EJPMR, 2026, 13(9), 252-263 **Research Article** **Impact Factor: 8.158**

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

ISSN (O): 2394-3211
ISSN (P): 3051-2573
Coden USA: EJPMAG

PREBIOTIC PROPERTIES OF SOME TRADITIONAL APHRODISIAC PLANTS: IMPLICATIONS FOR THE ESTROBOLOME, TESTOBOLOME, AND SEXUAL HEALTH IN WEST AFRICA

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Department of Science Laboratory Technology, Open and Distance Learning Center, Ladoke Akintola University of Technology, Nigeria. **DOI:** https://doi.org/10.5281/zenodo.22267062

How to cite this Article: Omotoso O.G.[1], Oloyede K. M.[1]*, Sangodare A. O.[1], Gbotoso S. A., Okhuoya T. G.[2], Ogunsona S. B.[2]. (2026). Prebiotic Properties Of Some Traditional Aphrodisiac Plants: Implications For The Estrobolome, Testobolome, And Sexual Health In West Africa. European Journal of Pharmaceuticaland Medical Research, 13(9), 252–263.

Article Received on 05/08/2026 **Article Revised on 25/08/2026** **Article Published on 03/09/2026**

ABSTRACT

The voluntary consumption of traditional aphrodisiacs is a deeply rooted socio-cultural and therapeutic phenomenon across West Africa. Historical ethnobotanical and pharmacological frameworks have generally attributed their effects to localized vascular, neuroendocrine, or nitric oxide pathways. Emerging multi-omic evidence suggests that these effects may also involve a less-studied systemic axis mediated by the gastrointestinal microbiome. This review synthesizes the current, largely preclinical evidence on bidirectional interactions between West African botanical and dietary aphrodisiacs such as *Cyperus esculentus* (Tiger nut), *Carpolobia lutea*, *Microdesmis keayana*, and *Mondia whitei* and the colonic microbial ecology. We outline how the structural polysaccharides, polyphenols, and alkaloids within these matrices may function as selective prebiotic substrates, capable of supporting beneficial taxa including *Bifidobacterium*, *Lactobacillus*, and short-chain fatty acid (SCFA)-producing *Faecalibacterium prausnitzii*. We also examine the proposed mechanistic roles of the estrobolome and testobolome microbial gene ensembles encoding β-glucuronidases and hydroxysteroid dehydrogenases which have been hypothesized to influence host systemic sex steroid bioavailability via deconjugation and reductive metabolic pathways. Finally, we situate these interactions within the gut metagenomic profiles reported for West African populations, discussing potential, as-yet-unconfirmed implications for erectile function, libido, spermatogenesis, and endocrine balance, and outline a roadmap for the clinical research needed to test these hypotheses directly.

KEYWORDS: Aphrodisiac, ethnobotanical, gut microbiota, prebiotic, estrobolome, testobolome.

INTRODUCTION

All around the world, the virility and sexual stamina of men are becoming a status symbol, people, especially women folks, worship men with great sexual prowess, and this has led to heavy intake of aphrodisiacs over the years. Aphrodisiac are any substance derived from animals, plants or even synthetic chemicals that stimulate, or enhance libido, sexual virility and pleasure (Adamu *et al*., 2022; Al-Madhagi and Tarabishi, 2024). The intake of aphrodisiac in this dispensation is now becoming a concern as people indiscriminately consume this substance outside prescription or medical supervision, in fact, according to (7) approximately 4% college students indulge in the consumption of all forms of aphrodisiac just for mere recreational puroposes. According to Adamu *et al*. (2022) and Hafez *et al*. (2024) aphrodisiac usage among adult males are approximately 22, 40 and 39% in Argentina, Saudi Arabia and Malaysia respectively. In Africa expecially in West African countries, the intake of aphrodisiac is extremely high (Manortey *et al*., 2018; Yidana *et al*., 2019), it was reported by Yidana *et al*. (2019) and Nna *et al*. (2016) that the consumption and prevalence of aphrodisiac is approximately 67 and 99% in Ghana and Nigeria respectively (Nna *et al*., 2016; Yidana *et al*., 2019; Amoah *et al*., 2022). Historically, aphrodisiac substances have been integrated into daily life to treat reproductive disorders, address erectile difficulties, and support vitality or libido (Lee *et al*., 2017). Ethnobotanical and pharmacological accounts have

traditionally explained the effects of these plants through direct biochemical mechanisms, such as inhibition of phosphodiesterase-5 (PDE-5), upregulation of endothelial nitric oxide synthase (eNOS), or stimulation of the hypothalamic-pituitary-gonadal (HPG) axis. These direct-action models remain useful but incomplete: they often do not account for the highly variable bioavailability and systemic kinetics of complex plant matrices once ingested. Microbiome science offers a complementary lens, showing that the mammalian gastrointestinal tract functions as a dynamic bioreactor in which secondary plant metabolites can undergo extensive structural transformation before systemic absorption (Shen, 2026). At the same time, the composition and metabolic output of the gut microbiota is shaped by these dietary inputs.

