

**SPERMATOGENIC AND ERECTOGENIC ACTIVITIES OF THE  
ETHANOL EXTRACT OF *Sphenocentrum jollyanum* PIERRE ROOT IN  
RATS AND RABBITS**

**BY**

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**A THESIS IN THE DEPARTMENT OF PHYSIOLOGY  
SUBMITTED TO THE FACULTY OF BASIC MEDICAL SCIENCES  
COLLEGE OF MEDICINE**

**IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE  
DEGREE OF**

**DOCTOR OF PHILOSOPHY**

**of the**

**UNIVERSITY OF IBADAN**

**MAY 2019**

## ABSTRACT

Infertility and sexual dysfunction exert psychological tolls on humans. This is characterised by anxiety and debilitating feeling of inadequacy. Hence, use of aphrodisiacs and sex enhancing drugs is common among people experiencing infertility. *Sphenocentrum jollyanum* root is widely used for its aphrodisiac effect in folkloric medicine. However, there is dearth of information on its mechanism of action on erectile dysfunction. This study was carried out to investigate the spermatogenic and erectogenic activities of ethanol extract of *Sphenocentrum jollyanum* root in rats and rabbits.

*Sphenocentrum jollyanum* root was harvested from Oniganbari via Ibadan and authenticated at Forestry Research Institute Nigeria (FHI No. 106994). The dry root powder was macerated in ethanol and the filtrate was evaporated to dryness in a water bath heated at 40°C. The phytochemical constituents of the extract were identified using the Gas chromatography Mass spectrometry (GC-MS). Spermatogenic activities were determined in 35 male Wistar rats (180-210 g) divided into seven groups (n=5) and treated orally thus: distilled water (0.5 mL/kg), extract (300, 600 and 1000 mg/kg) for 56 days and extract (300, 600 and 1000 mg/kg) for 56 days +28 days recovery. Sperm profile was analysed by microscopy; testicular Glutathione Peroxidase (GPx) and Superoxide Dismutase (SOD) activities by spectrophotometry. Mating behaviour was evaluated on 40 Flemish rabbits (3.0-3.5 kg) and were treated orally for five days thus: control (0.5 mL/kg, distilled water), extract (600 mg/kg), paroxetine (10 mg/kg), extract-paroxetine (600 mg/kg), linoleic acid (0.03 mg/kg), linoleic acid-paroxetine (0.03 mg/kg), sildenafil citrate (0.50 mg/kg), and sildenafil citrate-paroxetine (0.50 mg/kg). *In vitro* contractile activities of extract were assessed in strips of rabbit corpus cavernosa (CC) pre-contracted with 10<sup>-7</sup>M Phenylephrine followed by introduction of blockers among which were; Nifedipine (10<sup>-4</sup>M), Verapamil (10<sup>-4</sup>M), L-NAME (10<sup>-4</sup>M) and Indomethacin (10<sup>-4</sup>M) before treatment with graded doses of Sodium nitroprusside SNP (10<sup>-9</sup>-10<sup>-5</sup>M), Acetylcholine ACh (10<sup>-9</sup>-10<sup>-5</sup>M) or extract (0.1-3.2 mg/mL). Data were analysed using ANOVA at  $\alpha_{0.05}$ .

Thirty-four chemical constituents were identified in the extract and linoleic acid was the most abundant (73.5%). Sperm motility (93.0±1.2%), livability (97.2±0.6%) and count (193.50±15.25 million/mL) increased significantly in the 1000 mg/kg extract treated relative to control (83.0±2.3%; 89.0±2.8%; 145.50 ± 12.25 million/mL) respectively. Testicular GPx (U/L) and

SOD (U/mL) activities increased in 300 ( $268.3 \pm 13.57$  and  $1.92 \pm 0.13$ ), 600 ( $338.2 \pm 14.69$  and  $1.64 \pm 0.05$ ) and 1000 ( $393.6 \pm 18.12$  and  $1.49 \pm 0.28$ ) mg/kg extract compared with control ( $193.6 \pm 10.74$  and  $0.47 \pm 0.05$ ). Increased activities were however reversed after recovery. The extract reduced mount latency by 98.0%, while intromission frequency was increased by 150.0% in paroxetine-treated rabbits. Significant contractile inhibition was produced by extract ( $33.3 \pm 2.4\%$ ), ACH ( $42.8 \pm 2.3\%$ ) and SNP ( $52.8 \pm 1.6\%$ ) in corpus cavernosa strips of normal rabbits. Maximal contraction of CC strips was reduced by extract to  $11.3 \pm 1.5\%$  and  $14.6 \pm 1.1\%$  in the presence of nifedipine ( $42.8 \pm 2.1\%$ ) and Verapamil ( $22.0 \pm 1.5\%$ ), respectively. Relaxation response of CC to extract increased by 228.2% and 143.1% in the presence of Indomethacin and L-NAME in strips of rabbits pretreated with paroxetine.

The ethanol extract of *Sphenocentrum jollyanum* root improved spermatogenic profile, increased antioxidant activities and ameliorated paroxetine-induced erectile dysfunction. These actions may be linked to linoleic acid.

