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Phytochemical, spectroscopic and aphrodisiac studies of seed extract of *Carapa procera* D.C (Meliaceae) in male rodents

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ABSTRACT

***Background*:** *Carapa procera* DC Meliaceae seed is used in ethnomedicine to treat malaria and stem bark is utilized in management of male erectile dysfunction. The aim of the study is to assess the seed extract potentials in enhancing male sexual indices in male wistar albino rats.

***Method*:** The dried seed (1505 g) was extracted successively using 5L each of n-Hexane, dichloromethane and 70% methanol for 7 days and concentrated *in vacuo* while the crude extract was obtained by extracting about 352 g using 70% methanol. The crude extract was administered at 86.60, 173.21 and 259.81 mg/kg/day while the fractions (173.21 mg/kg/day) to the male wistar rats for 7 days, testosterone and distilled water were used as positive and negative control. The sexual indices; Mount Latency (ML), Mount Frequency (MF), Intromission Latency (IL), Intromission Frequency (IF), Ejaculation Latency (EL) Post Ejaculatory Interval (PEI), Erection Frequency (EF), and Penile Erection (PE) were assessed.

***Result*:** Phytochemical analysis and photochemical parameters showed the presence of alkaloids, carbohydrate, flavonoids, saponins and terpenes while anthraquinones, coumarins and tannins were absence. Elemental analysis revealed the presence of Na, K, Mg, Ca, P, Cr, Zn, Fe, while Pb, As, B, Cd, Se, Cu and Hg are below the minimum detectable level. Aphrodisiac appraisal revealed that high dose crude extract (HDCs), Dichloromethane fraction (DCMs), and Standard drug; Testosterone (STD) potentiate the testosterone level at $p<0.05$-0.001.The HDCs also potentiate Follicle Stimulating Hormone (FSH), at $p<0.05$. The LDCs, MDCs, MTOs and MTs fraction significantly reduced ejaculation latency at $p<0.05$-0.01 due to increase in the sensitivity of the penile organ and significantly decreased PEI at $p< 0.05$-0.01. These could be due to the presence of phytochemicals as revealed by the GC-MS analysis such as Vitamin E, Lupenone, Cyclolanost-23-ene-3,25-diol, Olean-12-ene-3-one, tetrahydrofuranoandrostone and fatty acids.

***Conclusion*:** This study confirms the potentials of *C. procera* seeds as aphrodisiac agents.

Keywords; *Carapa procera*, Aphrodisiac, Hormonal profile, Sexual indices

1. INTRODUCTION

Carapa procera D.C Meliaceae is a medicinal plant found in West African, the seed is used in forkloric medicine for the treatment of malaria by the Ijaws in Niger Delta Region of Nigeria. The decoction of stem bark when taken by men stimulates libido, enhance sexual pleasure and satisfaction [1, 2]. Aphrodisiac medicinal plants could elicit the desired pharmacological effect via provision of essential nutrients such as mineral and vitamins, stimulation of central

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nervous system, dilation of blood vessels to enhanced blood supply to the penile and inhibition of phosphodiesterase enzyme which stimulate erection of penile organ [1, 2]. The aim of this study was to assess the effect of seed extract in enhancing the sexual indices such as; mount latency, mount frequency, ejaculation latency, erection frequency, and reduction of post ejaculation interval, penile erection in male Wister rats, using two models; the physical sign and hormonal profile of the extracts in male Wister rats and to characterized the extracts using spectroscopic techniques.

2. MATERIALS AND METHODS

2.1.1 Materials

Each materials, reagents and pharmaceuticals were bought from trustworthy partners and were of analytical standard.

2.1.2 Collection and Identification of Plant Materials

The virgin kernel were self-collected from wilderness at "Otabi Community in Ogbia Local Government Area of Bayelsa State at the Global Position System (GPS) coordinate, 443.0614 N, 00620.7729 E; 443.0312N, 0.0620.7655 E; 443.0894 N, 00620.7674 E; 443.0894 N, 00620.7674 E and 442.833 N, 00620.5953 E". It was identified and documented by Mr. Emmanuel Chuwkuma a phytologist at Forestry Research Institute of Nigeria, Ibadan and Herbarium Number FHI 112975 was allotted to it [3, 4, 5].

2.2 Method

2.2.1 Seed extraction

The seed extraction procedure by Owaba et al., 2022 [5], was used as summarized in Figure 1.0, and concentrated crude seed extract and fractions obtained were used for the pharmacological assay [4, 5].