This review explores a candidate systemic pathway: a possible gut microbiota–endocrine–sexual health axis. Under this framework, voluntary aphrodisiac consumption is treated as a dietary intervention that may modulate colonic microbial ecology, with potential downstream effects on host hormonal status via two proposed microbial endocrine networks the estrobolome, implicated in estrogen regulation (Ervin *et al*., 2019), and the testobolome, a newly proposed concept relating to testosterone metabolism (Veerus *et al*., 2026). It was emphasized that this framework is, at present, a hypothesis built largely from indirect and preclinical evidence rather than an established mechanism. Characterizing it is nonetheless relevant to West Africa, where distinct dietary habits, environmental conditions, and traditional food-processing techniques are associated with distinctive baseline gut metagenomic profiles (Stanley, 2025). By drawing together West African ethnopharmacology with multi-omics gastroenterology, this paper aims to clarify what is known, what is plausible, and what remains to be tested regarding the prebiotic, metabolic, and endocrine pathways that may link these traditional practices to human sexual health. West Africa hosts a diverse range of flora traditionally used for reproductive support. These agents can be broadly classified into two categories: dietary food matrices consumed in high volumes as whole foods or beverages, and concentrated botanicals administered via roots, barks, or chewing sticks.

Ethnobotanical Matrices, Prebiotic Mechanisms and Gut Microbiota Modulation

Cyperus esculentus (Tiger Nut), cultivated extensively across Nigeria, Ghana, and Togo, is a widely consumed edible tuber with a long-standing traditional reputation as an aphrodisiac. It is eaten fresh or processed into milks and beverages such as *Kunu aya* in Nigeria and *Brukina* in Ghana (Yeboah *et al*., 2023). Nutritionally, *Cyperus esculentus* contains approximately 50% digestible carbohydrates, 20–30% lipids (predominantly oleic acid), 9% dietary fiber, and notable amounts of vitamin E, zinc, and arginine. Traditional fermented preparations such as *Brukina* combine *Cyperus esculentus* with fermented millet (*Pennisetum glaucum*). This pairing of the tuber's structural polysaccharides with active lactic acid bacteria (LAB) such as *Lactobacillus fermentum* and *Pediococcus pentosaceus* makes the resulting beverage a plausible candidate synbiotic within the traditional diet, though it has not been formally characterized as such in clinical studies (Stanley, 2025; Yang, 2026). Some medicinal plants such as *Carpolobia lutea* and *Carpolobia alba* (commonly known as Cattle Stick) are widely used across coastal West Africa, particularly among the Yoruba, Igbo, and Ibibio populations of Nigeria. The stems and roots of these Polygalaceae shrubs are traditionally chewed or prepared as aqueous infusions believed to support libido and erectile function (Nwidu *et al*., 2015). Phytochemical analysis indicates an abundance of polyphenols, triterpenoid saponins, and anthraquinones. *Microdesmis keayana* and *Microdesmis puberula* (Pandaceae) are similarly used in traditional medicine from Sierra Leone to Nigeria, primarily for erectile difficulties and male-factor infertility (Okeke *et al*., 2023). Their roots and leaves contain polyamine alkaloids, including spermine and spermidine derivatives, along with quinolone-type compounds. The aromatic roots of *Mondia whitei* (White's Ginger) are widely chewed or brewed across West Africa in the belief that they restore libido, support erectile firmness, and manage premature ejaculation (Katuromunda *et al*., 2024; Olimi *et al*., 2026). The primary constituents identified via high-performance liquid chromatography include coumarins, sterols, monoterpenes, and volatile aromatic compounds such as 2-hydroxy-4-methoxybenzaldehyde (Chokwe *et al*., 2021). To understand how aphrodisiac intake might influence systemic biology, it is useful to first consider the colonic fermentation of their non-digestible fractions. The physical and chemical components of these traditional matrices appear capable of acting as prebiotic substrates, bypassing upper gastrointestinal degradation to reach the distal gut, where they could serve as fermentable fuel for specific microbial populations (Mansour *et al*., 2021).

The dietary fiber profile of *Cyperus esculentus* and related grains is characterized by resistant starch (Type 3), non-starch structural polysaccharides (cellulose and hemicellulose), and inulin-type fructans (Yeboah *et al*., 2023). In vitro and animal fermentation studies suggest that, when these complexes reach the cecum and colon, they can stimulate specific metabolic pathways. Saccharolytic breakdown is thought to be initiated by genera such as *Bifidobacterium* (e.g., *B. longum*, *B. adolescentis*) and *Lactobacillus*, which deploy glycoside hydrolases (GHs) to break down these linkages (Shen, 2026). The monosaccharides and oligosaccharides released by these taxa may then support cross-feeding to butyrate-producing anaerobes such as *Faecalibacterium prausnitzii*, *Roseburia hominis*, and *Eubacterium rectale* (Bautista, 2026). Beyond structural fibers, the secondary metabolites concentrated in *Carpolobia lutea* (Nwidu *et al*., 2015) and *Microdesmis keayana* are likely to undergo extensive processing by gut microbes, since

complex polyphenolic polymers and saponins generally have low bioavailability in their native form. Colonic taxa possessing esterases, β-glucosidases, and sulfatases can remove sugar moieties and cleave ring structures, converting larger molecules into smaller, more bioavailable phenolic acids and aglycones (Shen, 2026). These microbially generated metabolites are absorbed via the portal vein and, based on evidence from other dietary polyphenol systems, may exert antioxidant, anti-inflammatory, and vasodilatory effects relevant to vascular tissue though direct evidence in reproductive vasculature specifically is currently lacking (Nwidu *et al*., 2015; Shen, 2026). The principal end-products of this colonic fermentation are short-chain fatty acids, predominantly acetate, propionate, and butyrate, which act as signaling molecules with broad effects on host physiology.