**Keywords:** *Sphenocentrum jollyanum*, Spermatogenic profile, Paroxetine-induced erectile dysfunction

**Word count:**500

## DEDICATION

This thesis is dedicated to:

*God Almighty*

*and*

*My children, Olatomiwa and Eniola*

You shall be blessed above all.

## ACKNOWLEDGEMENT

I like to express my profound gratitude to my amiable Supervisor and Head, Department of Physiology, Prof. Y. Raji, for his guidance and continuous tutoring which has immensely contributed to the success of this work. Thank you, Sir.

I express my appreciation to all my teachers in the Department: Prof. A. A. Fasanmade, Prof. A.R.A Alada, Prof. S.B Olaleye, Dr F.S Oluwole, Dr G.F Ibrinke, Prof. E.O. Adewoye, Dr O.O Akande, Dr S.A Onasanwo, Dr A.G Adeleye, Dr O.A Aiku, Dr J.T Lasisi, Dr A.O Odukanmi, Dr O.T Kunle- Alabi, Dr G.O Isehunwa, Dr S.T Shittu, Dr A.T Salami, Dr O.A Ige, Dr O.O Akindele and the support of all the academic, administrative and technical staff of the department.

I appreciate both Prof. H.M Salahdeen and Mr. B. A Murtala of the Department of Physiology, College of Medicine, Lagos State University for their support and tutelage throughout the period of my stay in your laboratory. God bless you. A big thank you to all members of Reproduction and Developmental Programming Unit, Department of Physiology of the faculty of Basic Medical Sciences, University of Ibadan, I really appreciate you.

I sincerely appreciate my employer, Osun State University, for the support I enjoyed in my quest for development by its provision of fund through TETFund for the support of this work. I also acknowledge the support received from the entire members of Staff of the Department of Physiology, UNIOSUN especially from Dr I. P. Oyeyipo, Dr O. O. Obembe, Dr O. T. Usman, Dr. O. S. Osuntokun, Dr. K. I. Adedokun and Mr. D. H. Adeyemi. The assistance of Mr O. Olaniyan, and Dr.T.G. Atere of Biochemistry Department, UNIOSUN is sincerely appreciated. God bless you all.

I want to express my gratitude to: my husband, Mr. Sunday Olarinre Oladokun; my children, Olatomiwa Oladokun and Eniola Oladokun; my parents, Mr. and Mrs. Rufus Olajide Fadare; my siblings, Mrs.Oluwakemi Omokanye, Mr. Olugbenga Fadare, Mr. Tolulope Fadare and Mrs. Morounfolu Akintunde; my friends; Mrs. Idowu Akinrinola (of blessed memory), Mrs. Olubukola Makinde, Mrs. Funmilola Babajide, Matron Amusan, Mr and Mrs Ayinde, Mr and Mrs Alabi, my pastors; Pastor Olumide Oyewo and Pastor Abioye Olagunju. Thank you all for your moral support.

My adoration goes to Almighty God, the maker of Heaven and Earth.

## CERTIFICATION

I certify that this work titled: **Spermatogenic and Erectogenic Activities of the Ethanol Extract of *Sphenocentrum jollyanum* Pierre Root in Rats and Rabbits** was carried out by Mrs Olayemi Olutobi **OLADOKUN** in the Department of Physiology, Faculty of Basic Medical Sciences, College of Medicine, University of Ibadan, Ibadan, Nigeria.

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## TABLE OF CONTENTS

|   |       |
|---|-------|
| ABSTRACT.....                                       | ii    |
| DEDICATION.....                                     | iv    |
| ACKNOWLEDGEMENT.....                                | v     |
| CERTIFICATION.....                                  | vi    |
| TABLE OF CONTENTS.....                              | vii   |
| LIST OF TABLES.....                                 | xiv   |
| LIST OF FIGURES.....                                | xv    |
| LIST OF PLATES.....                                 | xviii |
| ABBREVIATIONS.....                                  | xix   |
| CHAPTER ONE.....                                    | 1     |
| 1.0 INTRODUCTION.....                               | 1     |
| Statement of Problem.....                           | 6     |
| Justification.....                                  | 6     |
| Aim of the study.....                               | 6     |
| Specific objectives.....                            | 7     |
| CHAPTER TWO.....                                    | 8     |
| 2.0 LITERATURE REVIEW.....                          | 8     |
| 2.1 Anatomy of the male reproductive system.....    | 8     |
| 2.2 Spermatogenesis.....                            | 10    |
| 2.2.1 Hormonal control of spermatogenesis.....      | 14    |
| 2.3. Male sexual response.....                      | 15    |
| 2.4 Physiology of penile erection.....              | 17    |
| 2.4.1 Central control of erection.....              | 17    |
| 2.4.2 Peripheral control of erection.....           | 23    |
| 2.4.3 Mechanism of detumescence and flaccidity..... | 25    |
| 2.4.4. Mechanism of Tumescence.....                 | 27    |
| 2.4.5 Penile Hemodynamics.....                      | 31    |
| 2.5.1 Factors of male Infertility.....              | 33    |