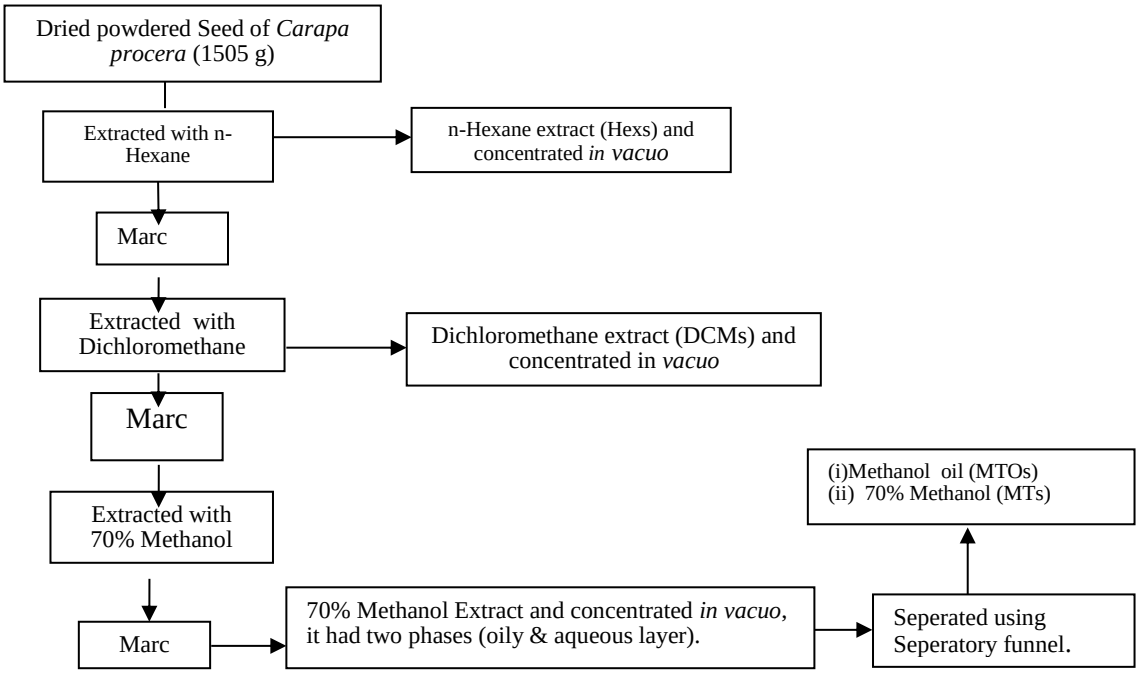

Figure 1.0: Extraction Scheme of *Carapa procera* Seeds

2.2.2 Phytochemical, Elemental and GC-MS Analysis

Phytochemical analysis was carried out on crude extract, using standard procedures[6,7,8] while the crude seed was subjected to elemental analysis using standard procedures and analyzed with Agilent Technologies 5977AA MSD [9]. n-Hexane, dichloromethane and Methanol oily fractions were subjected to GC-MS analysis using GC-MS-QP2010SE Shimadzu Japan.

2.2.3 Experimental Animals

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2.2.3.1 Acute toxicity

The acute toxicity studies were determined using Lorkes method and minimum dose that kill 50 percent of experimental animals (LD_{50}), were found to be 866.0 mg/kg for crude seed extracts as stated by Owaba et al, 2022 [5].

2.2.3.2 Aphrodisiac Assay

Preliminary sexual behaviour assessment was conducted using male rats on receptive female and the male exhibiting low sexual activities were excluded from the experiment. About fifty four (54) each of male (130-281 g) and female (135-200 g) albino wistar rats were used for the assay. The animal were handled and kept according to international laboratory standards [3,4,5]. The male rats were divided into nine groups of six animals each and the various doses administered as stated by Owaba *et al* 2022 [5]. The following doses were given; 86.60, 173.21 and 259.81 mg/kg/day which represent low, median and high dose of the crude extract while median dose(173.21 mg/kg/day) was given as the dose for all the factions(n-Hexs, DCMs, MTOs and MTs for 7 days) as illustrated in Figure 1.0. Testosterone and distilled water were given 1mg and 10 ml/kg/day respectively for 7 days [4, 5]. Estrous was induced in the female rats by administration of 17β- estradiol (8 µg/kg) and progesterone (500 µg/kg) 48 hours and 4 hours respectively before commencement of the experiment [11]. On the 7th day around 7:30 PM, Each male rat was introduced into the plexiglass copulation cage (46 cm x 41 cm x 41 cm) for 30 minutes prior to the introduction of the female rats for acclimatization. The test "began when the female rat was introduced into the cage and terminated at the end of 15 minutes, or immediately after post ejaculatory intromission". The following parameters were recorded; "Mount latency, intromission latency, ejaculatory latency, mount frequency, intromission frequency, post ejaculation interval, erection frequency and penile erection" by adopting standard procedures [3, 10, 12, 13, 14, 15, 16]. On the 8th day, the male animals were anaesthetized using trichloromethane and sacrificed. Blood specimen collected via cardiac vein perforation and allowed to be upstanding at room temperature for an hour, centrifuged at 2500 rpm for 5 minutes to separate the serum. The serum stored at -20^{o}C in icebox until appraisal was done [4,5,10,16,18]. The samples were evaluated using standard protocol to determine the following parameters; "Alanine aminotransaminase (ALT), Alkaline phosphatase (ALP), Aspartate aminotransaminase (AST), testosterone, follicle stimulating hormone (FSH), luteinizing hormone (LH) and prolactin, total cholesterol (TC), high density lipoprotein (HDL), triglyceride (TG)" [4,16, 18, 20]. The organs and tissues were weighed; testis, liver, kidney, epididymis, seminal vesicle were weighed while the testis were preserved in 10% (v/v) formalin for histopathological evaluation.