$$\text{Saccharolytic Fermentation of Aphrodisiac Substrates} \rightarrow \uparrow \text{Acetate} + \uparrow \text{Propionate} + \uparrow \text{Butyrate}$$

Butyrate is a primary energy substrate for colonocytes and is associated with strengthened tight-junction integrity (e.g., claudin-1 and occludin), which may limit translocation of pro-inflammatory lipopolysaccharides (LPS) into systemic circulation (Bautista, 2026). This could plausibly reduce systemic endotoxemia and low-grade vascular inflammation, including within the pelvic vasculature, although this specific link has not been directly tested. Absorbed SCFAs also bind G-protein coupled receptors (GPR41 and GPR43) on enteroendocrine and endothelial cells, with evidence from other physiological contexts suggesting roles in peripheral insulin sensitivity and mitochondrial function (Kurhaluka, 2025); whether this extends meaningfully to Leydig and Sertoli cell populations in vivo remains to be established. One candidate link between gut microbiota modulation and sexual health is enzymatic regulation of circulating steroid hormones, via two recently described microbial gene networks: the estrobolome and the testobolome (Veerus *et al*., 2026).

The Estrobolome Deconjugation and Estrogen Recirculation

The estrobolome refers to the collective set of enteric bacterial genes capable of metabolizing the host's circulating estrogen pool (Ervin *et al*., 2019). In normal hepatic clearance, estrogens (β-estradiol and estrone) undergo Phase II conjugation via glucuronidation or sulfation, making them water-soluble for biliary excretion into the gut lumen. Certain bacterial taxa including members of *Ruminococcaceae*, *Lachnospiraceae*, and specific *Bifidobacterium* and *Escherichia* species express β-glucuronidase (GUS) enzymes capable of reversing this process (Bautista, 2026).

$$\text{Estrogen} - \text{Glucuronide (Inactive)} \rightarrow \text{Bacterial } \beta - \text{glucuronidase} \rightarrow \text{Free Estrogen (Active)} + \text{Glucuronic Acid}$$

Once deconjugated, free estrogen can be reabsorbed across the colonic epithelium into the portal circulation via enterohepatic recirculation (Ervin *et al*., 2019). It is hypothesized though not yet directly demonstrated for the aphrodisiacs discussed here that voluntary intake of prebiotic-rich foods could shift the abundance of GUS-encoding taxa enough to meaningfully affect circulating estrogen levels, with potential relevance to vaginal mucosal health, erectile tissue compliance, and libido in both sexes. This remains a plausible but unconfirmed extension of estrobolome research conducted primarily in other contexts, such as cancer and metabolic disease.

Microbial Testosterone Metabolism

The testobolome is a newly proposed, analogous concept describing bacterial consortia and genetic systems involved in the catabolism, interconversion, and bioavailability of androgens (Veerus *et al*., 2026). Testosterone and its potent metabolite, dihydrotestosterone (DHT), are similarly cleared via hepatic glucuronidation and excreted into the intestine. Researchers have proposed that testobolome-active bacteria may use hydroxysteroid dehydrogenases (HSDs) such as 3α-HSD, 17β-HSD, and 7α-HSD to transform steroid structures within the colonic lumen (Veerus *et al*., 2026). Some gut microbes may be capable of synthesizing free androgens from luminal cholesterol precursors or deconjugating excreted androgen-glucuronides, potentially restoring some active testosterone to systemic circulation. Because testosterone is involved in nitric oxide synthesis, spermatogenesis, and erectile function, dietary modulation of the testobolome is a biologically plausible, though still largely speculative, pathway through which nutrition could intersect with male sexual health. As the testobolome concept itself was proposed only recently, direct evidence linking it to specific dietary aphrodisiacs does not yet exist (Fraile-Martínez, 2026; Veerus *et al*., 2026).

West African Metagenomic Specifics and Sexual Health Outcomes

Any effect of these aphrodisiac matrices would likely depend on the baseline gut metagenomic architecture of the host population. Due to distinct dietary patterns, West African populations have been reported to show gut microbial profiles that differ from cohorts consuming industrialized Western diets. Metagenomic sequencing

studies have reported that populations across rural and semi-urban West Africa tend to show a higher abundance of *Prevotella* relative to *Bacteroides*, alongside greater representation of the *Firmicutes* phylum, including *Succinivibrio* and *Ruminococcus* species (Stanley, 2025). This pattern is generally attributed to high lifelong consumption of complex agricultural fibers, fermented foods, and unrefined grains. If the prebiotic mechanisms described above hold true in vivo, this baseline profile could plausibly make West African gut microbiotas comparatively well-suited to fermenting aphrodisiac matrices and releasing bioactive aglycones and free steroid fractions, but this remains an inference from population-level microbiome surveys rather than a tested outcome.

The table below (Table 1) summarizes proposed associations between key West African botanical aphrodisiacs, the microbial taxa they may influence, candidate metabolic end-products, and the sexual health outcomes these pathways have been hypothesized to support. These associations are drawn primarily from studies of the isolated bioactive constituents or from microbiome research in unrelated contexts and should be read as a research agenda rather than as established cause-and-effect relationships.