|   |    |
|---|----|
| 2.5.2 Causes of male infertility.....   | 33 |
| 2.5.3 Management of erectile dysfunction .....  | 36 |
| 2.6.1 Medicinal plants .....  | 37 |
| 2.6.2 Medicinal plants as fertility enhancers .....   | 37 |
| 2.7 Phytochemical screening.....  | 40 |
| 2.8 Gas chromatography and mass spectrography GC-MS .....   | 44 |
| 2.9 Estimation of antioxidant activities.....   | 45 |
| 2.10 Acute toxicity Study and determination of LD <sub>50</sub> .....   | 50 |
| 2.11 Liver and Kidney Functions.....  | 54 |
| CHAPTER THREE .....   | 56 |
| 3.0 Materials and Methods.....  | 56 |
| 3.1 Plant material.....   | 56 |
| 3.2 Phytochemical Screening .....   | 56 |
| 3.2.1 Test for Alkaloids .....  | 56 |
| 3.2.2 Cardenolides/Cardiac Glycosides test (Keller-Killiani test) .....   | 56 |
| 3.2.3 Test for Anthraquinones .....   | 57 |
| 3.2.4 Saponins Test (Frothing test).....  | 57 |
| 3.2.5 Tannins Test .....  | 57 |
| 3.2.6 Flavonoid .....   | 57 |
| 3.2.7 Test for Starch .....   | 57 |
| 3.2.8. Test for Phenols (Ferric Chloride test) .....  | 58 |
| 3.2.9 Test for amino acid (Ninhydrin test) .....  | 58 |
| 3.3 Gas Chromatography – Mass Spectroscopy.....   | 58 |
| 3.4 <i>In vitro</i> Antioxidant Activities .....  | 59 |
| 3.4.1 2, 2'-azino-bis 3 ethylbenzthiazoline-6-sulfonic radical cation decolourization assay<br>ABTS assay ..... | 59 |
| 3.4.2 Ferric reducing antioxidant power assay (FRAP) .....  | 60 |
| 3.4.3 1, 1-Diphenyl-2 picryl-hydrazyl radical scavenging assay (DPPH).....                                      | 60 |
| 3.5 Animals .....   | 61 |
| 3.6 Acute Toxicity Studies .....  | 61 |
| 3.6.1 Determination of LD <sub>50</sub> .....   | 61 |
| 3.6.2 Experimental protocol .....   | 62 |
| 3.7 Sample collection and homogenate preparation for biochemical parameters.....                                | 66 |



|  |    |
|--|----|
| 3.8 Liver Function Test .....  | 66 |
| 3.8.1 Estimation of Serum total protein.....   | 68 |
| 3.8.2 Estimation of Serum Albumin (ALB) .....  | 68 |
| 3.8.3 Estimation of Serum Alkaline phosphatase (ALP).....  | 71 |
| 3.8.4 Determination of alanine transferase activity (ALT) .....  | 72 |
| 3.8.5 Determination of aspartate transferase (AST) activity .....  | 73 |
| 3.5.6 Determination of lactate dehydrogenase activity .....  | 75 |
| 3.9 Renal function Test .....  | 75 |
| 3.9. 1 Determination of serum urea concentration .....   | 75 |
| 3.9.2 Estimation of Serum Creatinine concentration.....  | 78 |
| 3.10 <i>Invivo</i> Antioxidant Assay .....   | 80 |
| 3.10.1 Estimation of Tissue Superoxide Dismutase (SOD) Activity .....  | 80 |
| 3.10.2 Estimation of tissue Glutathione Peroxidase (GPx) Activity .....  | 83 |
| 3.10. 3 Estimation of tissue Catalase Activity.....  | 85 |
| 3.11 Sperm profile analysis.....   | 89 |
| 3.11.1 Sperm Motility.....   | 89 |
| 3.11.2 Sperm morphology .....  | 89 |
| 3.11.3 Epididymal sperm count. ....  | 89 |
| 3.11.4 Histology .....   | 90 |
| 3.12 Mating Behavior Test.....   | 90 |
| 3.13 Investigating mechanism involved in the erectile effect of ethanol root extract of <i>Sphenocentrum jollyanum</i> on cavernosal tissue isolated from rabbit ..... | 91 |
| 3.13.1 Drugs .....   | 91 |
| 3.13. 2 Animal tissue preparation.....   | 91 |
| 3.13.3 Effects of <i>Sphenocentrum jollyanum</i> root extract on corpus cavernosum muscle pre-contracted with phenylephrine or potassium chloride.....                 | 92 |
| 3.13.4 Effects of <i>Sphenocentrum jollyanum</i> root extract on autonomic receptor activities   | 92 |
| 3.13.5 Effects of <i>Sphenocentrum jollyanum</i> root extract on corpus cavernosum endothelium integrity and nitric oxide synthase production. ....                    | 92 |
| 3.13.6 Effect of <i>Sphenocentrum jollyanum</i> root extract on Calcium (Ca <sup>+</sup> ) channel activities .....  | 93 |
| 3.13.7 Effect of <i>Sphenocentrum jollyanum</i> root extract on Potassium (K <sup>+</sup> ) channel activities.....  | 93 |