2.3 Statistical Analysis

The experimental results were analyzed using one way ANOVA (Graphpad Prism 3.0) and Tukey Kramer post test and data presented as Mean±S.E.M and $p< 0.05$ was considered significant [3, 4, 5, 16].

3.0 RESULTS

Table 1: Elemental analysis of crude seed and stem bark

S/N	Parameter	Seeds(mg/kg)
1	Sodium	2.513
2	Potassium	3.174
3	Magnesium	4.057
4	Calcium	0.994
5	Phosphorus	0.317
6	Manganese	0.047
7	Chromium	<0.001
8	Zinc	0.112
9	Iron	0.354
10	Lead	<0.001
11	Arsenic	<0.001
12	Boron	<0.001
13	Cadmium	<0.001
14	Mercury	<0.001
15	Copper	0.050
16	Selenium	<0.001

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Table 2: Aphrodisiac assay of seed extracts of *Carapa procera*

Sample	ML	MF	IL	IF	EL	PEI	EF	PE
	(Sec)		(Sec)		(Sec)		(Sec)	
VEH	86±20	17.17±19	215.83±62	11.83±0.9	761.83±69.89	1037±42.35	1.667±0.33	973.0±51.46
STD	14±2.0	9.67±2.45	19.17±2.18[a]	7.00±1.93	345.17±103.6	683.5±42.24	1.50±0.34	651.67±47.84
LDcs	38±3.9	9.17±2.18	7.00±0.93[b]	7.00±0.93	105.83±2.24[b]	478.33±21.73[b]	1.667±0.33	469.67±21.31[a]
MDcs	91.2±51.4	5.33±0.80	110.2±51.2	4.16±0.87	227.50±91.29[a]	464.83±95.89[b]	1.167±0.17	447.83±96.15[a]
HDcs	174.2±45.64	12.50±2.41	206.50±36.02	10.33±2.67	598.50±69.54	979.33±88.06	1.167±0.17	968.67±87.96
n-Hexs	51.83±36.78	20.17±5.95	18.67±6.08	18.67±6.08	570.17±201.6	894.50±213.4	1.50±0.22	848.50±218.20
DCMs	45.50±24.13	9.67±2.89	116.88±55.7	8.17±2.39	448.50±134.96	769.17±120.43	2.83±0.40	534.17±124.16
MTOs	45.33±20.08	7.67±1.41	71.67±40.43	6.83±1.54	175.83±45.71[b]	461.83±33.98[b]	1.167±0.167	432.17±38.88[a]
MTs	27.67±10.11	7.17±1.14	6.17±1.30.0	6.17±1.30	196.0±58.08[b]	526.33±45.46[a]	1.833±0.31	429.33±57.85[a]

Values represent Mean±SEM, Significance relative to control; [a]p<0.05, [b]p<0.01, [c]p<0.001; (n = 6)
Keys: VEH = Distilled water(10 ml/kg), STD = Standard drug (Testosterone 1 mg/kg), LDcs = Low Dose Crude Extract (86.60 mg/kg), MDcs = Median Dose Crude Extract (173.21 mg/kg), HDcs = High Dose Crude Extract (259.81 mg/kg), n-Hexs = n-Hexane fraction (173.21 mg/kg), DCMs = Dichloromethane fraction (173.21 mg/kg) and MTs = 70% Methanol fraction (173.21 mg/kg).ML = Mount Latency, MF = Mount Frequency, IL = Intromission Latency, IF = Intromission Frequency, EL = Ejaculation Latency, PEI = Post Ejaculation Interval, EF = Erection Frequency, PE = Penile Erection

