi *et al.,* 2022). Even though many studies have shown the plant's low levels of toxicity and safety, there have been claims of various body parts such as the roots, bark, and seeds' antifertility and abortifacient capabilities (Stohs &

Hartman, 2021; Abarikwu *et al.,* 2020). These reproductive effects could be due to particular phytochemicals that have effects on hormones, uterine contraction, or the fetus itself.

In vivo experiments conducted with animal models show that extracts of M. oleifera cause some reproductive abnormalities including implantation and fetal growth. Nevertheless, results have not been consistent for now with few findings on the abortive effect of MSP on pregnancy outcomes. This concern is even more important for developing countries where the prevalence of herbal medicine is high while regulatory measures are weak (World Health Organisation, 2024; Kiguba *et al.,* 2023). It is therefore important to conduct research concerning the safety of MSP during pregnancy.

The objective of this research is to examine the abortifacient effect of MSP on pregnant albino Wistar rats and litters as well. Specifically, this study aims at determining the effect of MSP on pregnant rats through assessing phytochemistry composition, acute toxicity profile, and pregnancy or abortion effect in the first, second, and third trimesters.

The overall objective of this study is to determine the abortifacient effect of MSP on pregnant albino Wistar rats and their offspring. The specific objectives are to determine the phytochemistry of MSP, acute toxicity profile, and abortifacient effect in the first, second, and third trimesters of pregnancy.

METHODS

In this study 60 Albino Wistar rats of reproductive age aged about 7 weeks comprising 40 female and 20 males were used in this experimental study. Animals weighing 150 g or more were kept in standard laboratory conditions with good ventilation, temperature control and given 12 hours of light and dark. They were fed a normal rat chow and water as required. The animals were given a period of acclimatisation before the experiment proper began and pregnant females were secured by mating. Rats used were healthy, sexually mature of proper weight and age, whereas immature, ill, used or sexually inexperienced rats were not used.

The study was carried out in the Animal House, University of Jos, Nigeria. The animals feeding, weighing and observation for abortifacient activity were carried out in the Pharmacology Department of Faculty of Pharmaceutical Sciences. Meanwhile, histopathology analysis was carried out in the Histopathology Laboratory, School of Veterinary Medicine, Vom, Jos. The dry pods of M. oleifera were harvested and seeds were taken, peeled and powderized. The seeds were dried and then stored in a cool dry place until they were needed. For extraction 50g of the powdered seeds was soaked in ethanol and left to stand for 24 hours with intermittent shaking to ensure good extraction. After filtration, the filtrate was concentrated with rotary evaporator and drying cabinet to get crude extract and preserved in a desiccator before using.

The phytochemical screening was performed according to the standard qualitative method for the identification of bioactive compounds such as alkaloids, saponins, tannins, flavonoids, cardiac glycosides, steroids, anthraquinones and carbohydrates. The acute toxicity (LD_{50}) of extract was tested by Lorke's method (1983) consisting of two stages. The first phase involved three groups of nine (9) rats each being given graded doses of 10, 100 and 1000mg/kg of the extract. Animals were kept in observation for 24 hours to check for toxicity and death. Three (3) rats were then used in the second phase, and were each given the extract at higher doses of 1600, 2900 and 5000 mg/kg, and were again observed for 24 hours. The median lethal dose (LD_{50}) was determined as the geometric mean between the highest dose at which no deaths occurred and the lowest dose at which a death occurred.

The pregnant rats for the experimental design were randomly divided into six groups of six rats. The control group received 0.5 ml of normal saline whereas the test groups received graded dose of M. oleifera seed powder of 100, 200, 500, 1000 and 2000 mg/kg body weight respectively. Oral treatment was given on days 2 through 8 (4-11 days post-mating) of the confirmed pregnancy. All animals were fed normal rat chow and drinking water ad libitum during the experimental period. The animals were carefully observed for abortion activity (bleeding, resorption, no litter at term). The body weight of the pregnant rats was determined at various gestation periods, litter weights and physical condition were determined at the time of delivery and in the postnatal period. Animals were sacrificed at the end of the experiment under chloroform anaesthesia. The vital organs such as brain, heart, lungs, liver and kidneys were carefully cut out and fixed in 10% formalin. Standard procedures were followed in the histopathological processing, which involved dehydration in graded alcohols, clearing in xylene, paraffin wax embedding, sectioning and staining with hematoxylin and eosin. The slides were prepared and observed using light microscope for any pathological changes seen. The analysis of data collected from the study were done using SPSS version 20. The results were reported as mean with standard deviation and differences between the groups were tested using student's t-test. A p value < 0.05 was taken as statistically significant.