|  |     |
|--|-----|
| 3.14 Statistical analysis .....  | 93  |
| 4.0 CHAPTER FOUR.....  | 95  |
| RESULTS .....  | 95  |
| 4.1 Phytochemical Screening of ethanol root extract of <i>Sphenocentrum jollyanum</i> .....  | 95  |
| 4.2 Gas Chromatograph of Ethanol fraction of <i>Sphenocentrum jollyanum</i> root (SJE).....  | 97  |
| 4.3 <i>In vitro</i> antioxidant properties of ethanol root extract of <i>Sphenocentrum jollyanum</i> .....   | 100 |
| 4.4.1 Mean Ferric reducing antioxidant power (FRAP) and cupric reducing antioxidant capacity (CUPRAC) of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE).....                           | 102 |
| 4.4.2 2, 2' - Azinobis-(3-ethylbenzothiazoline 6 Sulfonic acids) (ABTS)/Trolox equivalent antioxidant capacity (TEAC) of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) .              | 104 |
| 4.5 Acute toxicity Study.....  | 106 |
| 4.5.1 Determination of LD <sub>50</sub> of <i>Sphenocentrum jollyanum</i> root extract .....   | 106 |
| 4.5.2 Body weight of rats treated with ethanol crude extract of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) .....   | 108 |
| 4.6 Effects of <i>Sphenocentrum jollyanum</i> (SJE) on Liver and Kidney Functions .....  | 110 |
| 4.6.1 Serum level of creatinine of animals treated at varying concentration of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 28 days .....  | 110 |
| 4.6.2 Serum level of urea of animals treated at varying dose of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) root for 28 days .....  | 112 |
| 4.6.3 Serum level of total protein and albumin of animals treated at graded concentration of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) root for 28 days.....                      | 114 |
| 4.6.4 Serum level of Alanine and Aspartate Amino transferases activities in animals treated at graded concentration of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 28 days..... | 116 |
| 4.6.5 Serum level of Alkaline phosphatase and Lactase dehydrogenase activities in animals treated at varying dose of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 28 days.....   | 118 |
| 4.7 Effects of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) on <i>in vivo</i> antioxidant activities .....   | 120 |
| 4.7.1 Superioxide Dismutase Activity in the testes and epididymis of rats treated with ethanol root extract of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 56 days .....        | 120 |
| 4.7.2 Glutathione Peroxidase Activity of Rats treated with ethanol root fraction of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 56 days.....                                    | 122 |
| 4.7.3 Catalase activity of rats treated with ethanol root fraction of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 56 days .....   | 124 |

|   |     |
|---|-----|
| 4.8 Spermatological profile of animals treated with varying doses of <i>Sphenocentrum jollyanum</i> root for 28 days .....  | 126 |
| 4.8.1 Caudal epididymal spermatozoa count of animals treated at varying dose of <i>Sphenocentrum jollyanum</i> root for 28 days .....   | 126 |
| 4.8.2 Percentage motility, viability and morphology of caudal epididymal spermatozoa of animals treated at graded concentration of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 28 days .....                                 | 128 |
| 4.8.3 Sperm profile of rats treated with ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 56days .....  | 130 |
| 4.9 Cytoarchitecture of rats' testes and epididymes treated with ethanol extract of <i>Sphenocentrum jollyanum</i> root extract.....  | 132 |
| 4.10 Effects of chronic treatment of ethanol root extract of <i>Sphenocentrum jollyanum</i> on pituitary and gonadal hormones .....   | 141 |
| 4.10.1 Follicle Stimulating Hormone values of rats treated with ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 56 days. ....  | 141 |
| 4.10.2 Luteinizing hormone values of rats treated with ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 56 days .....   | 143 |
| 4.10.3 Testosterone hormone values of rats treated with ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 56 days .....  | 145 |
| 4.11 Mating Behavior Test.....  | 147 |
| 4.11.1 Effect of <i>Sphenocentrum jollyanum</i> root extract, linoleic acid and sildenafil citrate on mount and intromission latency.....   | 147 |
| 4.11.2 Effect of <i>Sphenocentrum jollyanum</i> root extract (SJE), linoleic acid (LA) and sildenafil citrate (SC) on mount and intromission frequency.....   | 152 |
| 4.12 Effects of <i>Sphenocentrum jollyanum</i> root extract (SJE) on corpus cavernosum smooth muscle strips of control and paroxetine-induced erectile dysfunction rabbits pre-contracted with phenylephrine.....                                 | 157 |
| 4.12.2 Effect of <i>Sphenocentrum jollyanum</i> root extract(SJE) on corpus cavernosum muscle of control and paroxetine- induced erectile dysfunction rabbit depolarized with potassium chloride (KCl) 10- 60mM- containing Krebs's solution..... | 159 |
| 4.12.3 Comparative Effects of <i>Sphenocentrum jollyanum ethanol</i> root extract (SJE) and acetylcholine on corpus cavernosum smooth muscle.....   | 161 |
| 4.12.4 Comparative effects of <i>Sphenocentrum jollyanum ethanol</i> root extract (SJE) and sodium nitropusside (SNP) on corpus cavernosum smooth muscle.....   | 163 |
| 4.12.5 Relaxation response of control and paroxetine pre-treated corpus cavernosum to <i>Sphenocentrum jollyannum</i> extract (SJE) after cyclo-oxygenase and prostaglandins inhibition by indomethacin. ....                                     | 165 |