Table 3: Effect of seed extract on organs and tissues

Sample	IW	WT	LV	Testes	EPID	KID	VD	SV (g)
VEH	168.17±7.30	158.0±4.89	4.96±0.21	2.36±0.15	1.77±0.16	1.10±0.04	0.12±0.01	0.48±0.08
STD	170.17±9.14	162.50±8.80	5.50±0.16	2.46±0.14	1.61±0.16	1.09±0.03	0.13±0.01	0.96±0.11
LDcs	177.50±11.35	165.67±9.34	6.11±0.24	2.37±0.09	2.02±0.08	1.08±0.06	0.15±0.01	0.79±0.07
MDcs	180.0±6.25	176.17±8.27	6.18±0.29	2.22±0.21	2.16±0.32	1.13±0.04	0.23±0.05	0.72±0.18
HDcs	164.83±5.24	180.17±7.19	7.94±0.22[c]	2.33±0.04	1.96±0.13	1.11±0.02	0.14±0.01	0.47±0.10
n-Hexs	184.83±16.73	183.33±16.4	7.09±0.53[a]	2.11±0.20	2.41±0.41	1.25±0.09	0.15±0.04	0.69±0.18
DCMs	207.50±20.48	222.67±16.89[a]	8.81±0.78[c]	2.24±0.13	3.41±0.45[b]	1.27±0.06	0.22±0.05	1.08±0.23
MTOs	199.17±13.76	212.67±16.89	7.76±0.46[c]	2.57±0.06	2.49±0.23	1.35±0.05	0.19±0.03	0.93±0.09
MTs	198.67±16.75	188.33±17.61	6.24±0.48	2.38±0.12	2.39±0.23	1.29±0.10	0.17±0.03	0.92±0.21

Values represent Mean±SEM, Significance relative to control; [a]p<0.05, [b]p<0.01, [c]p<0.001, (n = 6)
Keys: IW = Initial Body weight, WT = Body weight after treatment, Lv = Liver, EPID = Epididymis, KID = Kidney, VD = Vas deferens, S.V = Seminal vesicle

Table 4.0: Hormonal profile of seed extract of *Carapa procera*

Sample	TE(ng/mL)	PRL(ng/mL)	LH(m/u/mL)	FSH (m/u/mL)
VEH	1.23±0.22	1.15±0.07	1.31±0.09	0.68±0.07
STD	3.00±0.74[a]	1.13±0.19	0.84±0.09	0.61±0.11
LDcs	1.14±0.24	1.25±0.16	0.87±0.12	0.45±0.06
MDcs	1.79±0.22	1.23±0.04	1.41±0.12	0.83±0.15
HDcs	5.36±0.74[c]	1.06±0.06	1.05±0.08	1.73±0.31[c]
n-Hexs	2.82±0.36	1.03±0.15	0.87±0.10	0.47±0.05
DCMs	3.46±0.55[b]	1.12±0.07	1.47±0.14	0.64±0.07
MTOs	2.68±0.28	1.05±0.03	1.48±0.16	0.60±0.08
MTs	1.85±0.29	1.07±0.22	0.84±0.11	0.44±0.05

Values represent Mean±SEM, Significance relative to control; [a]p<0.05, [b]p<0.01, [c]p<0.001, (n = 6)
Keys: Te = Testosterone; PRL =Prolactin; LH = Luteinising Hormone; FSH = Follicle Stimulating Hormone

Table 5.0: Result of Biochemical profile of the Seeds of *Carapa procera*

Sample	AST (u/mL)	ALT	ALP	TC (mmol/L)	TG	HDL
VEH	36.83±3.22	11.77±0.92	39.00±1.07	2.60±0.07	1.42±0.10	0.79±0.79
STD	29.67±2.62	11.47±0.39	49.67±2.56	2.60±0.07	1.42±0.10	0.79±0.03
LDcs	37.50±1.34	11.00±0.41	29.67±2.56	2.40±0.11	0.99±0.88	1.00±0.03
MDcs	31.83±1.92	9.22±0.69	26.17±2.06[a]	2.73±0.05	1.29±0.06	0.91±0.11
HDcs	22.17±2.40[c]	7.12±0.32[a]	22.00±2.06[c]	2.37±0.09	1.28±0.13	1.01±0.06
n-Hexs	37.00±1.07	11.50±0.51	41.17±2.57	2.72±0.14	1.69±0.11	1.26±0.10[c]
DCMs	32.33±2.06	10.18±0.43	40.50±2.59	2.72±0.12	1.39±0.16	1.09±0.04
MTOs	47.50±1.95[a]	17.36±2.14[b]	46.00±4.25	2.73±0.07	1.23±0.11	1.08±0.08
MTs	40.83±1.87	10.72±0.22	27.00±0.73[a]	2.52±0.06	1.06±0.08	1.07±0.09

Values represent Mean±SEM, Significance relative to control; [a]p<0.05, [b]p<0.01, [c]p<0.001; (n = 6)
Keys; AST= Aspartate aminotransferase; ALT = Alanine aminotransferase; ALP = Alkaline phosphatase; TC = Total Cholesterol, TG = Total Triglyceride, HDL = High Density Lipoprotein.