RESULTS AND DISCUSSION

Results

Based on Table 1, the phytochemical screening showed high concentrations of alkaloids, glycosides, flavonoids, saponins and steroids.

Table 1. Results of Phytochemical Screening of *Moringa Oleifera* Seed Powder.

S/No	Phytochemicals	Results
1.	Alkaloids	+
2.	Anthraquinones	-
3.	Saponins	+
4.	Carbohydrates	+++
5.	Cardiac glycosides	++
6.	Flavonoids	++
7.	Phlobatannins	-
8.	Tannins	++
9.	Terpenes	+
10.	Terpenoids	+

Key: - Means Absent; + Means Present; ++ Means Highly Present; +++ Means Very Highly Present

Table 2. Observations for Signs of Enhancement/Abortion Throughout the Pregnancy Period (Day 1 – Day 28).

TITLE	NO. OF RATS IN EACH GROUP	DAY 2 (BEFORE MSP ADMINISTRATION): Beginning of Pregnancy			DAY 7 (5TH DAY OF MSP ADMINISTRATION): 1st Trimester			DAY 14 (12TH DAY AFTER MSP ADMINISTRATION): 2nd Trimester			DAY 20 (18TH DAY AFTER MSP ADMINISTRATION): 3rd Trimester			DAY 28 (LITERS DELIVERY): End of Pregnancy		
		Appetite	Blood Stain	Pregnancy Test	Appetite	Blood Stain	Pregnancy Test	Appetite	Blood Stain	Pregnancy Test	Appetite	Blood Stain	Pregnancy Test	No. of Litters Per Rat	Groups Total No. of Litters	Average No. of Litters Per Group
AC (Control)	i	+	-	+	+	-	+	+	-	+	+	-	+	4	28	4.67
	ii	+	-	+	+	-	+	+	-	+	+	-	+	4		
	iii	+	-	+	+	-	+	+	-	+	+	-	+	6		
	iv	+	-	+	+	-	+	+	-	+	+	-	+	3		
	v	+	-	+	+	-	+	+	-	+	+	-	+	6		
	vi	+	-	+	+	-	+	+	-	+	+	-	+	5		
AT1 (Test One)	i	+	-	+	+	-	+	+	-	+	+	-	+	5	26	4.33
	ii	+	-	+	+	-	+	+	-	+	+	-	+	3		
	iii	+	-	+	+	-	+	+	-	+	+	-	+	5		
	iv	+	-	+	+	-	+	+	-	+	+	-	+	4		
	v	+	-	+	+	-	+	+	-	+	+	-	+	4		
	vi	+	-	+	+	-	+	+	-	+	+	-	+	5		
AT2 (Test Two)	i	+	-	+	-	+	-	+	+	-	+	+	-	0	0	0.0
	ii	+	-	+	-	+	-	+	+	-	+	+	-	0		
	iii	+	-	+	-	+	-	+	+	-	+	+	-	0		
	iv	+	-	+	-	+	-	+	+	-	+	+	-	0		
	v	+	-	+	-	+	-	+	+	-	+	+	-	0		
	vi	+	-	+	-	+	-	+	+	-	+	+	-	0		
AT 3 (Test Three)	i	+	-	+	-	+	-	+	+	-	+	+	-	0	0	0.0
	ii	+	-	+	-	+	-	+	+	-	+	+	-	0		
	iii	+	-	+	-	+	-	+	+	-	+	+	-	0		
	iv	+	-	+	-	+	-	+	+	-	+	+	-	0		
	v	+	-	+	-	+	-	+	+	-	+	+	-	0		
	vi	+	-	+	-	+	-	+	+	-	+	+	-	0		
AT 4 (Test Four)	i	+	-	+	-	+	-	+	+	-	+	+	-	0	0	0.0
	ii	+	-	+	-	+	-	+	+	-	+	+	-	0		
	iii	+	-	+	-	+	-	+	+	-	+	+	-	0		
	iv	+	-	+	-	+	-	+	+	-	+	+	-	0		
	v	+	-	+	-	+	-	+	+	-	+	+	-	0		
	vi	+	-	+	-	+	-	+	+	-	+	+	-	0		
AT5 (Test Five)	i	+	-	+	-	+	-	+	+	-	+	+	-	0	0	0.0
	ii	+	-	+	-	+	-	+	+	-	+	+	-	0		
	iii	+	-	+	-	+	-	+	+	-	+	+	-	0		
	iv	+	-	+	-	+	-	+	+	-	+	+	-	0		
	v	+	-	+	-	+	-	+	+	-	+	+	-	0		
	vi	+	-	+	-	+	-	+	+	-	+	+	-	0		