|   |                                     |
|---|-------------------------------------|
| 4.12.6 Effects of <i>Sphenocentrum jollyannum</i> extract (SJE) on autonomic receptor activities.<br>.....  | 167                                 |
| 4.12.7 Relaxation response of control and paroxetine pre-treated corpus cavernosum to<br><i>Sphenocentrum jollyannum</i> extract (SJE) after Nitric oxide synthase (NOS) inhibition by N<br>(gamma)-nitro-L arginine methyl ester (L-NAME) .....            | 169                                 |
| 4.12.8 Relaxation response of control and paroxetine pre-treated corpus cavernosum smooth<br>muscle to <i>Sphenocentrum jollyannum</i> root extract (SJE) in the presence of calcium ion<br>agonist-barium Chloride (BaCl <sub>2</sub> ).....               | <b>Error! Bookmark not defined.</b> |
| 4.12.9 Relaxation response of control and paroxetine- induced erectile dysfunction corpus<br>cavernosum smooth muscle to <i>Sphenocentrum jollyannum</i> rootextract(SJE) in the presence of<br>calcium ion influx inhibitors nifedipine and verapamil..... | 173                                 |
| 4.12.10 Relaxation response of control and paroxetine- induced erectile dysfunction corpus<br>cavernosum smooth muscle to <i>Sphenocentrum jollyannum</i> extract in the presence of methyl<br>Blue.....  | 176                                 |
| 4.12.11 Comparative effects of <i>Sphenocentrum jollyannum ethanol</i> root extract (SJE) and<br>sildenafil citrate (SC) on corpus cavernosum smooth muscle.....  | 178                                 |
| 4.12.12 Comparative effects of <i>Sphenocentrum jollyannum ethanol</i> root extract (SJE) and<br>linoleic acid (LA) on corpus cavernosum smooth muscle .....  | 180                                 |
| 4.12.13 Comparative effects of linoleic acid (LA) and sildenafil citrate (SC) on corpus<br>cavernosum smooth muscle.....  | 182                                 |
| CHAPTER FIVE .....  | 184                                 |
| 5.0 DISCUSSION .....  | 184                                 |
| 5.1 Phytochemical scening of <i>Sphenocentrum jollyannum</i> root extract.....  | 184                                 |
| 5.2GC-MS analysis of <i>Sphenocentrum jollyannum</i> root extract.....  | 185                                 |
| 5.3 Qualitative analysis of Antioxidant properties of Ethanol extract of <i>Sphenocentrum<br/>jollyannum</i> root .....   | 187                                 |
| 5.4 Acute toxicity Study: Determination of LD <sub>50</sub> .....   | 187                                 |
| 5.5 Effects of <i>Sphenocentrum jollyannum</i> root ethanol extract on kidney Functions .....   | 188                                 |
| 5.6. Effects of <i>Sphenocentrum jollyannum</i> root ethanol extract on liver functions.....  | 188                                 |
| 5.7 Effect of <i>Sphenocentrum jollyannum</i> root extract on testicular and epididymal antioxidant<br>activities .....   | 190                                 |
| 5.8 Effects of ethanol crude extract of <i>Sphenocentrum jollyannum</i> root on Sperm characteristics<br>.....  | 190                                 |
| 5.9 Effect of chronic treatment of ethanol root extract of <i>Sphenocentrum jollyannum</i> on<br>pituitary and gonadal hormones .....   | 191                                 |
| 5.10 Effect of <i>Sphenocentrum jollyannum</i> root on mating behaviour .....   | 191                                 |

|   |     |
|---|-----|
| 5.11 <i>In Vitro</i> Myorelaxant effects of SJE on corpus cavernosus muscle isolated from rabbits.<br>.....                 | 192 |
| 5.12 Conclusion.....  | 195 |
| 5.13 Contribution to knowledge.....   | 196 |
| 6.0. References.....  | 197 |
| Appendices.....   | 235 |
| Appendix 1 Phytochemical components identified by GC-MS in <i>Sphenocentrum jollyanum</i><br>root (SJE).....                | 235 |
| Appendix II <i>In Vitro</i> tracing of Myorelaxant effects of SJE on corpus cavernosus muscle<br>isolated from rabbits..... | 236 |