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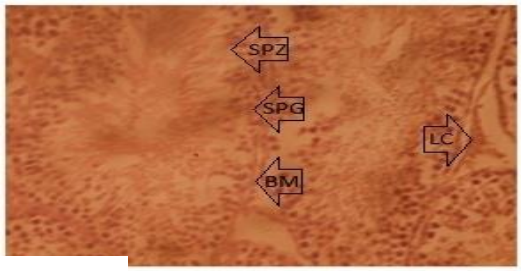
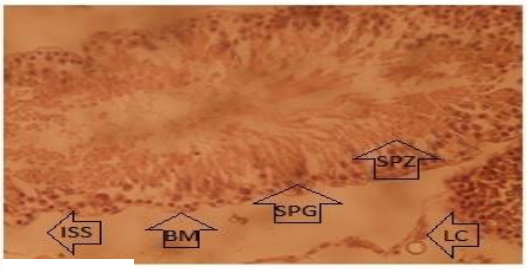
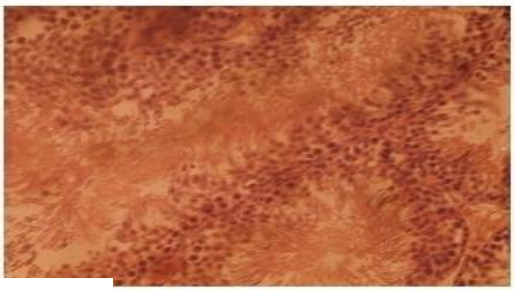


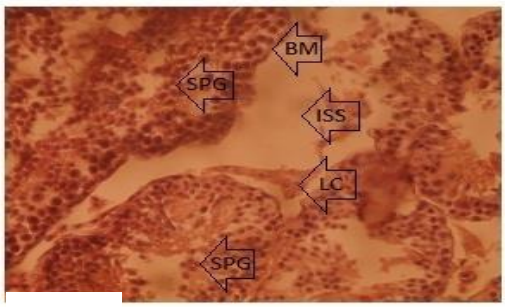
VEH



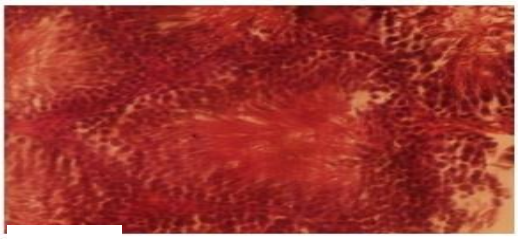
STD



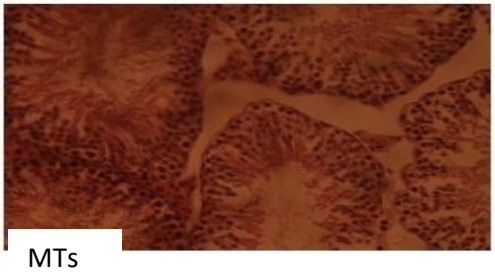
LDcs



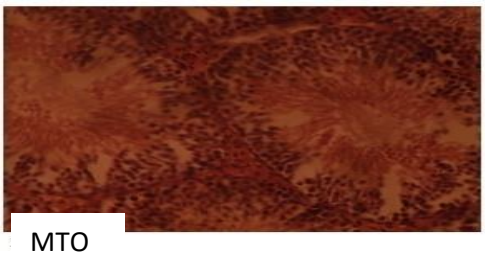
MDcs



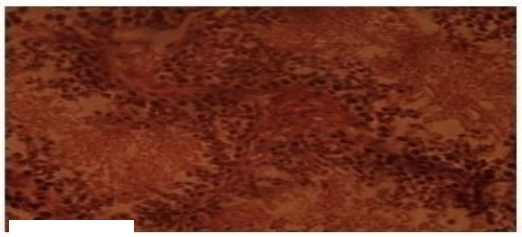
HDcs



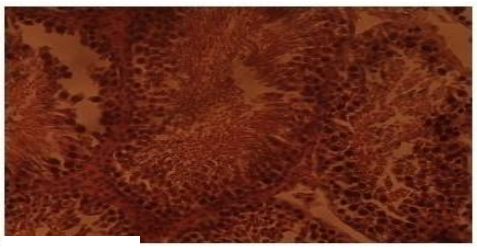
MTs



MTO



n-Hexs



DCMs

Keys; BM = Basal Membrane, SPG =Spermatogonia, SPZ = Spermatozoa, ISS = Insterstitial Spaces, LC = Leydig cells Figure 2.0: Histological effect of the Crude extracts and fractions of *Carapa procera* Seed on the testis.

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Table 6.0: Summary results of histological evaluation seed extracts of *Carapa procera* on the testis

S/N	Samples	Organs	Comment
1	Control (H_2O)	The Testis	Histologically normal, seminiferous tubules bound by basal membrane contain spermatogonia cells and spermatozoa. The interstitial space contain Leydig cells
2	Spermatozoa.	STD Testis	Histologically normal, seminiferous tubules bound by basal membrane contain spermatogonia cells and spermatozoa. interstitial space contains Leydig cells
3	Seed extracts	The Testis	The crude extract of the seed and fractions showed histologically normal testis

Table 7.0: Results of GC-MS Analysis of n-Hexane extract(n-Hexs) of the seeds of *Carapa procera*

