



Effect of Sub-chronic Administration of Mascum Herbal Pride on Sperm Quality of Male Albino Rats

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Authors' contributions

This work was carried out in collaboration between all authors. Author PCO conceived and designed the study, wrote the protocol and also wrote the first draft of the manuscript. Author CFO managed the literature searches and data entry. Author EO supervised experimental, laboratory works and data analyses. Author PCU co-supervised laboratory works and data analyses. All authors read and approved the final manuscript.

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ABSTRACT

The effect of Mascum Herbal Pride - a registered popular polyherbal medication composed of *Hepocreatea pollen* 20%, *Xylopiya aethiopic*a 20%, *Medicago sativa* 20%, *Tetrapieura tetrapetra* 20%, *Urtica dioica* 20% with indications to promote masculine hormone and male reproductive organ - on the sperm quality of male albino rats was studied. This was an investigation of the claim that the drug improves the male reproductive organ. Aqueous solution of the herbal product was given by oral gavage to three dose groups of five male rats each, namely 1250, 2500, 3750 mg/kg/body weight (b.w) for 90 days and were fed *ad libitum* with rat chow, the control group received only deionised water. Afterwards, the rats were bled-sacrificed. Epididymal sperm was collected and analyzed using standard procedures. Sperm analyses involved sperm count, sperm morphology test and sperm motility test. At the doses administered, Mascum Herbal Pride affected the sperm number, morphology and motility of treated animals. Epididymal sperm count and motility were

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significantly increased ($P < 0.05$). Compared to the control mean sperm count of 172.5×10^6 , groups II, III and IV rats had mean sperm counts of 209×10^6 , 258×10^6 and 293×10^6 respectively. Sperm motility scores were 70.0%, 78%, 83.5% and 95% for group I (control), groups II, III and IV respectively. Sperm morphology of the treated animals was not obviously affected when compared with the control. The present investigation showed that Mascum Herbal Pride modified the sperm characteristics in male albino rats by increasing the sperm count and motility. This proves that the claim that Mascum Herbal Pride improves sexual potency in man may be true. Further research in this regard is recommended.

Keywords: Mascum herbal pride; sub-chronic; sperm quality; acute toxicity.

1. INTRODUCTION

Herbal preparations/medicaments have been used since ancient times in many parts of the world including Nigeria [1]. Due to poverty and limited access to modern medicine, about 80% of the world's population, especially in the developing countries uses herbal medicine as their source of primary healthcare [2]. Less than 10% of herbal products in the world market are truly standardized to known active components and strict quality control measures are not always diligently adhered to [3]. For majority of these products in use, very little is known about their active and/or toxic constituents. Safety is a fundamental principle in the provision of herbal medicines and herbal products for health care, and a critical component of quality control [4]. Herbal medications are claimed and widely believed to be beneficial; however, some reports indicated that the use of herbal medicines may result in acute and chronic intoxications resulting from their use [5]. Cases of reproductive failure after prolonged intake of herbal preparations have been anecdotally reported in Nigeria. Since these registered herbal remedies are widely used in Nigeria because of their acclaimed pharmacological properties, it is feared that high doses and chronic intake may be implicated in some undocumented cases of reproductive failure in men [5]. The efficacy and safety of a popular herbal product (Mascum Herbal Pride) in the South East Nigeria was studied in male albino rats.

2. MATERIALS AND METHODS

Mascum Herbal Pride was sourced from Nnewi outlet of Libracin Natural Health Care Research Ind. Ltd, maker of the herbal product. Acute toxicity study was done using to Lorke [6] method for LD_{50} determination. Twenty sexually matured male albino rats were allocated to four dose groups A, B, C, D of 5 rats/group. Group A (Control) did not receive herbal extract but had

access to deionized water, the remaining groups received 1250 mg/kg, 2500 mg/kg, 3750 mg/kg respectively of aqueous extract of Mascum Herbal Pride by oral gavage for 90 days. At the end of this period, the rats were anesthetized and dissected. Semen from the epididymis was expelled and diluted with physiological saline. This suspension was placed on microscopic glass slides for further analyses. Sperm analyses involved sperm count, sperm morphology test and sperm motility tests. The Neubers' haemocytometer was used for the sperm count [7]; sperm motility test was done using a wet mount [7] while the sperm morphology test was done by staining air-dried and fixed smears with haematoxylin/eosin stain [7].

The results were expressed where appropriate as mean \pm standard error of mean. Statistical analysis was performed using GraphPad Prism version 5.00 for Windows, GraphPad Software, San Diego California USA, www.graphpad.com. Tests performed include One-way ANOVA with Dunnett's post test, Two-way ANOVA. Statistical significance was considered at $P < 0.05$.

3. RESULTS

Acute toxicity study done showed the LD_{50} to be > 5000 mg/kg body weight. Other results were obtained by viewing slides under a compound microscope at high magnifications. Photomicrographs were obtained using a microscopic digital camera. Fig. 1 and Table 1 show the analysis results and test of significance for sperm count while Fig. 2 and Table 2 show that for sperm motility. Sperm count and sperm motility results were significantly ($P < 0.05$) increased and dose-dependent compared with the control. Sperm morphologies were not obviously affected across the treatment groups. Plate 1 shows a normal rat sperm morphology, while Plates 2-4 show some of the sperm morphologies as a result of the administered herbal medication.