## LIST OF TABLES

|   |     |
|---|-----|
| Table 2.1 Neurotransmitters and neuropeptides that influence penile erection in the central nervous system .....  | 21  |
| Table 2.2 Neurotransmitters, neuropeptides and other agents that act on erectile tissues at the local level .....   | 30  |
| Table 2.3 OECD's Classification and Labeling of Acute Toxicity .....  | 52  |
| Table 3.1 Estimation of Serum total protein .....   | 68  |
| Table 3.2 Estimation of Serum Albumin (ALB) .....   | 70  |
| Table 3.3 Determination of alanine transferase activity (ALT).....  | 73  |
| Table 3.4 Determination of aspartate transferase (AST) activity .....   | 74  |
| Table 3.5 Assay Protocol for Lactate Dehydrogenase (LDH).....   | 75  |
| Table 3.6 Protocol for the determination of serum urea concentration .....  | 77  |
| Table 3.7 Protocol for determination of serum creatinine concentration .....  | 78  |
| Table 3.8 a Estimation of Tissue Superoxide dismutase (SOD) Activity.....   | 81  |
| Table 3.8 b Estimation of Tissue Superoxide Dismutase (SOD) Activity .....  | 82  |
| Table 3.9 Estimation of tissue Glutathione peroxidase (GPx) Activity.....   | 84  |
| Table 3.9 b Estimation of tissue Glutathione peroxidase (GPx) Activity.....   | 85  |
| Table 3.10 Estimation of tissue Catalase Activity .....   | 88  |
| Table 4.1 Phytochemical Screening of ethanol root extract of <i>Sphenocentrum jollyanum</i> .....   | 96  |
| Table 4.2 Mean Ferric reducing antioxidant power (FRAP) and cupric reducing antioxidant capacity (CUPRAC) of ethanol extract of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) (mg/mL Trolox equivalent)..... | 103 |
| Table 4.3 Acute oral toxicity result of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE).....   | 107 |
| Table 4.4 Sperm profile of rats treated with ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 56 days .....   | 131 |

## LIST OF FIGURES

|  |     |
|--|-----|
| Figure 2. 1 Anatomy of the Male Reproductive system .....  | 9   |
| Figure 2. 2 Section of the germinal epithelium in the seminiferous tubule .....  | 11  |
| Figure 2. 3 Germ cell development in rat spermatogenesis .....   | 13  |
| Figure 2. 4 Sexual response cycle.....   | 16  |
| Figure 2. 5 Central control of penile erection .....   | 19  |
| Figure 2.6 Autonomic innervation of the male reproductive system.....  | 22  |
| Figure 2. 7 Nitric Oxide and Penile Smooth Muscle Activities .....   | 24  |
| Figure 2. 8 Regulation of smooth muscle contraction .....  | 26  |
| Figure 2. 9 Smooth muscle relaxation .....   | 29  |
| Figure 2. 10 Penile vessels and the smooth muscle of the corpora cavernosa.....  | 32  |
| Figure 2. 11 <i>Sphenocentrum jollyanum</i> .....  | 39  |
| Figure 2. 12 Classification of Phytochemicals .....  | 43  |
| Figure 3.1 Preparation of Strips from rabbit corpus cavernosum.....  | 65  |
| Figure 3. 2 Isometric tension measurement .....  | 65  |
| Figure 3. 3 Determination of serum urea concentration .....  | 66  |
| Figure 3. 4 Picrate - creatinine complex- Jaffe Reaction.....  | 79  |
| Figure 3. 5 Estimation of tissue Catalase Activity.....  | 87  |
| Figure 4.1 Gas chromatography of ethanol extract of <i>Sphenocentrum jollyanum</i> root .....  | 98  |
| Figure 4. 2 12-Octadecadienoic acid, ethyl ester .....   | 99  |
| Figure 4.3 DPPH assay of Ethanol fraction of <i>Sphenocentrum jollyanum</i> compared with Vitamin E. ....  | 101 |
| Figure 4.4 ABTS/ TEAC antioxidant capacity of <i>Sphenocentrum jollyanum</i> root .....  | 105 |
| Figure 4.5 Body weight of rats treated with ethanol crude extract of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE).....   | 109 |
| Figure 4.6 Serum creatinine level of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) treated rats. ....   | 111 |
| Figure 4.7 Serum level of urea of animals treated with varying doses of SJE for 28 days. ....  | 113 |
| Figure 4.8 Serum level of urea of animals treated with varying doses of <i>Sphenocentrum jollyanum</i> root for 28 days. ....  | 115 |
| Figure 4.9 Serum level of Alanine and Aspartate Aminotransferases activities in animals treated with varying doses of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 28 days .....                 | 117 |
| Figure 4.10 Serum level of alkaline phosphatase and Lactase dehydrogenase activities in animals treated with graded concentrations of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 28 days. .... | 119 |