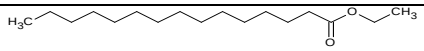
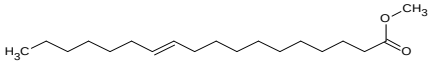
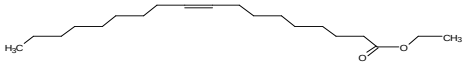
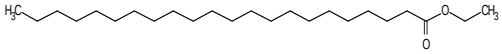
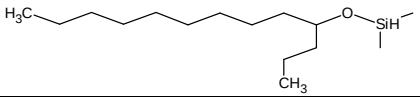
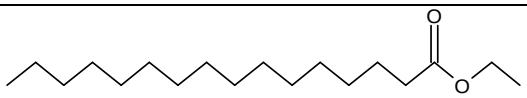
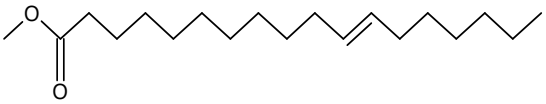
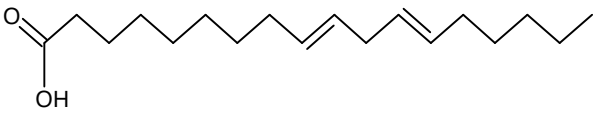
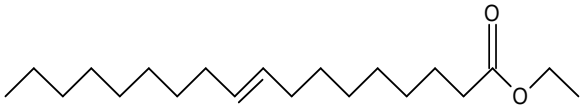
S/N	Structure	Chemical Formular	Name	RT	Area (%)
1.		$C_{18}H_{36}O_2$	Ethylhexadecanoatate	16.398	11.94
2.		$C_{19}H_{36}O_2$	Methyl-11-Octadecanoate	17.43	3.14
3.		$C_{18}H_{32}O_2$	9-Octadecynoic acid	17.99	4.47
4.		$C_{20}H_{38}O_2$	Ethyloleic acid ester	18.080	75.85
5.		$C_{24}H_{48}O_2$	Ethyldocosonoate	18.310	4.36
6.		$C_{15}H_{34}OSi$	4-dimethylsilyloxytridecane	22.42	5.44

Table 8.0: GC-MS Result of DCMs fraction of *Carapa procera* Seed

S/N	Chemical Structure	Chemical Formular	Name	RT	Area
1.		$C_{18}H_{36}O_2$	Ethyl hexadecanoate	15.729	1.64
2.		$C_{19}H_{36}O_2$	Methyl-11-Octadecenoate	16.397	13.03
3.		$C_{18}H_{32}O$	9,11-Octadecenoic acid	17.430	3.28
4.		$C_{20}H_{38}O_2$	Ethyl-9-octadecenoate	17.991	4.39
5.		$C_{24}H_{48}O$	Ethyl docosonate	18.075	58.28

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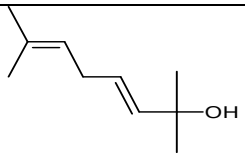
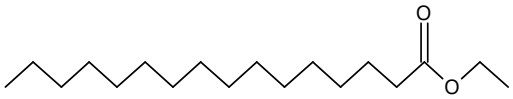
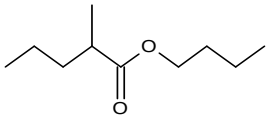
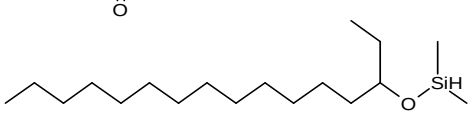
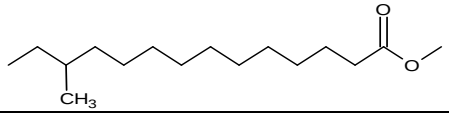
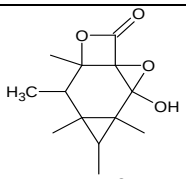
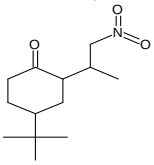
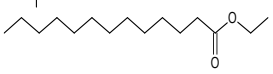
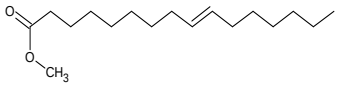
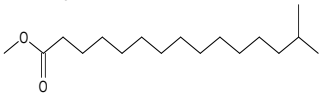
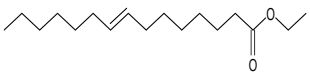
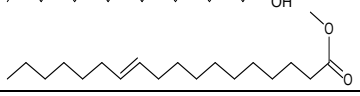
6.		$C_{10}H_{18}O_2$	7-Dimethyl-1-methyl-3,6-octadien-2-ol	18.308	5.02
7.		$C_{18}H_{36}O_2$	Ethyl hexadecanoate	19.776	4.73
8.		$C_{10}H_{20}O_2$	Butyl- 2-methylvalerate	20.072	0.61
9.		$C_{17}H_{38}OSi$	3-Dimethylsilyloxypentadecane	20.906	3.69
10.		$C_{16}H_{32}O_2$	Methyl 12-methyltetradecanoate	22.420	5.35

