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Synergistic Effects of *Synclistia Scarbrida* and *Sterculia Tragacantha* on Pregnancy Development and Blood Parameter of Gravid Dams

Obaro-Onezeyi O. E. [a] ***& Omoregie A.E.*** [a]

[a] Department Science Laboratory Technology, Faculty of Life Sciences, University of Benin, Benin City Nigeria.
Corresponding author: osasere.obaro-onezeyo@uniben.edu

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Abstract

The evaluation of synergistic effect of aqueous extract Synclistia scarbrida and Sterculia tragacantha (AESSST) on some Dams and pups parameter of matured pregnant wistar rats was carried out .8 groups of rats (5 each) received the extracts, at two oral doses of 0, 50, and 300 mg /kg/ day, administered orally for a period of 0-21 days and 14- 21 all the Dams undergoing the treatment received single dose of oxytocin at day 12 of the experiment .The Dams and pups, were evaluated for letter size inutero , Hematological indices was improved whit blood cell Wbc when compared with the control 15.4±0.0 , 16.42±0.2^{a,} and 18.21±1.0^{d} , for Red blood cell Rbc the improvement was observed to have significantly increased when compared to the control 5.8±0, 6.6±0.1^{a}, and 8.4±0.1^{d},The pac cell volume Pcv was found significantly increased when compared to the control with p-values at 34.6±0.4 , 35.45±0.1^{b} and 38.96±0.4^{d}. Platelet Plt and Neu were parameters maintained unaffected when compared with the control 67.01±0.2, 66.90±0.2 and 66.89±0.7 Plt and Neutrophil Neu 20.98±0.3, 21.00±0.2 and 20.99±0.3.The Body Weight Index of the gravid dams was seen presenting significant increases when compared to the control at day 7 183.9±0.2, 192.1±3.9^{b} and 204.2±5.2^{d} with values at mean while significant increases was indicated with p-values at a = p< (0.05), b =p< (0.01),c = p< (0.001) and d = p< (0.0001).Assessment of gravid rats were done using standard procedures such as examination Number of uterine implant, calculation of percentage % of Quantal pregnancy, calculation of percentage Implantation index, calculation of Pre-implantation loss if any ,percentage calculation of Gestation Index finally calculation of Mean gestation day calculated in days .The extract was concluded to have acted as an immune boosting agents and fertility enhancer on the basis of reported result of the hematological assay, as it was revealed that there was significant increases in the number of red and white blood cells, Pac cell volume, with platelet and Neutrophil maintained unaffected . Conclusively, AESSST favored pregnancy developmental parameters, increased litter sizes, prevented miscarriages, and acted as a natural immune-boosting agent, thereby supporting its folkloric and synergistic uses during pregnancy.

1.0. Introduction

The uses of medicinal plants during pregnancy have been a common practice in Nigeria. In spite of modern antenatal prescription, some pregnant women prefer traditional medicine. Hence, there is need for the documentation and botanical identification of plants used by pregnant women [1]. Plants can perform a significant role in pregnancy such as guaranteeing good fetal development and ease labor. [2]. Since there is lack of scientific research in traditional plants in Africa, the required positive effect is not always measurable. This is because of the absence of scientific comparisons

between modern antenatal prescription and traditional prescription for the purpose of antenatal care. The African women involved in this practice, has a belief that AESSST fortifies pregnancy, facilitate labor and delivery and after child birth could also be responsible for possession of beautiful and rich dark skin of African babies [3].

1.1. Preterm birth and preterm labor

Premature birth is the main cause of neonatal death and illness, meanwhile preterm labor is known as the commencement of labor before the predictable delivery date .This results in the delivery of an under-developed newborn, since premature birth is responsible for neonatal mortality and morbidity in a developed world, there is need for a perfect tocolytic agent that will uniformly effect absolute feto-maternal wellbeing which is non- existent in the real sense [4].

1.2. Botany Synclisia scabrida

Synclisia scabrida (S.scabrida) a climbing shrub with slender stems that can be up to 40 metres long. These stems can climb high into the forest canopy, twining around other plants for supportA commonly used and important traditional medicine within its native range, the plant is commonly harvested from the wild for local use. It is sometimes sold for medicinal use in local markets [5].