|  |     |
|--|-----|
| Figure 4.11 Superoxide dismutase activity in the testes and epididymis of rats treated with ethanol root extract of SJE for 56 days. ....  | 121 |
| Figure 4.12 Glutathione peroxidase activity of rats treated with ethanol root extract of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 56 days. ....  | 123 |
| Figure 4.13 Catalase activity of rats treated with ethanol root extract of ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 56 days. ....  | 125 |
| Figure 4.14 Caudal epididymal spermatozoa count of animals treated at varying dose of <i>Sphenocentrum jollyanum</i> root for 28 days. ....  | 129 |
| Figure 4.15 Percentage (%) Motility, Viability and Morphology of Caudal epididymal spermatozoa of animals treated with varying dose of <i>Sphenocentrum jollyanum</i> root for 28 days. ....   | 129 |
| Figure 4.16 Follicle Stimulating Hormone values of rats treated with ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 56 days. ....  | 142 |
| Figure 4.17 Leutinizing hormone values of rats treated with ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 56 days. ....   | 144 |
| Figure 4.18 Testosterone hormone values of rats treated with ethanol root extract of <i>Sphenocentrum jollyanum</i> (SJE) for 56 days. ....  | 146 |
| Figure 4.19 Effect of SJE - <i>Sphenocentrum jollyanum</i> root extract, LA -linoleic acid and SC - sildenafil citrate on mount latency as compare with control. ....  | 148 |
| Figure 4.20 Effects of SJE - <i>Sphenocentrum jollyanum</i> root extract, LA -linoleic acid and SC - sildenafil citrate on Intromission latency as compare with control. ....  | 149 |
| Figure 4.21 Effect of SJE - <i>Sphenocentrum jollyanum</i> root extract, LA -linoleic acid and SC - sildenafil citrate treatment on Mount latency of paroxetine-induced erectile dysfunction rabbit ED as compared with control. ....            | 150 |
| Figure 4.22 Effect of SJE - <i>Sphenocentrum jollyanum</i> root extract, LA -linoleic acid and SC - sildenafil citrate treatment on Intromission latency of paroxetine-induced erectile dysfunction rabbit ED as compared with control. ....     | 151 |
| Figure 4.23 Effect of <i>Sphenocentrum jollyanum</i> root extract (SJE), linoleic acid (LA) and sildenafil citrate (SC) on Mount frequency as compare with control. ....   | 153 |
| Figure 4.24 Effect of <i>Sphenocentrum jollyanum</i> root extract (SJE), linoleic acid (LA) and sildenafil citrate (SC) on Intromission frequency as compare with control. ....  | 154 |
| Figure 4.25 Effect of <i>Sphenocentrum jollyanum</i> root extract (SJE), linoleic acid (LA) and sildenafil citrate (SC) treatment on mount frequency of paroxetine-induced erectile dysfunction rabbit (ED) as compared with control. ....       | 155 |
| Figure 4.26 Effect of <i>Sphenocentrum jollyanum</i> root extract (SJE), linoleic acid (LA) and sildenafil citrate (SC) treatment on Intromission frequency of paroxetine-induced erectile dysfunction rabbit (ED) as compare with control. .... | 156 |
| Figure 4.27 Effects of <i>Sphenocentrum jollyanum</i> root extract (SJE) on concentration response curve of corpus carvenosus muscle strips pre-treated with paroxetine (TRT) and control constricted with PE (10-9-10-5M). ....                 | 158 |
| Figure 4.28 Concentration response curve of control and paroxetine pre-treated Corpus carvanosus muscle to contraction with KCl (10 mM - 60 mM). ....  | 160 |



|   |                                     |
|---|-------------------------------------|
| Figure 4.29 Concentration response curve of paroxetine pre-treated (TRT) and control corpus cavernosum muscle pre- contracted with PE ( $10^{-7}$ M) to extract (0.1-3.2mM/mg) and acetylcholine ( $10^{-9}$ - $10^{-4}$ ).   | 162                                 |
| Figure 4.30 Concentration response curve of paroxetine pre-treated corpus cavernosum (TRT) and control corpus cavernosum muscle to sodium nitropusside (SNP) ( $10^{-9}$ - $10^{-4}$ M) or SJE (0.1-3.2mg/ml).  | 164                                 |
| Figure 4.31 Concentration response curve of <i>Sphenocentrum jollyanum</i> root extract (SJE) to paroxetine pre-treated (TRT) and control corpus cavernosum pre-contracted with PE ( $10^{-7}$ M) in the absence of (Extract) and presence of indomethacine ( $10^{-4}$ M). | 166                                 |
| Figure 4.32 Concentration response curve of paroxetine pre-treated and control corpus cavernosum pre-contracted with PE ( $10^{-7}$ M) in the absence of (Extract) and presence of atropine ( $10^{-4}$ M).   | 168                                 |
| Figure 4.33 Concentration response curve of paroxetine pre-treated (TRT) and control corpus cavernosum muscle pre-contracted with PE to Extract only and Extract in the presence of L-NAME.   | 170                                 |
| Figure 4.34 Cumulative response curve of paroxetine pre-treated and non- treated CC pre- contracted with PE ( $10^{-7}$ M) to <i>Sphenocentrum jollyanum</i> root extract (SJE) in the absence of (Extract) and presence of Barium chloride ( $10^{-3}$ M).                 | 172                                 |
| Figure 4.35 Concentration response curve of paroxetine pre-treated and control corpus cavernosum CC pre-contracted with PE ( $10^{-7}$ M) to SJE in the absence of (Extract) and presence of Nifedipine ( $10^{-4}$ M).   | <b>Error! Bookmark not defined.</b> |
| Figure 4.36 Concentration response curve of paroxetine pre-treated and control corpus cavernosum (CC) pre-contracted with PE ( $10^{-7}$ M) to SJE in the absence or presence of verapamil ( $10^{-4}$ M).  | 175                                 |
| Figure 4.37 Cumulative response curve of paroxetine pre-treated and control corpus cavernosum (CC) pre-contracted with PE ( $10^{-7}$ M) to SJE in the absence or presence of methyl blue ( $2 \times 10^{-3}$ M).  | 177                                 |
| Figure 4.38 Cumulative response curve of paroxetine pre-treated and control corpus cavernosum muscle to extract and sildenafil citrate.   | 179                                 |
| Figure 4.39 Cumulative response curve of paroxetine pre-treated and non-treated Corpus cavernosum muscle to extract and linoleic acid.  | 181                                 |
| Figure 4.40 Cumulative response curve of paroxetine pre-treated and non-treated Corpus cavernosum muscle to sildenafil citrate and linoleic acid.   | 183                                 |