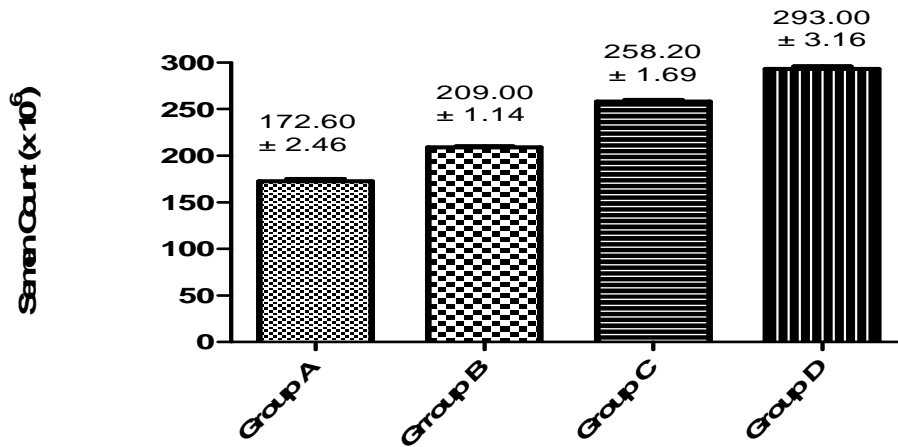


Fig. 1. Semen count

Table 1. Test of significance for the semen count

Dunnett's multiple comparison test	Mean Diff.	Significant? P < 0.05?	Summary	95% CI of diff
Group A vs Group B	-36.4	Yes	< 0.0001	-44.64 to -28.16
Group A vs Group C	-85.6	Yes	< 0.0001	-93.84 to -77.36
Group A vs Group D	-120.4	Yes	< 0.0001	-128.6 to -112.2

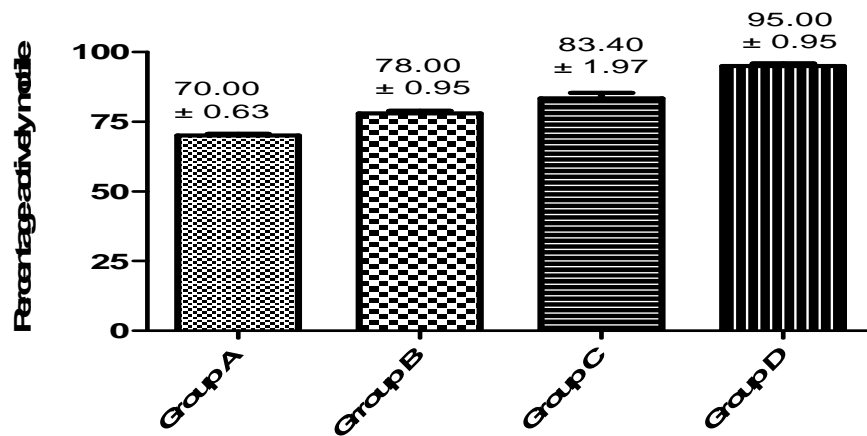


Fig. 2. Percentage active motility

Table 2. Test of significance for the sperm motility

Dunnett's multiple comparison test	Mean Diff.	Significant? P < 0.05?	Summary	95% CI of diff
Group A vs Group B	-8	Yes	< 0.0001	-12.51 to -3.487
Group A vs Group C	-13.4	Yes	< 0.0001	-17.91 to -8.887
Group A vs Group D	-25	Yes	< 0.0001	-29.51 to -20.49



Plate 1. Photomicrograph of H & E Stained control rat semen showing normal sperm morphology (Mag. x 100)



Plate 4. Photomicrograph of H & E Stained 3750 mg/kg dose rat semen showing normal sperm morphology (Mag. x 100)



Plate 2. Photomicrograph of H & E Stained 1250 mg/kg dose rat semen showing normal sperm morphology (Mag. x 100)



Plate 3. Photomicrograph of H & E Stained 2500 mg/kg dose rat semen showing normal sperm morphology (Mag. x 100)

4. DISCUSSION AND CONCLUSION

Male reproductive toxicology has recently become a rapidly extending area of research and testing. Acute toxicity study conducted showed that the median lethal dose (LD_{50}) of Mascum Herbal Pride (MHP) was > 5000 mg/kg which implies that MHP is relatively non-toxic according to Lorke's [6] postulates.

Sperm tests provide a direct measure of the quality of sperm produced in chemically treated animals [8]. A major strength in conducting sperm evaluations in test animals is that similar data can be obtained from humans, enhancing the ability to confirm effects seen in test species and vice versa [9]. In this present study, exposure of rats to MHP resulted in a significant dose dependent increase ($p < 0.05$) in epididymal sperm count and mortality when compared with the control group but sperm morphology was not obviously affected. These findings were similar to that of a study by Woode et al. [10] on the effect of ethanolic fruit extract of *Xylopiya aethiopica* on reproductive function of male rats. MHP ingestion did not impair spermatogenesis within the investigation period.

Based on the results of the study, it can be concluded that MHP acted as a fertility enhancing drug. Further studies are recommended to investigate the various phytoconstituents found in the herbal drug and also carry out a histopathological and hormonal assessment of the effect the drug on the male reproductive organ. Likewise, a placebo controlled clinical trial to test the hypothesis that the effect on semen parameters seen in albino

rats can be observed in men who are on MHP is recommended.

CONSENT

It is not applicable.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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