+ = Increase/Presence/Positive **-** = Decrease/Absence/Negative **X** = Death

The above MBP solution, when administered orally at different doses, exhibited 100% abortifacient activity from 200 mg/kg onward, litter production was significantly affected in a dose-dependent manner, with

normal litter sizes recorded in the control group (mean = 4.6) and the low-dose group (100 mg/kg, mean = 4.3), whereas higher-dose groups produced no litters. Mortality did not occur in any of the groups of pregnant mothers (see table 2).

Table 3. Determination of Abortifacient Efficacy (Signs of Abortion).

S/No	Title	Substances	Dose, ml or mg/kg	No. of Rats per Group	Presence/ Absence of Litters	Average No. of Litters per Rat	Blood stain	Weight loss	% Abortion
1.	AC	NS	1.0	6	+	4.6	-	-	0.0
2.	AT_1	MSP	100	6	+	4.3	-	-	0.0
3.	AT_2	MSP	200	6	-	None	+	+	100.0
4.	AT_3	MSP	500	6	-	None	+	+	100.0
5.	AT_4	MSP	1000	6	-	None	+	+	100.0
6.	AT_5	MSP	2000	6	-	None	+	+	100.0

+ = Presence, - = Absence

No foetal formation was observed in the drug-treated groups. (See tables 2 & 3).

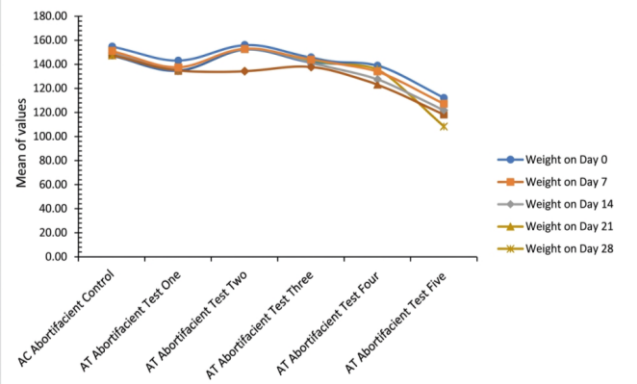


Figure 1. Dosage-response curve of the different trimesters of pregnancy.

Maternal body weight gain**:** Gain in body weight was less in the treatment group as compared to the control group (see Tables 2 and figure 1). The study also revealed a decrease in maternal body weight in the treated groups, which was statistically significant compared with the control group. Although acute toxicity testing indicated no mortality at doses up to 5000 mg/kg (LD_{50} > 5000 mg/kg), a 100.00% mortality rate was observed in the higher-dose groups (200 mg/kg and above), indicating potential risks at elevated concentrations.

Table 4. ANOVA Statistical Date.

VALUES	Sum of Squares	df	Mean Square	F	Sig.
Between Squares	.025	4	.006	1.403	.235
Within Groups	.784	175	.004		
Total	.809	179			

The results shown above indicate a reduction in body weight among pregnant rats administered higher doses (200, 500, 1000, and 2000 mg/kg) of *M. oleifera* seed powder, especially at the end of the first trimester, and the weight reduction is statistically significant as the *p-value* is less than 0.5 (0.235). *p*-value is significant at $p <$ 0.5 (see Table 4)

Pathological changes after confirmation of delivery/abortion

Histopathological results of the rats brains at the end of pregnancy period. These findings are found in the micrograms below:

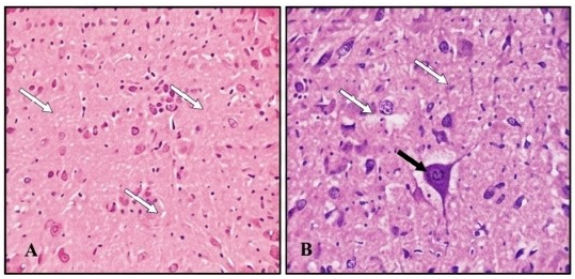


Figure 2 (AC). Brain (cerebral cortex) of Albino rat administered 1 ml/Kg body weight of normal saline for 7 days. Brain tissue presents with normal morphology. Black arrow= Pyramidal neuron, white arrows= Gray matter. H&E A: X100 B: X400.

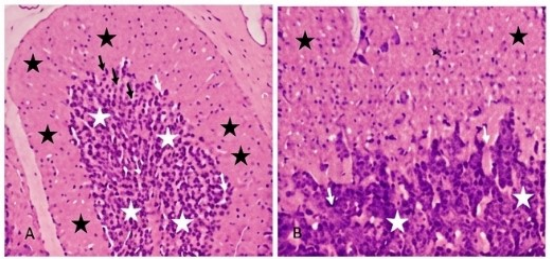


Figure 3 (AT1). Brain (Cerebellum) of albino rat administered 100 mg/Kg body weight of MSP for 7 days. The morphology is normal. Black stars= molecular layer, white stars= granular layer, white arrows= Purkinje layer. H&E A: X100 B:X400.

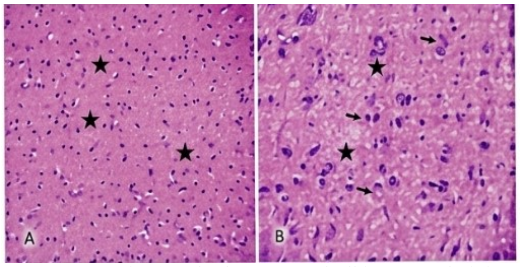


Figure 4 (AT2). Brain (cerebral cortex) of albino rat administered 200 mg/Kg body weight of MSP for 7 days. The morphology is normal. Black stars= gray matter, Black arrows= Granule cells. H&E A: X100 B:X400.

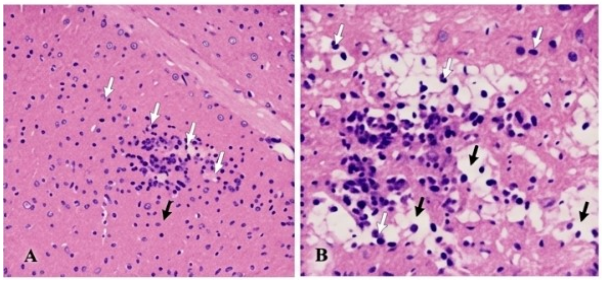


Figure 5 (AT3). Brain (Cerebral Cortex) of albino rat administered 500 mg/Kg body weight of MSP for 7 days. There is mild inflammation and oedema. White arrows= Inflammatory cells, black arrows= areas of oedema. H&E A: X100 B:X400.

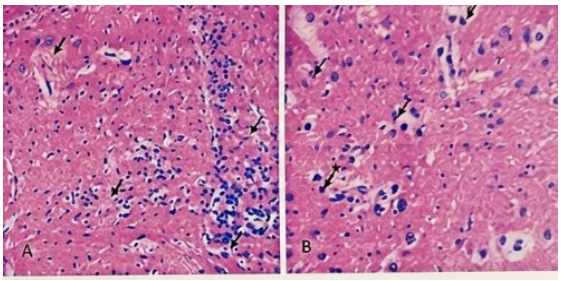


Figure 6 (AT4). Brain (Cerebral Cortex) of albino rat administered 1000 mg/Kg body weight of MSP for 7 days. There is severe inflammation. Black stars= inflammatory cells. Tissue architecture is mildly altered. H&E A: X100 B:X400.