## LIST OF PLATES

|  |     |
|--|-----|
| Plate 4.1 Photomicrograph of the testis of control rats (H & E).....   | 133 |
| Plate 4.2 Photomicrograph of the testis of rats treated with 300 mg/kg of <i>Sphenocentrum jollyanum</i> root extract .....            | 134 |
| Plate 4.3 Photomicrograph of the testis of rats treated with 600 mg/kg of <i>Sphenocentrum jollyanum</i> root extract .....            | 135 |
| Plate 4.4 Photomicrograph of the testis of rats treated with 1000 mg/kg of <i>Sphenocentrum jollyanum</i> root extract .....           | 136 |
| Plate 4.5 Photomicrographs of epididymal sections of control rats.....   | 137 |
| Plate 4.6 Photomicrographs of epididymal sections of rats treated with 300 mg/kg of <i>Sphenocentrum jollyanum</i> root extract .....  | 138 |
| Plate 4.7 Photomicrographs of epididymal sections of rats treated with 600 mg/kg of <i>Sphenocentrum jollyanum</i> root extract .....  | 139 |
| Plate 4.8 Photomicrographs of epididymal sections of rats treated with 1000 mg/kg of <i>Sphenocentrum jollyanum</i> root extract ..... | 140 |

## ABBREVIATIONS

AAPH - 2,2'-azobis (2 amidinopropane) hydrochloride

ABP - androgen-binding protein

ABTS - 2,2' - Azinobis-(3-ethylbenzothiazoline 6 Sulfonic acids)

ACH - acetylcholine

ALB - Albumin

ALP- alkaline phosphatase

ALT - Alanine aminotransferase

ANOVA- analysis of variance

APVH - periventricular hypothalamic area

ArO\* - aryloxy radical

ARs - androgen receptors

AST - aspartate aminotransferase

BTB- blood testis barrier

Ca<sup>2+</sup> – intracellular calcium ion

CC - corpus cavernosum

cGMP - cyclic guanosine monophosphate

cGMP - cyclic guanosine monophosphate

CUPRAC - cupric reducing antioxidant capacity

DALY - disability adjusted life year

DHT - dihydrotestosterone

DNA- deoxyribonucleic acid

ED- erectile dysfunction

EDRF - endothelium releasing factors

EDTA- ethylenediaminetetraacetic acid

ET-1. endothelin-1

FCR - Folin\_Ciocalteu Reagent

FRAP - Ferric reducing antioxidant power

FSH- Follicle-Stimulating Hormone

GABA-gama –aminobutyric acid

GC - guanylate cyclase

GC-MS - Gas chromatography-mass spectrometry analysis

GMP - guanosine monophosphate

GnRH - gonadotropin-releasing hormone

GPx -Glutathione peroxidase

GSH - glutathione

GTP - guanosine triphosphate

H<sub>2</sub>O<sub>2</sub> - hydrogen peroxide

I.N.T. - 2-(4-iodophenyl)-3-(4-nitrophenol)-5-phenyltetrazolium chloride

iNOS - inducible Nitric oxide synthase

IP3 - inositol trisphosphate

LD<sub>50</sub> - Median lethal dose

LH - Luteinising Hormone

L-NAME- N (gamma)-Nitro-L-arginine methyl ester

MPOA - medial preoptic area

NANC- Nonadrenergic, Noncholinergic

NIST-National Institute of Standards and Technology

NO –Nitric oxide

NOS - Nitric oxide synthase

OECD - Organization of Economic Cooperation and Development

ORAC - oxygen radical absorbance capacity

OS - Oxidative stress

PE - phenylephrine

PVN - paraventricular nucleus

RNS - Reactive Nitrogen Species,

ROS - Reactive Oxygen Species

SEM- standard error of mean

SGAD- second-generation antidepressants

SJ - *Sphenocentrum jollyanum*

SJE - *Sphenocentrum jollyanum* root extract

SNP - sodium nitroprusside

SOD -Superoxide dismutase

SpC - spinal cord

SSRIs- Selective serotonin reuptake inhibitors

STZ –Streptozotocin

T - testosterone

TAC -total antioxidant capacity

TCA- tricyclic antidepressant

TCM-traditional and complementary medicine

TEAC- Trolox equivalent antioxidant capacity

WHO -World Health Organisation

$\alpha$ -MSH -  $\alpha$  melanocyte stimulating hormone