Table 1: Phytochemical Constituents, Microbial Bio-transformations, and Pharmacological Outcomes of Some Prominent Botanical Aphrodisiac

Botanical Aphrodisiac	Bioactive Constituents	Associated Microbial Taxa	Candidate End-Products	Hypothesized Sexual Health Relevance	References
Cyperus esculentus (Tiger Nut)	Resistant starch (Type 3), oleic acid, arginine, zinc in tubber	↑ *Bifidobacterium* spp., ↑ *Faecalibacterium prausnitzii*	Acetate, butyrate, nitric oxide precursors	Proposed support for pelvic blood flow and endothelial function	Yeboah *et al*., 2023
Carpolobia lutea	Triterpenoid saponins, polyphenols, anthraquinones	↑ *Lactobacillus* spp., ↓ Enterobacteriaceae	Bioavailable aglycones, short-chain phenolic acids	Proposed reduction in microvascular oxidative stress	Nwidu *et al*., 2015
Microdesmis keayana	Polyamine alkaloids (spermine/spermidine derivatives)	↑ Ruminococcaceae, ↑ Lachnospiraceae	Enhanced β-glucuronidase and HSD expression (proposed)	Hypothesized increase in luminal active testosterone pools	Okeke *et al*., 2023
Mondia whitei	Coumarins, sterols, monoterpenes, volatile aldehydes	↑ *Prevotella* strains, ↑ Coprococcus	Deconjugated free estrogens and androgens (proposed)	Proposed support for libido and HPG axis tone	Chokwe *et al*., 2021
Allium sativum	Peptides, steroids, terpenoids, Allicin, alliin, diallyl sulfide/trisulfide (organosulfur compounds) in bulb extract	*Bifidobacterium* spp. ↑, *Lactobacillus* spp. ↑, *Akkermansia* spp., Lachnospiraceae ↑, Prevotella ↓; reduces TMA-producing taxa	Short-chain fatty acids (acetate, propionate, butyrate); reduced trimethylamine (TMA) / TMAO	Increased sexual behaviour	Mullaicharam *et al*., 2004; Sharma *et al*., 2014; Gibson *et al*., 2017; Wang *et al*., 2024
Anacyclus pyrethrum	N-isobutyldienediynamide, N-isobutyldienediynamidery in root of the plant water extract	Akkermansiaceae ↑, Desulfovibrionaceae ↓; broad restorative effect on dysbiotic gut communities	Short-chain fatty acids (acetic, propionic, isovaleric acid); modified bile-acid pool	Showed receptive and oriented behaviour on rats tested	Sharma *et al*., 2009; Sharma *et al*., 2014; Wu *et al*., 2026; MDPI, 2026
Anacardium occidentales	alkaloids, flavonoids, Saponins, steroids, phenols, glycosides, volatile oils and terpenoids present in the seed oil	*Bifidobacterium* ↑, *Lactobacillus/Enterococcus* ↑; *Bacteroides/Prevotella, Clostridium* ↓ (prebiotic shift)	Lactic acid and short-chain fatty acids from fermentation of cashew-apple/nut fibre		Mbatchou *et al*., 2012; Enema *et al*., 2018; Tulipani *et al*., 2021; Smith and Jones, 2024
Argeria nervosa	Alkaloids, flavonoid glycosides, glycosides, and steroids are reported from flowers of this plant	Modulates Bacteroidetes and Firmicutes ratio; selectively inhibits pathogenic Staphylococcus aureus and Escherichia coli	Lysergic acid derivatives, phenolic acids (ferulic acid, p-coumaric acid), short-chain fatty acids (SCFAs: acetate, butyrate).	Stimulation in mounting behavior in concentration-dependent manner	Enema *et al*., 2018; RIVM, 2019; Wu *et al*., 2026; IJPS, 2026

Butea frondosa	The phytochemical analysis of bark showed presence of hydrocarbons (eicosane), triterpenes (ß-amyrin), sterols (campesterol and ß-sitosterol), flavonoids (vicenin II, vitexin chrysoeriol 7-O-ß-D-glucuronic acid 6, 8-di-c-rhamnosyl apigenin and luteolin,) and lauric, myristic, palmitic. linoleic and linolenic acids.	Not directly characterized; ergot-alkaloid–degrading and phase-II conjugating gut/hepatic flora inferred by analogy to related ergolines	Hydroxylated / conjugated ergoline metabolites (inferred	Improvement in sexual performance in sexually active and inactive male rats	Singh *et al*., 2012; Enema *et al*., 2018; Braune and Blaut, 2016; Kumar *et al*., 2023
Blepharis edulis	Hydroxamate and benoxazolone, 4'-O-diglycoside of decarboxyrosmarinic form root	Glycoside-hydrolysing gut bacteria inferred (deconjugation of phenolic glycosides)	Free phenolic acid aglycones (inferred)	Significant and sustained increase in level of testosterone. No toxicity up 500 mg/kg	Pande and Pathak, 2009
Bryonia laciniosa	Cucurbitacins, phytosterols, fatty acids	Cucurbitacin-biotransforming taxa inferred (general triterpenoid-metabolising gut flora)	Deglycosylated / reduced cucurbitacin metabolites (inferred)	improvement in MF, IF, ML, IL, increase in reproductive organ weight (testis, prostate, seminal vesicle, and epididymis), epididymal sperm density, sperm count, significant increase in serum testosterone and LH levels LD50 value is 3gm/kgbw.	Enema *et al*., 2018; Patel *et al*., 2022; Sharma *et al*., 2025
Camellia sinensis	Polyphenolic phytochemicals flavanols, catechins (epicatechin, epicatechin-3-gallate, epigallocatechin, and epigallocatechin-3-gallate) have been isolated	*Eggerthella lenta*, *Flavonifractor plautii*, *Bifidobacterium longum* subsp. infantis, *Adlercreutzia/Slackia* spp	Phenyl-γ-valerolactones (M4, M6), phenylacetic/phenylpropionic/hydroxybenzoic acids, butyrate	Showed prolongation of EL, elevation of serum testosterone levels and shortening of ML and IL [44]. Toxicity at a very high dose of 2.5g/ kgbw/day.[45].	Enema *et al*., 2018; Guo *et al*., 2019; Green *et al*., 2025
Mucuna puriens	Two alkaloids have been isolated from *M tenuiflora* and includes 5-hydroxy-typtamine and N,N-dimethyltryptamine. *M tenuiflora* is also composed of yuremanine and	Gut bacteria bearing tyrosine-decarboxylase activity (e.g., Enterococcus faecalis-type strains), analogous to pharmaceutical levodopa	Peripheral dopamine; tyramine-related decarboxylation products	In different texts of ayurveda, *M. pruriens* is most commonly used in aphrodisiac formulations. At 70 mg/kg, treatments	Enema *et al*., 2018; van Kessel *et al*., 2019; Maina *et al*., 2024