Histopathological results of the rats heart at the end of pregnancy period

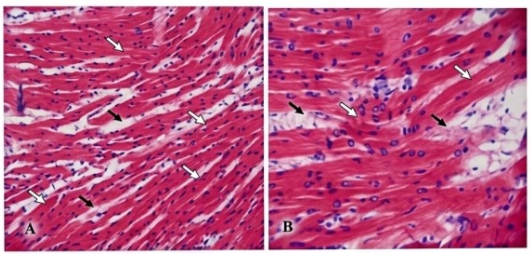


Figure 7 (AC). Heart of Albino rat administered 1 ml/ Kg body weight of normal saline for 7 days. White arrows= cardiac muscles, Black arrows= Interstitial spaces. Heart tissue presents with normal morphology. H&E A: X100 B: X400.

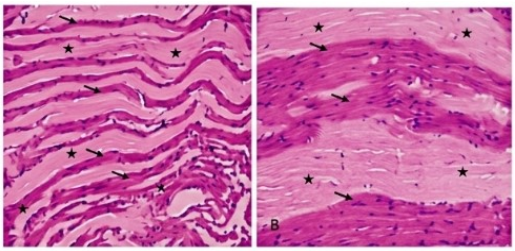


Figure 8 (AT1). Heart of albino rat (Longitudinal section) administered 100 mg/Kg body weight of MSP for 7 days. Black arrows= cardiac tissues, black stars= interstitial spaces. The morphology is normal. H&E A: X100 B:X400.

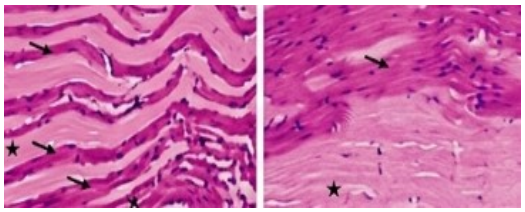


Figure 9 (AT1). Heart of albino rat (Longitudinal section) administered 200 mg/Kg body weight of MSP for 7 days. Black arrows= cardiac tissues, black stars= interstitial spaces. The morphology is normal. H&E A: X100 B:X400.

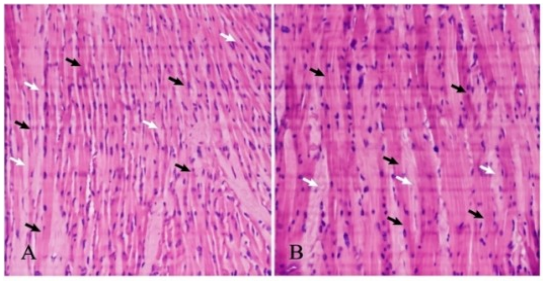


Figure 10 (AT3). Heart (Longitudinal section) of albino rat administered 500 mg/Kg body weight of MSP for 7 days. There tissue architecture is normal. Black arrows= Cardiac muscles, white arrows= interstitial space. H&E A: X100 B:X400.

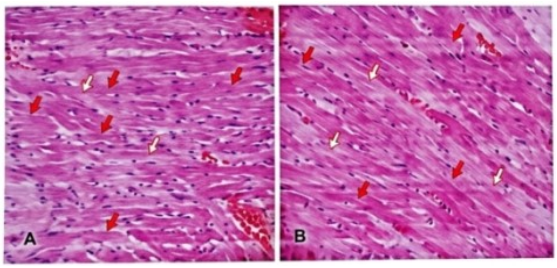


Figure 11 (AT4). Heart (Longitudinal section) of albino rat administered 1000 mg/Kg body weight of MSP for 7 days. The tissue architecture is normal. Black arrows= Cardiac muscles, white arrows= interstitial spaces. H&E A: X100 B:X400

Histopathological results of the rats kidney at the end of pregnancy period

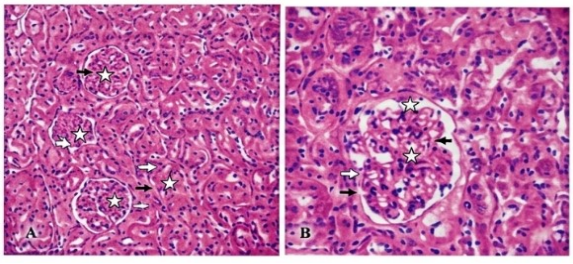


Figure 12 (AC). Kidney of Albino rat administered 1 ml/ Kg body weight of normal saline for 7 days. White star= Glomerulus, white arrows= capsular space, black arrow= glomerular capsule. Heart tissue presents with normal morphology. H&E A: X100 B: X400.