1.3. Botany of *Sterculia tragacantha*

Sterculia tragacantha is a specie of the family Sterculacea , it is a medium sized tree growing up to about 15 meters, with smooth grayish bark and stiff rugose branch-lets. The Leaves are collected towards the ends of the branches. The shape of the leaves are leathery, entire, broadly oblong, obovate-oblong, or ovate-oblong, apex of the leaf is obtuse or abruptly acuminate, 6].

2.0. Material and Method

2.1. Sample collection

Fresh leaves of *S.scabrida and S.tragacantha* were obtained from Idunowina Community.The leaves were dried at room temperature after collection then put in an oven at 40^0C for 3 days. The dried leaves were then Grinded into fine powdery form and filtered with 30- mesh sieve. The dehydrated sample of leaves was stored in an air tight container.

2.2. Extraction of plant materials

The powdered plant materials was extracted with distilled water using kedjah heating mantle at the temperature of 45^0C for 1 hour , in a 3000ml beaker and a cylinder of 2000 ml in the ratio 1:1. The resulting crude extract was then filtered with a cheese cloth followed by concentrating in a water bath, and drying in an oven at a temperature of 40^0 C for 48 hours.

2.3. Experimental animals

Female and male albino rats weighing approximately 180 g and 200 g were obtained from pharmacology animal house University of Benin, Benin City. These animals were adapted and maintained in the animal house fed with pelletized feed and tap water *ad libitum.*

2.4. Drugs and chemicals

Drugs/chemicals procured in the course of experiment include: Sabultamol (GlaxoSmith Kline), aqueous extract of (AESSST).

2.5. Mating procedures

Female rats were mated to their male canter pats in a ratio of 1:1 at pro-estrus. Successfully mated females were separated from the males, after microscopic examination for presence of sperm in the virginal and considered as day zero of pregnancy.

