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Pharmaceutical evidence of *Piper guineense* on reproductive toxicity

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ABSTRACT

Objectives: Nutritional value and health benefits of *Piper guineense* (a spice known as Uziza in Igbo language of Nigeria) cannot be overemphasized. Its therapeutic inputs on reproductive toxicity were elucidated. **Study approach:** Literature survey was carried out in various electronic search databases such as Google scholar, Crossref and pubmed. The survey done February 2022 – March 2022 considered literatures that reported the impact of *Piper guineense* on reproductive system as well as reproductive toxicity. The search keys include; “*Piper guineense* and reproductive health” “*Piper guineense* and reproductive toxicity” “*Piper guineense* on non-heavy metals induced reproductive toxicity” “*Piper guineense* on heavy metals induced reproductive toxicity” “*Piper guineense* on lead, cadmium, and arsenic induced reproductive toxicity”. The search keywords were used respectively and collectively. **Findings:** Eight (8) reports were found most appropriate for the pharmaceutical evidence of *Piper guineense* on reproduction; which suggests its essential therapeutic input on reproductive toxicity. **Conclusively,** *Piper guineense* is a potential vital ingredient for pharmaceuticals, used to ameliorate reproductive toxicity.

Keywords: Heavy metals, Lead, Pharmaceuticals, *Piper guineense*, Reproduction, Reproductive toxicity.

INTRODUCTION

The vitality of the reproductive system is continuity of life and avoidance of extinction of species [1]. In humans and animals, it involves the fusion of male and female gametes to form zygote (a process known as sexual reproduction) [2]. Nodus associated with reproduction involves disruption of either the male, female reproductive system or both [3, 4].

Several factors have been reported to affect reproductive system adversely leading to reproductive toxicity and impairment [5]. Heavy metals such as lead, cadmium, arsenic, mercury have been reported to induce cellular toxicity, nephrotoxicity, hepatotoxicity, and reproductive toxicity [6-9]. Reproductive toxicity have also been reported in non-heavy metals toxicants like boron, acrylamide, calcium carbide, drugs side effects [10-13]. They form basis of infertility which results from hormonal imbalance, decrease in semen quality and viability as well as altered estrous cycle. Some plants have been reported to have therapeutic inputs on reproductive toxicity and impairments [14-16].

Pharmaceuticals are developed from medicinal and nutritional plant to address pathophysiologic conditions associated with reproductive toxicity [17, 18]. In this study, the health benefit and therapeutic input of *Piper guineense* on reproductive system and its toxicity was considered. This is based on the medicinal and nutritional value reported on *Piper guineense* [19, 20]. The explored medicinal and nutritional value of *Piper guineense* with respect to reproductive system and its toxicity forms basis for its inclusion as a potential ingredient for pharmaceuticals used to ameliorate certain reproductive toxicity and impairment.

METHODOLOGY

Literature survey was carried out for period of one month (February 2022 – March 2022) on different research search data base such as Google scholar, Crossref metadata, PubMed; The search keys used to explore the impact of the plant on reproductive system and its toxicity includes; “*Piper guineense* and reproductive health” “*Piper guineense* and reproductive toxicity” “*Piper guineense* on non-heavy metals induced reproductive toxicity” “*Piper guineense* on heavy metals induced reproductive toxicity” “*Piper guineense* on lead, cadmium, and arsenic induced reproductive toxicity”. The results obtained are summarized (Table 1).

FINDINGS

Eight (8) reports were found most appropriate for the pharmaceutical evidence of *Piper guineense* on reproduction; suggesting its essential therapeutic input on reproductive toxicity induced by certain heavy metals and non-heavy metals (Table 1).

Table 1: Pharmaceutical evidence of *Piper guineense* on reproductive toxicity

S No.	Pharmaceutical impacts of <i>Piper guineense</i>	Research evidence
1.	<i>Piper guineense</i> enhances male fertility parameters such as testicular hormones, sperm count, spermatocyte count, spermatids count, and sperm morphology via stimulation of testes, epididymis and seminal vesicles.	[21-23]
2.	<i>Piper guineense</i> is reported to be a natural sexual enhancer (aphrodisiac) as it significantly increased some libido parameters.	[24]
3.	<i>Piper guineense</i> improves female reproductive performance, as well as enhancing certain reproductive hormones.	[25, 26]
4.	<i>Piper guineense</i> enhances antioxidants in aluminium chloride induced reproductive toxicity.	[27]
5.	<i>Piper guineense</i> ameliorate testicular oxidative stress damage induced by lead toxicity.	[28]

DISCUSSION

Piper guineense (Ashanti pepper) a native to the tropics of Western and Central Africa commonly cultivated in Southern Nigeria is a spice plant which comes from the Piperaceae family and the piper genus. It is called different local names like ‘Uziza’ in Igbo, ‘Iyere’ in Yoruba, ‘Ebe-ahinhi akpoke’ in Edo and ‘Etinkene’ in Efik [29]. It is used as vegetables in most Nigerian soups and the fruits used as flavor in most dishes.

Piper guineense has been reported to have positive impacts on liver [30], kidney [31], female reproductive system [25], diabetes [32], ulcer [33] male libido enhancement and male reproductive parameters [21-24]. Its therapeutic impact on body toxicity such as nephrotoxicity, hepatotoxicity, neurotoxicity and reproductive toxicity has been reported [34, 35]. Studies have also shown it has antioxidants, anticancer, antimicrobial, analgesic properties which made up its medicinal impact [19, 27, 28].

In this study we provided pharmaceutical evidence of *Piper guineense* on reproductive systems, its impairment and toxicity (Table 1). Reproductive toxicity induces alterations in sexual behavior and performance [36]. It also involves impairment of reproductive system leading to infertility, and/or loss of the fetus during pregnancy as well as parturition complications [37, 38]. Reproductive toxicity could be induced by toxins such as heavy metal (cadmium, lead, arsenic, mercury), non-heavy metals (calcium carbide, acrylamide, T-2

toxins). Exposure to these toxins could be occupational, dietary, food processing, use of technology [39-41].

This study surveyed that *Piper guineense* enhances male fertility parameters such as testicular hormones, sperm count, spermatocyte count, spermatids count, and sperm morphology via stimulation of testes, epididymis and seminal vesicles. This suggests that it can potentially reverse the impact of toxins on these parameters. This study also stated pharmaceutical evidence of *Piper guineense* on libido; suggesting it can potentially avert the impact of certain toxin on libido and it is a potential component for aphrodisiac. Studies from the survey also suggest positive impact on females via its improvement on female reproductive performance, as well as enhancing certain reproductive hormones.

Direct therapeutic evidence of *Piper guineense* on reproductive toxicity was demonstrated in aluminium chloride and lead induced reproductive toxicity (Table 1), where it induced antioxidant effect on the oxidative stress induced by this toxicant.

CONCLUSION

Pharmaceutical evidence of *Piper guineense* on reproductive system suggests it is a potential active ingredient to be included in pharmaceuticals used to combat reproductive impairment and toxicity.

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Conflict of Interest

None declared.

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