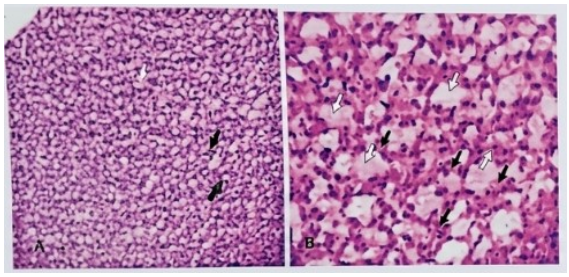


Figure 13 (AT1). Kidney Medulla (Transverse section) of albino rat administered 100 mg/Kg body weight of MSP for 7 days. The morphology is normal. White arrows= papillary ducts, black arrows= cell nuclei. H&E A: X100 B:X400.

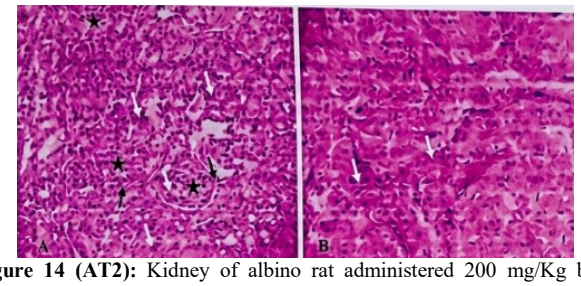


Figure 14 (AT2): Kidney of albino rat administered 200 mg/Kg body weight of MSP for 7 days. There is mild tissue swelling and haemorrhage. White arrows= area of red blood cells, Black arrows=reduced capsular space as a result of tissue swelling, black stars= glomeruli. H&E A: X100 B:X400.

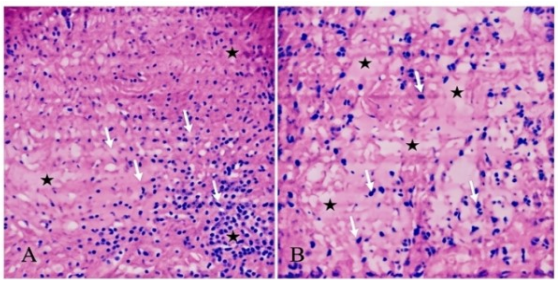


Figure 15 (AT3). Kidney medulla of albino rat administered 500 mg/Kg body weight of MSP for 7 days. There severe necrosis, inflammation and tissue atrophy. Black stars= areas of necrosis, evident by the dissolution of cellular material, white arrows= inflammatory cells. H&E A: X100 B: X400.

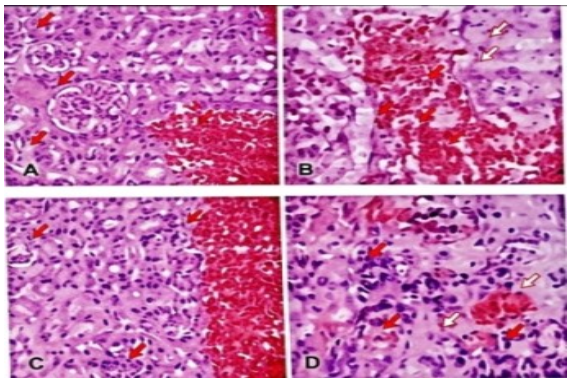


Figure 16 (AT4). Kidney of albino rat administered 1000 mg/Kg body weight of MSP for 7 days. There is Severe haemorrhage in both the cortical (A and B and Medullary areas (C and D). Black arrows= red blood cells in areas of haemorrhage. White arrows= Naked nuclei as a result of necrosis. Tissue atrophy and mild necrosis is also observed. H&E A&C: X100 B and D:X400.