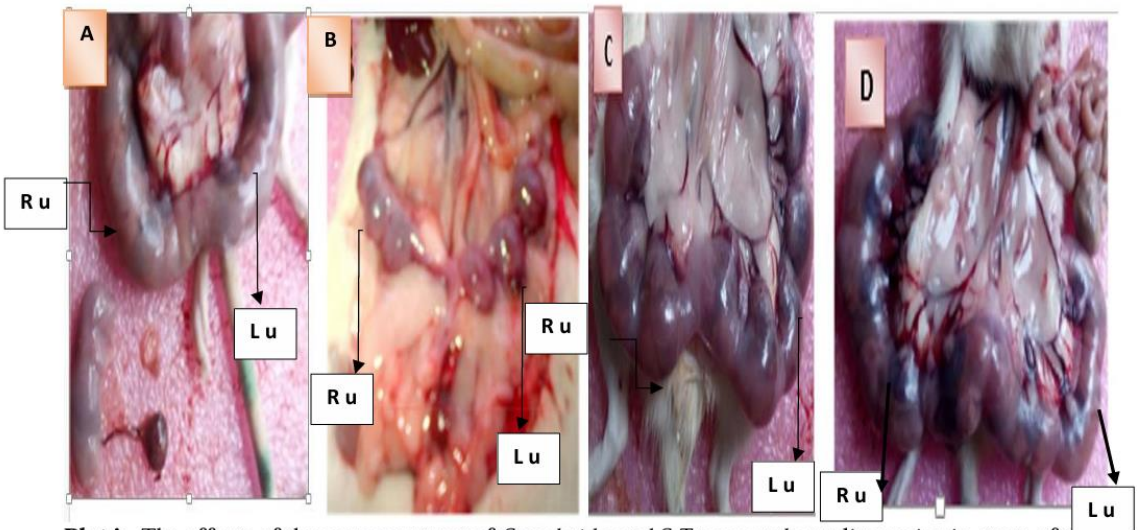
2.6. Pregnancy out come

The study utilized 40 gravid dams were divided into the various sub groups 1a &1b – 4a comprising five gravid dams per group & 4b gravid dams were treated with 0 mg/kg control, 0.5 iu oxytocin intraperitoneally negative control, 50 and 300 mg\kg orally. All animals in sub group (a) were studied from day 0-20 had uterine horns examined for implantation and resumption sites and compared in terms of litter size while the animals in sub group (b) were studied from day 0 of pregnancy to day 21 and allowed to litter and the pups in this group were compared in terms of pups weight, mortality, day of appearance of furs and eye opening day.Dams were examined daily for signs of toxicity like diarrheal, salivation , jaw movements such as chewing , squint, lacrimation, tremors, writhing, convulsions ,hair loss , behavioural abnormalities, and mortality for the period of 21 days. On day 12^{th} of the experiment, all Gravid rats were administered 0.5IU of oxytocin one hour after administration of AESSST extract. All the dams in sub group ^{a} were laparotomized under chloroform anaesthesia in sterile conditions at day 20^{th} . The uterus were examined on day 20^{th} for pregnancy outcome evaluating pregnancy parameters such as the presence and location of resorption sites and for live and dead foetuses in-utero. The animals in sub group 1b-4b that were left to give birth, were examined for birth parameter as during and after parturition. The number of live or dead pups was recorded, and their body mass was determined. Pups were examined for gross congenital abnormalities such as (clubfoot, anomalies of tail, open eyelids). Pup death rate up to 6 days, eye opening day, and fur appearance. On the Basis of these data, the indices were computed as follows: quantal pregnancy= (number of pregnant dams/number mated)x 100; implantation index = (total number of implants/number mated) x 100; pre-implantation loss = [(number of corpora lutea -number of implantations)/number of corporalutea) x 100; post-implantation loss =[(number of implantations - number of viable implantations)/number of implantations]x 100; viability index = (number of viable pups on day 4 after delivery/number of live born pups) x 100; birth index = (number of Pups born/number of implantations) x 100; fetal survival ratio = (number of surviving pups/number of implantations) x 100; live birth index = (number of live born pups/total number of pups born) x 100; gestation index= (number of live pups/number of pregnant dams) x 100.

2.7. Statistical analysis

The obtained data was articulated as the mean ± SEM (standard error of mean). Statistical analysis was carried out using graph pad prism 8 version software (UK). One-way analysis of variance (ANOVA), and comparison between the control and treated groups were analyzed by Dunnett's multiple comparison test. With p-values at a = $p< (0.05)$, b =$p< (0.01)$,c = $p< (0.001)$ and d = $p< (0.0001)$was regarded significant difference as the cases may be.

3.0. Results



Plat i: The effects of the aqueos extract of *S.scabrida and S.Tragacantha* on litters size in-utero of the dams

A, represent the control, oral fed distilled water B ,represent negative control, administered oxytocin intraperitonially C, represents50 mg/kg ,D, represent 300 mg/kg an respectively.

Key: Lu = left uterine horn, R u = right uterine horn

Table i. The effect of aqueous extract of S.scabrida and S.Tragacantha leaves on some Dams parameters of female rats.

Parameter	Control (N=5)	Negative control (N =5)	Positive control (N=5)	50,300 mg/kg Mid-pregnancy (N=20)	50,300, 1000mg/kg Late-Pregnancy (N=21)
Number of uterine implants	(6-8)	(0)	3-5	(5-10)(7-12)(10-12)	(5-10)(7-12)(10-12)
Quantal pregnancy (%)	100	0.00	100	100	100
Implantation index (%)	52.08	70.83	100	100	100
Pre-implantation loss (%)	4.7±0.1	100±0.0^{c}	2.99±0.1^{a}	(1.75±3.6$^{a)}$)(1.5±0.4)(1.45±0.2)	(1.81^{a}±0.2)(1.3±0.5)(1±00)
Gestation Index (%)	100	100	100	100	100
Meangestation day(days)	21.3±0.2	21±00	21.4±0.3	(22.5± 0.3^{a})(22.9±0.1^{b})(23.0)	(23.0±0.6^{c})(24.6±0.3^{c})(25.8±01^{d})

Data are reported as means ±SEM *P<0.05,**P< 0.01 compared to control using graph pad prism 8 uk.

Table ii. Out-come of aqueous extract of Sterculia tragcactha leaves on litter parameters of female rats.