Table 9.0: GC-MS analysis of MTOs fraction

S/N	Structure	Chemical Formular	Name	RT	Area (%)
1.		$C_{13}H_{20}O_4$	Tricyclononane	12.025	0.11
2.		$C_{13}H_{23}NO_3$	2-Nitroisopropyl-4-tertbcyclohexanone	14.418	0.08
3.		$C_{15}H_{30}O_2$	Ethyltridecanoate	15.250	0.12
4.		$C_{17}H_{32}O_2$	9-Hexadecenoic acid methyl ester	16.741	0.17
5.		$C_{17}H_{34}O_2$	Methyl-14-methylpentyldecanoate	17.165	3.52
6.		$C_{18}H_{34}O_2$	Ethyl-9-Hexadecenoate	17.660	0.54
7.		$C_{18}H_{36}O_2$	Ethylhexadecanoate	18.162	8.45
8.		$C_{16}H_{32}O_2$	Hexadecanoic acid	18.635	19.18
9.		$C_{19}H_{36}O_2$	Methyl-11-Octadecenoate	19.440	9.49

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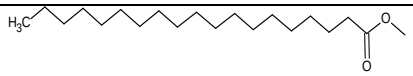
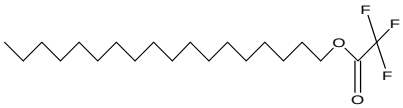
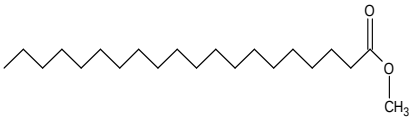
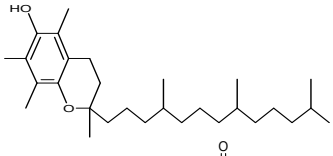
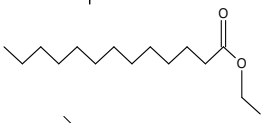
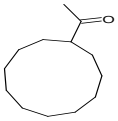
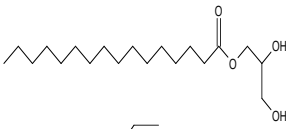
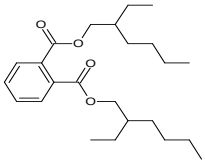
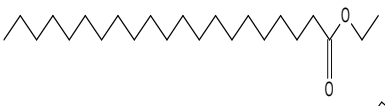
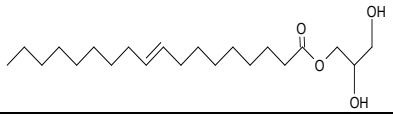
10.		$C_{19}H_{38}O_2$	Methylstearate	19.720	4.36
11.		$C_{20}H_{38}O_2$	Ethyl-9-Octadecenoate	20.240	13.78
12.		$C_{20}H_{40}O_2$	Ethyloctadecenoate	20.660	7.13
13.		$C_{20}H_{35}F_3O_2$	Oleyltrifluoroate	20.860	18.62
14.		$C_{21}H_{42}O_2$	Methyl eicosanoate	22.310	1.29
15.		$C_{29}H_{50}O_2$	Vitamin E	22.605	1.19
16.		$C_{15}H_{30}O_2$	Ethyltridecanoate	23.176	0.87
17.		$C_{14}H_{26}O$	1-Cyclododecylethanone	23.500	0.62
18.		$C_{22}H_{40}$	1,9,11Docasatriene	23.855	0.11
19.		$C_{19}H_{38}O_4$	Glyceryl-1-Palmitate	24.468	2.05
20.		$C_{24}H_{38}O_4$	Bis(2-ethylhexyl)Phthalate	24.819	0.25
21.		$C_{18}H_{36}O_2$	Butylmyristate	25.205	0.15
22.		$C_{20}H_{40}O_2$	Ethyldocosonate	25.550	0.10
23.		$C_{24}H_{44}O_4$	Oletyl (2,2-dimethyl 1,3dioxolanyl) methylester	26.180	0.39
24.		$C_{21}H_{40}O_4$	Glyceryl Monooleate	26.670	4.19

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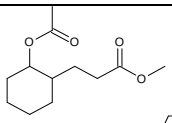
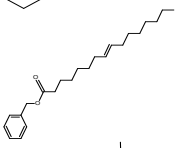
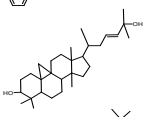
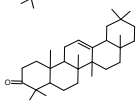
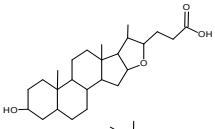
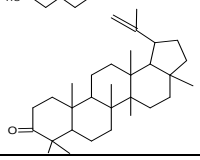
25.		$C_{12}H_{20}O_4$	2-acetyoxycyclohexanemethylpropanoate	27.125	0.06
26.		$C_{23}H_{36}O_2$	9-Hexadecenoic acidPhenylmethylester	27.330	0.12
27.		$C_{30}H_{50}O_2$	9,19-Cyclolanost-23-ene-3,25-diol	27.80	1.53
28.		$C_{30}H_{48}O$	Olean-12-ene-3-one	28.185	0.46
29.		$C_{25}H_{40}O_4$	Tetrahydrofuranoandrostan-3-ol	28.880	0.06
30.		$C_{30}H_{50}O$	Lupenone	29.345	1.04