Histopathological results of the rats lungs at the end of pregnancy period

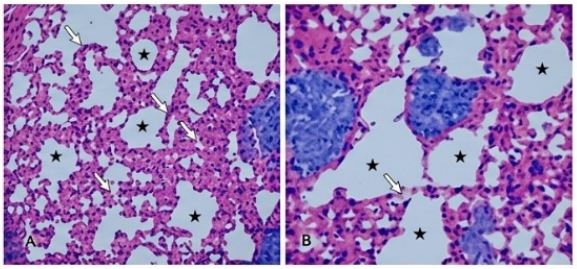


Figure 17 (AC): Lungs of Albino rat administered 1 ml/ Kg body weight of normal saline for 7 days. Lung tissue presents with normal morphology. Black stars= alveolar ducts, white arrows= alveoli. H&E A: X100 B: X400.

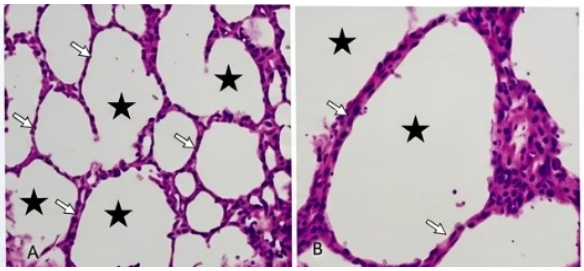


Figure 18 (AT1). Lungs of albino rat administered 100 mg/Kg body weight of MSP for 7 days. The morphology is normal. Black stars= alveolar ducts, White arrows= interalveolar septa. H&E A: X100 B:X400.

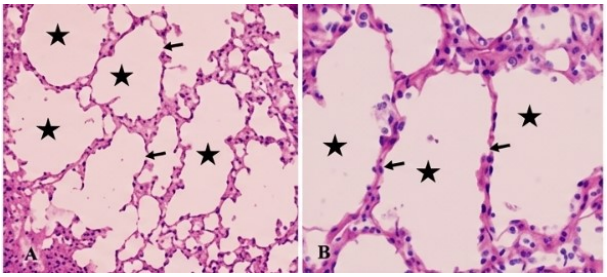


Figure 19 (AT2). Lungs of albino rat administered 200 mg/Kg body weight of MSP for 7 days. There morphology is normal. Black stars= alveolar ducts, Black arrows= interalveolar septa. H&E A: X100 B:X400.

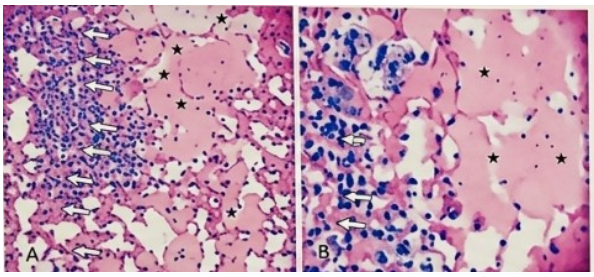


Figure 20 (AT3). Lungs of albino rat administered 500mg/Kg body weight of MSP for 7 days. There is severe inflammation, pneumonia and oedema. White arrows= inflammatory cells, black stars= areas of oedema. Morphology of lung tissues severely altered. H&E A: X100 B:X400.

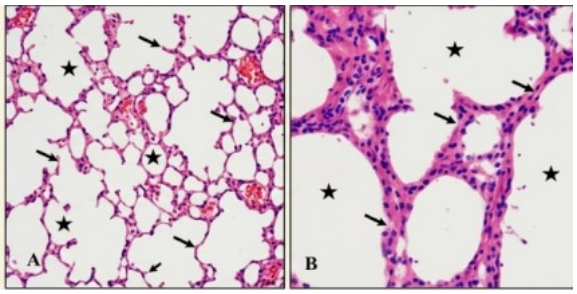


Figure 21 (AT4). Lungs of albino rat administered 1000 mg/Kg body weight of MSP for 7 days. The morphology is normal. Black stars= alveola ducts, Black arrows= interalveolar septum. H&E A: X100 B: X400.

DISCUSSION

Phytochemicals constitute the biologically active components of medicinal plants and are largely responsible for their diverse pharmacological effects (Omale *et al.,* 2026). In the present study, preliminary phytochemical screening of *M. oleifera* seed powder (MSP) revealed the presence of alkaloids, flavonoids, saponins, carbohydrates, and steroids. These findings are consistent with previous reports, including those of Ajibade *et al*. (2013), which identified similar bioactive constituents in *M. oleifera* seeds. The presence of these compounds suggests that the observed biological effects in this study may be attributable to one or more of these phytochemicals.