Parameters	Number of Pups (g) Born	Number of living born pups (mean)	Pups Weight at birth(g)	Number of Deformed Pups	Birth index (%)	Pup Survival Ratio(%)	Life birth Index(%)	Eye opening day	Appearance Of fur day
Control	6.8±0.5	5.5±0.8	2.96±0.3	0.00	100	95.2±0.2	100	21±0.5	7.4±0.3
N.Control	5.5±0.8	1.6±1.1	2.8±0.3	0.00	100	35±0.1	100	21±0.3	9.1±0.1
150mg/kg	9.68±0.5[a]	6.8±0.3[a]	3.57±0.1	0.00	100	97.7±0.3[b]	100	14.9[b]	6.8±0.3[b]
500mg/kg	9.88±0.2[c]	9.7±0.3[c]	4.09±0.2[a]	0.00	100	98.7±0.3[c]	100	14±0.5[c]	6.3±0.4[c]
1000mg/kg	11.58±0.3[d]	12±0.0[d]	4.36±0.4[d]	0.00	100	100±0.2[d]	100	13.6±0.5[d]	6±0.1[d]

The gravid rats administered 150, 500 and 1000g/kg, s.t, daily commencing day 0- 21 and day14-21middle- late gravid group. Data were represented as means ±SEM *P< 0.01 and ***p< 0.001 .

Table iii: Summary of the results obtained from hematological analysis of blood samples collected from the dams. The result reveals that the aqueous extract was found to have significantly increased WBC, RBC, PCV, PLT, NEU and BASO.

Parameter	White blood cell(Wbc)	Red lood Cell(Rbc)	Packcell volume (Pcv)	Platelet(Plt)	Neutrophil (Neu)	Basophil (Baso)
Control	15.4±0.0	5.8±0.0	34.6±0.4	67.54±2.2	16.07±	1.44±0.1
150mg/kg	16.42±0.2[a]	6.6±0.1[a]	35.45±0.1[b]	70.89±0.3	20.98±0.3[d]	1.040±0.0
500mg/kg	17.53±0.1[d]	7.14±0.1[d]	38.96±0.4[d]	74.90±0.6[a]	22.40±0.2[d]	7.98±0.2[d]
1000mg/kg	18.21±1.0[d]	8.4±0.1[d]	40.82±0.8[d]	77.20±0.9[d]	23.27±0.3[d]	8.44±0.2[d]

Key:[a]p< (0.05), [b]p< (0.01),[c] p< (0.001) and[d]p< (0.0001).

3.1. Body weight index

Results obtained from the body weight index of the dams during pregnancy, revealed that even in the presence of induction of abortion the extract treated Dams had successful progression of pregnancy and development (Table iv).

Table iv: Body weight index of the dams

Treatment	Day0	Day7	Day14	Day21
Control	183.38±0.1	183.9±0.2	184.2±0.3	198±0.3[b]
N. control	187.8± 04	188.6± 0.1	170±0.2	157.1±1.1
50mg/kg	187.8±3.3	192.1±3.9	195.7±2.4[a]	259.6±0.9[b]
300mg/kg	183.8±1.3	204.2±5.2	275.9±4.1[d]	285.1±3.8[d]

Key: [a] p< (0.05),[b] p (0.01) [c] p< (0.001), and [d] p< (0.0001).