4. DISCUSSION

The seeds of *Carapa procera* extracted with n-hexane, dichloromethane and methanol yielded 11.29%, 10.03%, 0.954% and 3.77% fraction, while the crude seed extracts yielded 5.58%. Phytochemical screening of the crude seed extract revealed the presence of alkaloids, carbohydrates, flavonoids, terpenes, tannins and saponins. Elemental analysis of the seed of *Carapa procera* (Figure 1.0), revealed the presence of sodium, potassium, magnesium, calcium, phosphorus, manganese, zinc and iron. This could enhance male reproductive health and sexual function. From the results of analysis, the seeds are free from heavy metal contamination [21, 22, 23]. The seed extracts showed insignificant effect on Mount Latency, Mount frequency, Intromission Frequency and Erection Frequency compared to control. The ejaculation latency; LDcs, MDcs, MTOs and MTs fractions significantly reduced ejaculation interval at $p<0.05$-0.01 as illustrated in Table 4.0. This could be due to hypersensitivity of the penile organ. The post ejaculatory interval is very important because it measured how fast the animals were able to recover from the depressive effect of ejaculation, to be able to mount and penetrate the female rats for the next intromission series. The LDcs, MDcs, MTOs and MTs fractions significantly decreased the PEI at $p<0.05$-0.01 and penile erection period at $p<0.05$ as shown in Table 2.0. This signifies its aphrodisiac potentials could be due to the presence of phytochemicals as revealed by the GC-MS analysis(Table 6.0-8.0) such as vitamin E, lupenone, 9,19-cyclolanost-23-ene-3,25-diol, olean-12-ene-3-one, tetrahydrofuranoandrostan-3-ol, could be due to essential fatty acid such as linoleic acid, methylester, linolenic acid methylester[16, 24]. The dichloromethane extract of the seed showed a significant effect on the body weight at $p< 0.05$, this could be due to anabolic effect (Table 5.0). However, the dichloromethane fraction significantly increased the weight of epididymis at $p<0.01$ which is highly significant, this could be due to steroids and fatty acids presence in the extracts. The HDcs, n-Hexs, DCMs, MTOs fractions significantly increased the weight of the liver which could be an inflammation of the liver and toxicity at $p<0.05$ and 0.001. The dichloromethane extract of the seed showed a significant effect on the body weight at $p< 0.05$, this could be due to anabolic effect (Table 3.0). However, the dichloromethane fraction significantly increased the weight of the epididymis at $p<0.01$ which is highly significant, this could be due to anabolic effect of steroids presence in the seed extracts. The HDcs, n-Hexs, DCMs, MTOs fractions significantly increased the weight of the liver which could be due to inflammation of the liver at $p<0.05$ and 0.001 as shown in Table 3.0 [16, 25]. The STD (Testosterone), HDcs and DCMs extract increased plasma level of testosterone concentration at $p<0.05$-0.001 when compared to control. The HDcs also potentiate the plasma concentration of FSH at $p<0.05$. All the samples showed insignificant effect on plasma prolactin and LH as illustrated in Table 4.0. The biochemical parameters were assessed; HDcs showed significant effect by reducing the plasma AST, ALT and ALP concentration at $p<0.001$; 0.05 and 0.001 respectively [4]. MTOs fraction increased AST plasma

concentration at $p<0.05$ which means a sign of toxicity. However, MTOs significantly increased the plasma concentration of AST and ALT at $p<0.05$ -0.01 (Table 5.0), this is a sign of hepatoxicity [4]. The ALP concentration is reduced significantly by MDcs and MTs at $p<0.05$ which could be useful in management inflammatory condition of the liver cells. The samples showed insignificant effect on total cholesterol, triglyceride, high density lipoprotein excerpt n-Hexs which significantly potentiate serum HDL [4]. High density lipoprotein may help prevent cardiovascular disease such as atherosclerosis and formation of plaques [19, 20, 26]. Histological assessment (Figure 2.0) of the testis revealed that the extracts are devoid of any deleterious effect at doses administered to the experimental animals (Table 6.0).

5. CONCLUSION

The seed extracts showed potentials aphrodisiac effect via elevation of the plasma testosterone and increase in the physical behavioral parameters of libido this could be due to essential elements. This ratify *Carapa procera* potentiate sexual indices in men without any pathological effect on the testis as revealed by the histological assessment.

Acknowledgement
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Conflict of Interest: Nil

Contribution of the Authors
All authors participated in conception and design of the research. Owaba, ADC, performed the experiments in the laboratories and the writing of the manuscript, while Johnson, EC, Ogbiko, C, Ugwoke, E.C and Etim, E.I supervised the experiment, interprets result and edit manuscript.

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