The abortifacient activity observed in this study may be linked to the identified phytochemical constituents, particularly alkaloids, flavonoids, and saponins. Previous studies have reported that high intake of certain phytochemicals can produce toxic effects in both humans and experimental animals, affecting organs such as the liver, kidneys, and gastrointestinal tract (Yang, 2007). Alkaloids are known for their potent physiological effects. For instance, ergot alkaloids have been reported to induce uterine contractions and are contraindicated during pregnancy due to their association with fetal distress and miscarriage (Doodipala, 2013). The high alkaloid content in MSP observed in this study may therefore explain its abortifacient potential.

The acute toxicity (LD_{50}) assessment revealed that the oral LD_{50} of MSP exceeded 5000 mg/kg, indicating that the substance is relatively non-toxic at lower doses. This finding agrees with earlier studies, which reported the safety of *M. oleifera* seeds and their use in applications such as water purification without significant toxicity (Oluduro *et al.,* 2009; Jahn, 1988). Notably, no mortality was recorded during the LD_{50} evaluation, further supporting its low acute toxicity profile. However, this does not preclude the possibility of dose-dependent adverse effects, particularly on reproductive outcomes.

The results of this study demonstrated a reduction in body weight among pregnant rats administered higher doses (200, 500, 1000, and 2000 mg/kg) of *M. oleifera* seed powder, especially at the end of the first trimester. In contrast, the control group and the low-dose group (100 mg/kg) showed progressive weight gain throughout pregnancy. This pattern suggests that higher doses of the seed powder may interfere with normal gestational progression. These findings agree with previous studies, such as Ekhator et al. (2015), which reported weight reduction associated with abortifacient activity in *M. oleifera* extracts.

Importantly, the study demonstrated a clear dose-dependent abortifacient effect. While no abortion was observed at 100 mg/kg, higher doses (200, 500, 1000, and 3000 mg/kg) resulted in abortion, evidenced by clinical signs such as vaginal bleeding, weight loss, negative pregnancy tests, and absence of litters at term. At the end of the gestation period, only the control and low-dose groups produced litters, with average litter sizes of 4.6 and 4.3, respectively. In contrast, no litters were recorded in the higher-dose groups. These findings indicate that MSP possesses abortifacient properties at moderate to high doses.

Furthermore, the histological investigation showed inflammation of the tissues and haemorrhages in the vital organs of the mothers at high doses of 500, 1000 and 2000 mg/kg (figures 2 -21).

These further confirmed the abortifacient activity and corroborate the earlier literature, which documents the abortion causing ability of its leaves at higher doses (Ekhafor & Osifo, 2015). This aligns with reports highlighting the dangers associated with unsafe or self-induced abortion practices and the potential health consequences (World Health Organisation, 2012). Analysis of gestational stages revealed that the abortifacient effect was most pronounced during the first trimester, particularly around day 7 of pregnancy. Statistical analysis showed that the reduction in body weight and BMI at this stage was significant ($p < 0.05$) compared to later stages of pregnancy. This suggests that MSP may interfere with early pregnancy processes such as implantation or early fetal development.

The findings of this study demonstrate that while MSP is relatively non-toxic at low doses, it exhibits significant abortifacient activity at higher doses, particularly during the early stages of pregnancy. These effects are likely mediated by its phytochemical constituents, especially alkaloids and flavonoids. The results highlight the need for caution when consuming M. oleifera seeds, especially among pregnant women, and underscore the importance of further studies to elucidate its reproductive safety profile fully.

CONCLUSION

The present study demonstrated that MSP possesses significant abortifacient potential in pregnant albino Wistar rats. The effect was dose-dependent and occurred predominantly during the first trimester of pregnancy (days 2–7 after pregnancy confirmation). Administration of MSP at doses of 200 mg/kg body weight and above

resulted in termination of pregnancy, evidenced by absence of litters, weight reduction, observable signs of abortion and inflammation of the vital organs, suggesting that MSP disrupts normal reproductive processes at higher doses, particularly during early pregnancy. Further studies can be carried out to investigate the detailed mechanism of action.

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