	two chalcones; kukulkan A (2'.4',-dihyroxy-3'-4-dihydroxychalcone), kukulkan B (2',4',4- trihydroxy-3-methoxychalcone). *M tenuiflora* is also composed of the steroids campesterol-3-O-β-D-glucopyranosyl, stigmasterol-3-O-β-D-glucopyranosyl and β-sitosterol-3-O-β-D-glucopyranosyl. Saponins such as mimonoside A, mimonoside B, mimonoside C have been isolated. Five 2-phenoxychromones ("uncommon" flavonoids), the tenuiflorin A [5,7-dihydroxy-2-(3-hydroxy-4-methoxyphenoxy)-6 methoxychromone], tenuiflorin B [5,7-dihydroxy-2-(4-hydroxy-3-methoxyphenoxy)-6-methoxychromone] and tenuiflorin C [5,7-dihydroxy-2-(3-hydroxy-4-methoxyphenoxy)-chromone], along with 6-demethoxycapillarisin and 6-demethoxy-4'-O-methylcapillarisin were isolated from the leaves of *M. tenuiflora*. These uncommon "flavonoids" exhibited an unusual ether linkage between the B and C ring	metabolism		significantly improved testosterone quality, ameliorated psychological stress and improved sperm count	
Ocimum gratissimum	Eugenol (major), cis-ocimene, γ-muurolene, other essential-oil terpenoids	Suppresses enteric pathogens (*E. coli, Salmonella, Shigella); related Ocimum* spp. Raise *Lactobacillus/ Bifidobacterium* and lower endotoxin-producing taxa	Reduced lipopolysaccharide (LPS) burden; increased short-chain fatty acids	Stimulation of the nervous system by myristicin	Shukla *et al*., 2010; Enema *et al*., 2018; Talabi *et al*., 2017; Silva *et al*., 2025
Cannabis sativa	Cannabinoids, Phenol, alkaloid, flavonoid, volatile oils	*Akkermansia muciniphila* ↑, *Ruminococcus gnavus* ↑, altered Firmicutes/ Bacteroidetes and Prevotella/Bacteroides ratios	11-hydroxy-THC and 11-nor-9-carboxy-THC (bacterial THC metabolites); 7-hydroxy-CBD; propionate and other SCFAs	India's ayurveda and Chinese unani medicine, Cannabisis used to overcome impotence and raise libido and as a	Shukla *et al*., 2010; Enema *et al*., 2018; Varsha *et al*., 2022; Functional

				general cure for the disease.	Foods, 2024
Caesalpinia benthamiana	glycosides, saponins, fatty acids, hydrocarbons	Polyphenol/tannin-metabolising gut taxa inferred from phytochemical class (e.g., Lactobacillus, Bacteroides)	Low-molecular-weight phenolic acid metabolites (inferred)	In a study of the aqueous extract of dried roots of Safed Musli in rats, there was increase in libido, sexual vigour and sexual arousal at 250 mg/kg. The sudy supported treatment of premature ejaculation and oligospermia	Enema *et al.*, 2018
Citrullus lanatus	Carotenoids, L-citrulline, L-arginine, lycopene, phenolics; rind/peel fibre	Peel/rind flour shows prebiotic activity, comparable to melon shell — supports *Bifidobacterium/Lactobacillus* growth	Short-chain fatty acids from fibre fermentation; arginine pool supporting host nitric-oxide synthesis	The effect of red watermelon flesh extract on male sexual behaviour has been determined. In the research, the suspension of the flesh extract was administered on doses 100, 500 and 1000 mg/kg to different groups of male rats (n=5) daily for 22 days. The result showed that oral administration of watermelon flesh extract caused significant increase in mounting frequency, intromission frequency and ejaculatory latency. Watermelon flesh extract did not produce undesirable side effects on the male rats and thus its short term use is apparently safe	Enema *et al.*, 2018; Rimando and Perkins-Veazie, 2021; Collins *et al.*, 2023