3.2. Discussion

The aqueous extract of (AESSST) showed results that suggests improvement of hematological parameters by the observed boost of white blood cell counts (WBC) ,red blood cell counts (RBC),Pack cell volume (PCV) , while platelet aggregation , Neutrophil and Basophil counts(BOS) was maintained unaffected on the blood as the dose increased .The count of some hemagenic series was improved in counts of WBC, RBC and PCV all of which are activation regulating the immune system was observed boosted, this result relates the works of lee *et al* and Jung *et al* were blood parameters was reported improved [7]. Information's concerning WBC counts pointed out platelet (PLT) linger unchanged, in that while amplified count of white blood cells (WBC) is expectedly obliging in boosting immune system [7] [8], red blood cell (RBC) and pack-cell volume (PCV) is signposted to be helpful in boosting immune system actually, assessments of haematological parameters are used to determine the extent of decree On the red blood cell RBC count which was fortunately increased as the dose of the extract increased an indication that this plant is a good source of tonic, even the pac-cell volume (PCV) count was improved as well suggestive of polycythemia and positive erythopoisis [9][10] [11]. A significant increase in RBC with no alteration in PCV Hence AESSST treated animal's revealed the extract synergistically causes no toxic effect on RBC. By reason of the positive effect of the extract, the platelet (PLT) aggregation was also increased, the counts of basophil BOS was increased, This also backs the in-utero examination findings as the results proposed, that AESSST has potential effect as a naturally derived immune stimulant for the immune boosting effects induced by AESSST Administration to gravid dams. Induced body mass gains was reported, unlike the works of Sadeghi et *al* were weight loss was induced, this weight gain despite oxytocin administration at single dose level on day 12 revealing that the extract averted abortion and preterm labour [5].weight loss was observed in the negative control group on administration of oxytocin at single dose level indicating abortion and preterm labour. Over the 21days of the experiment, body mass of negative control group was much -less than normal control and extract treated group. In contrast, rats administered AESSST had body mass of the Dams progressively increased in all the extract treated group. The result reveals that despite the induction of abortion with oxytocin and preterm labour on day twelve of pregnancy there was progressive fetal development with the various doses of the extract which was an explanation of positive pregnancy outcome on the dams and their litters [6].The results of *pregnancy* outcome reveals that AESSST usefully managed pregnancy, prevented miscarriage as the plate i: **B**, negative control dams was revealed to possess high presence of resorption site [7]. As the negative control dams, which received oxytocin intraperitoneally on day twelve had no litters presence but the high presence of resorption sites it was a clear indication of induced abortion by oxytocin [8].

The litter's size present in the uterine horns of the extract treated dams was found to be more in number and healthier when compared with the normal control plate 1: **A** and those of C-D, even in the presence of induced abortion and preterm labor on day twelve. Surprisingly, on sacrifice at day twenty one the extract treated dams had extremely high number of litter's presence up to ten (8-10and 10-12) per a dam figure 1plate **C-D** [1].

From the results obtained from Dams in the sub-group **B** left to litter, the extract treated dams from day zero to twenty one , oxytocin was given an hour after oral administration of various doses of the aqueous extract. It was observed that onset of labor was delayed for up to 73.3 hours. As genuine proof that the plant extract may have caused the delay in onset of labor.

The pups delivered by the Dams treated with the different doses of extract was observed to be grossly better in size, appearance and more in number and higher in weight [9].The death rate of the pups arising from normal control, negative control and the positive control treated with sabultamol, the death rate was very high, as there was almost no survival records in24hours after their delivery. The extract treated dams had increased survival rates as there was almost no death records apart from one from the highest dose of extract whose death was tired to untimely feeding [10].Oral administration of AESST during pregnancy had positive effects on litter in terms of uterine implants, gestation index / implantation index. Conversely, it posed no considerable threat to successful pregnancy [11] Lamont, 2017). These positive outcome in pregnancy resulted from reduced developing deaths as evident at laparotomy probably at mid stage of prenatal development since the AESSST was non-toxic, and no correlation existed between maternal toxicity and developmental toxicity, the use of AESSST becomes embracing especially for women suffering incessant miscarriage and premature labour and are at high risk of miscarriage. The pups born by dams treated with AESSST at 50 mg/kg and 300 mg/kg had increased birth weights. This indicates intra-uterine growth promotions was not due to increase of gestational length without incidence of preterm delivery, and was probably no Intrinsic Deleterious effects as there was no negative foetal factors such as chromosomal Abnormalities or other malformations. However, it may be attributed to increased blood flow through the placental and essential supply of nutrients to the foetuses. The extract appeared to be synergistically non-teratogenic in rodents [12].

The viability index of pups born following foetal exposure to AESSST was improved, even if some parameters of postnatal development (day of eye opening and day of appearance of fur) remained unaltered. The extract of AESSST applied to pregnant women, by introduction of the consumption of AESSST. Normal birth weight has a major influence on neonatal wellbeing with less occurrence morbidity, neuro -cognitive deficiencies, with no negative neurobehavioral effects. Increased growth *in-utero* is reported to be linked to foetal wellbeing and good foetal development. In a conclusive statement, the use of AESSST incorporation in diet is encouraged for pregnant women [13].

4.0. Conclusion

The present evaluation has shown that AESST has positive effects on pregnancy development parameter and blood parameters respectively.

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Conflict of interest

The authors declare no conflict of interest

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