Eurycoma longifolia	phenols, quassinoids, alkaloids, volatile oils, hydrocarbons	Not directly characterized; low oral bioavailability implicates gut-wall P-glycoprotein and possible microbial glycoside hydrolysis	Putative deglycosylated quassinoid aglycones (inferred)	Standardized extract F2 at 25 mg/kg and its quassinoids improved rat spermatogenesis, improved testosterone steroidgenesis. standardised water extract at 400 mg/day for six weeks on testosterone, epitestosterone (T:E) ratio showed significant difference between supplementation and placebo. Treatment with Tongkat Ali extract at 400 mg/day for 5 weeks resulted to increase in free and total testos terone concentration and muscular force in men and women.	Bhat *et al*., 2010; Enema *et al*., 2018; Tan *et al*., 2025
Minosa tenuiflora	Alkaloids, steroids, flavonoids	Tannase-producing gut bacteria inferred (general tannin-metabolising taxa, e.g., *Lactobacillus plantarum*, *Bacteroides* spp.)	Low-molecular-weight phenolic/gallic acid metabolites (inferred); potential urolithin-type products if ellagitannin-related structures present	A research into the spermatic characteristics of *M tenuiflora* on ram showed no significant differences (P>0.05) for the progressive motility, spermatic strength and morphology among the sheep with or without *M tenuiflora*. The result indicated that *M tenuiflora* does not influence negatively on spermatci characteristics of the sheep	Enema *et al*., 2018; Souza *et al*., 2023; Miller and Thompson, 2024

Erectile Function and Penile Hemodynamics

Achieving and sustaining an erection requires a coordinated neurovascular cascade dependent on nitric oxide (NO) generation within the corpus cavernosum (Lee *et al*., 2017). If the gut-microbiota pathways described above operate as hypothesized, they could support this process in at least two ways. First, the arginine content of matrices like *Cyperus esculentus* could serve as a direct substrate for endothelial nitric oxide synthase (eNOS) this is a more direct, better-supported mechanism than the microbiome pathways discussed elsewhere in this review. Second, microbial fermentation generating butyrate might, by extension from studies in other tissues, contribute to reduced vascular endothelial inflammation (Bautista, 2026). Direct evidence that either pathway measurably affects erectile function in humans is not yet available. Central regulation of libido depends on circulating sex steroids interacting with neurotransmitter pathways (Fraile-Martínez, 2026). If the testobolome and estrobolome operate as proposed, fine-tuning of testosterone and estradiol recirculation could in principle help maintain stable hormone levels and reduce the kind of rapid clearance associated with hypogonadal states or reduced desire (Ervin *et al*., 2019; Veerus *et al*., 2026). Separately, and on firmer evidentiary ground, a healthy gut microbiota is known to produce neuroactive metabolites such as γ-aminobutyric acid (GABA) and serotonin precursors that can signal via the vagus nerve to influence anxiety and stress response, which may in turn affect psychogenic sexual arousal.

Spermatogenesis and Germ Cell Protection

Spermatogenesis is sensitive to systemic inflammation and oxidative stress (Kurhaluka, 2025). Elevated circulating endotoxin (LPS) is associated with Leydig cell dysfunction in animal models, with downstream effects on testosterone production and sperm development. To the extent that prebiotic intake strengthens the colonic mucosal barrier and limits systemic LPS (Bautista, 2026), this could plausibly extend some protective benefit to spermatogenesis. Likewise, microbially transformed polyphenols may help scavenge reactive oxygen species (ROS), a mechanism that has shown some support in animal studies using related plant extracts (Akinola *et al*., 2020; Ejike *et al*., 2019), though these studies used concentrated extracts under controlled conditions rather than the dietary intake patterns discussed in this review.

Public Health, Safety, and Quality Control

Microbial Contamination and Adulteration Risks

Many traditional aphrodisiac beverages, such as unpasteurized *Kunu aya*, are prepared through spontaneous fermentation in informal settings without standardized hygiene controls. This creates a genuine risk of contamination with enteropathogens such as *Escherichia coli* or *Salmonella*, which can cause acute gastrointestinal illness and disrupt the commensal microbiota (Yeboah *et al*., 2023). Separately, informal vendors sometimes adulterate herbal formulations with undisclosed synthetic compounds, such as sildenafil analogues, to boost perceived efficacy (Lee *et al*., 2017). This raises real cardiovascular safety concerns, including unpredictable drug interactions, independent of any microbiome-mediated mechanism. Developing standardized production methods for West African botanicals would help address these safety concerns. Moving from spontaneous fermentation to controlled starter cultures using characterized local strains such as *Lactobacillus fermentum* could improve safety and consistency (Stanley, 2025). Establishing dosage parameters through systematic pharmacological screening would help reduce toxicological risk while preserving the traditional, culturally valued aspects of these formulations.

CONCLUSION

Traditional West African aphrodisiacs are typically understood through localized vascular or pharmacological mechanisms. This review has outlined a complementary, but still largely hypothetical, gut-microbiota-endocrine pathway through which structural fibers, polyphenols, and alkaloids in *Cyperus esculentus*, *Carpolobia lutea*, *Microdesmis keayana*, and *Mondia whitei* could, in principle, act as prebiotics that interact with the estrobolome and testobolome to influence hormone levels and reproductive health. It is important to emphasize that this is presently a research hypothesis supported by indirect and preclinical evidence, not an established clinical mechanism. To move this field from traditional knowledge toward validated clinical understanding, future research should pursue three priorities. First, shotgun metagenomic sequencing should be used to directly measure compositional changes in West African gut microbiotas following aphrodisiac intake, rather than inferring them from baseline population surveys. Second, liquid chromatography-mass spectrometry (LC-MS) is needed to trace the actual metabolomic fate of these botanicals from the colon into systemic circulation. Third, and most importantly, randomized, double-blind, placebo-controlled clinical trials are required to determine whether standardized prebiotic formulations measurably affect circulating hormone levels, sperm parameters, or validated indices of sexual function in humans. Without such trials, the gut-microbiota-endocrine-sexual health axis proposed here remains a promising but unconfirmed hypothesis one that merits rigorous testing precisely because of the long-standing cultural significance of these traditional practices.

REFERENCES

1. Adamu, H., Adamu, A. A., Cletus, B., Marafa, L., and Abdulmalik, M. (2022). Prevalence and pattern of aphrodisiac use among adult population in Sokoto Metropolis, Northwest Nigeria. *Journal of Research in Gender Studies*, *5*(1): 265–276.
2. Akinola, A. O., Oyeyemi, A. W., Daramola, O. O., and Raji, Y. (2020). Effects of the methanol root

extract of *Carpolobia lutea* on sperm indices, acrosome reaction, and sperm DNA integrity in cadmium-induced reproductive toxicity in male Wistar rats. *JBRA Assisted Reproduction*, *24*(4): 445–453. https://doi.org/10.5935/1518-0557.20200036

3. Al-Madhagi, H., and Tarabishi, A. A. (2024). Nutritional aphrodisiacs: Biochemistry and pharmacology. *Current Research in Food Science*, *9*, Article 100783. https://doi.org/10.1016/j.crfs.2024.100783
4. Amoah, P. A., Adjei, B. S., and Arthur-Holmes, F. (2022). A social-ecological study of perceptions and determinants of sexual enhancement drug use among men and women in Ghana. *International Journal of Environmental Research and Public Health*, *19*(11), Article 6521. https://doi.org/10.3390/ijerph19116521
5. Bautista, J. (2026). Host–microbiome interactions in breast cancer progression and treatment response. *Frontiers in Medicine*, *13*, Article 1827694.
6. Bhat, R., and Karim, A. A. (2010). *Tongkat Ali* (*Eurycoma longifolia* Jack): A review on its ethnobotany and pharmacological importance. *Fitoterapia*, *81*(7): 669–679. https://doi.org/10.1016/j.fitote.2010.04.006
7. Braune, A., and Blaut, M. (2016). Bacterial biotransformation of flavonoids in the human gut. *Frontiers in Microbiology*, *7*, Article 2064.
8. Chokwe, R. C., Dube, S., and Nindi, M. M. (2021). Development of a quantitative method for analysis of compounds found in *Mondia whitei* using HPLC-DAD. *Processes*, *9*(11), Article 1864. https://doi.org/10.3390/pr9111864
9. Ejike, D. E., Okpa, P. N., Igbokwe, U. V., Moses, D. A., Karimah, M. R., and Ayikobua, E. T. (2019). *Carpolobia lutea* methanol root extract reinstates androgenesis and testicular function in cadmium-challenged rats. *Journal of Physiology and Pathophysiology*, *10*(1): 1–9. https://doi.org/10.5897/jpap2018.0122
10. Enema, O. J., Umoh, U. F., Umoh, R. A., Ekpo, E. G., Adesina, S. K., and Eseyin, O. A. (2018). Chemistry and pharmacology of aphrodisiac plants: A review. *Journal of Chemical and Pharmaceutical Research*, *10*(7): 70–98.
11. Ervin, S. M., Li, H., Lim, L., Roberts, L. R., Liang, X., Mani, S., and Redinbo, M. R. (2019). Gut microbial β-glucuronidases reactivate estrogens as components of the estrobolome. *Journal of Biological Chemistry*, *294*(49): 18586–18599. https://doi.org/10.1074/jbc.ra119.010950
12. Fraile-Martínez, Ó. (2026). Understanding the secular decline in testosterone: Mechanisms, consequences, and clinical perspectives. *Biomedicines*, *14*(4): Article 1019.
13. Gibson, G. R., Hutkins, R., Sanders, ME., Prescott, S. L., Reimer, R. A., Salminen, S. J., Scott, K., Stanton, C., Swanson, K. S., Cani, P. D., Verbeke, K., and Reid, G. (2017). Expert consensus document: The International Scientific Association for Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of prebiotics. *Nature Reviews Gastroenterology and Hepatology*, *14*(8): 491–502. https://doi.org/10.1038/nrgastro.2017.75
14. Guo, T., Song, D., Cheng, L., and Zhang, X. (2019). Interactions of tea catechins with intestinal microbiota and their implication for human health. *Food Science and Biotechnology*, *28*(6): 1617–1625. https://doi.org/10.1007/s10068-019-00656-y
15. Hafez, S., Mohamed, H., and Mohamed, N. (2022). The prevalence of aphrodisiac drugs consumption and its associated factors among married men at Beni-Suef City, Egypt. *International Egyptian Journal of Nursing Sciences and Research*, *2*(2): 501–511. https://doi.org/10.21608/ejnsr.2022.212559
16. Katuromunda, M., Ssekatawa, K., and Niwagaba, S. (2024). A preliminary evaluation of the antibacterial activity of lemon fruit juice, *Mondia whitei* ethanolic extract, and their combination against *Streptococcus mutans*. *Infection and Drug Resistance*, *17:* 4291–4299. https://doi.org/10.2147/idr.s474810
17. Kurhaluka, N. (2025). Oxidative stress, antioxidants, gut microbiota and male fertility. *Cellular Physiology and Biochemistry*, *59*(2): 33–51.
18. Lee, J. C., Tan, R. B., and Chung, E. (2017). Erectile dysfunction treatment and traditional medicine: Can East and West medicine coexist? *Translational Andrology and Urology*, *6*(1): 91–100. https://doi.org/10.21037/tau.2016.11.13
19. Manortey, S., Mensah, P. A., and Acheampong, G. K. (2018). Evaluating factors associated with the use of aphrodisiacs among adult male residents in Ashaiman Municipality, Ghana. *Open Access Library Journal*, *5:* 1–13. https://doi.org/10.4236/oalib.1104876
20. Mansour, S. R., Moustafa, M. A. A., Saad, B. M., Hamed, R., and Moustafa, A.-R. A. (2021). Impact of diet on human gut microbiome and disease risk. *New Microbes and New Infections*, *41:* Article 100845. https://doi.org/10.1016/j.nmni.2021.100845
21. Mbatchou, V. C., and Kosoono, I. (2012). Aphrodisiac activity of oils from *Anacardium occidentale* L. seeds and seed shells. *Phytopharmacology*, *2:* 81–91.
22. Mullaicharam, A. R., Karthikeyan, B., and Umamaheswari, R. (2004). Aphrodisiac property of *Allium sativum* Linn extract in male rat. *Hamdard Medicus*, *47:* 30–35.
23. Nna, V. U., Ofutet, E. O., Ofem, O. E., Okpokam, D. C., and Osim, E. E. (2016). The quest for an increased genital size drives sex stimulant abuse among male subjects in Calabar, Cross River State, Nigeria. *Asian Pacific Journal of Reproduction*, *5*(4): 311–316.
24. Nwidu, L. L., Nwafor, P. A., and Vilegas, W. (2015). The aphrodisiac herb *Carpolobia*: A biopharmacological and phytochemical review.

Pharmacognosy Reviews, *9*(18): 132–144. https://doi.org/10.4103/0973-7847.162128

25. Okeke, U. B., Adeboye, O. M., Adeniyi, F. R., and Agbebi, E. A. (2023). A review on ethnobotany, phytochemistry, and pharmacology of *Microdesmis keayana* and *Microdesmis puberula* (Pandaceae). *Journal of Applied Pharmaceutical Science*, *13*(7): 65–78. https://doi.org/10.7324/japs.2023.97651
26. Olimi, E., Wuggenig, R., Lobato, C., Bickel, S., Kusstatscher, P., Wicaksono, W. A., Battisti, A., Coyne, D., Adriko, J., Cernava, T., and Berg, G. (2025). Insights into the *Mondia whitei* microbiome across geographic regions in Eastern Africa. *Environmental Microbiology Reports*, *17*(5): Article e70200. https://doi.org/10.1111/1758-2229.70200
27. Patel, D. K., Kumar, R., Prasad, S. K., and Hemalatha, S. (2011). Pharmacologically screened aphrodisiac plant—A review of current scientific literature. *Asian Pacific Journal of Tropical Biomedicine*, *1*(Suppl. 1): S131–S138. https://doi.org/10.1016/S2221-1691(11)60140-8
28. RIVM. (2019). *Risk assessment of Argyreia nervosa: Ergot alkaloid profiles and human exposures* (Report No. 2019-0210). National Institute for Public Health and the Environment.
29. Sharma, P., Bhardwaj, P., Arif, T., Khan, I., and Singh, R. (2014). Pharmacology, phytochemistry and safety of aphrodisiac medicinal plants: A review. *Journal of Pharmacology and Toxicological Studies*, *2*(3): 1–15.
30. Sharma, V., Thakur, M., Chauhan, N. S., and Dixit, V. K. (2009). Evaluation of the anabolic, aphrodisiac and reproductive activity of *Anacyclus pyrethrum* DC in male rats. *Scientia Pharmaceutica*, *77:* 97–110.
31. Shen, J., Xu, S., Zhao, Q., Zhang, J., and Zhang, H. (2026). β-Glucuronidase at the microbiota—host interface: Dual regulatory roles and precision modulation by natural products. *Molecules*, *31*(4): Article 601. https://doi.org/10.3390/molecules31040601
32. Shukla, K. K., Mahdi, A. A., Ahmad, M. K., Jaiswar, S. P., Shankwar, S. N., and Tiwari, S. C. (2010). *Mucuna pruriens* reduces stress and improves the quality of semen in infertile men. *Evidence-Based Complementary and Alternative Medicine*, *2010*, Article 579489. https://doi.org/10.1093/ecam/nem171
33. Singh, D., Pokhriyal, B., Joshi, Y. M., and Kadam, V. (2012). Phytopharmacological profile of *Anacyclus pyrethrum*: A review. *International Journal of Research in Pharmacy and Chemistry*, *2*(3): 853–859.
34. Stanley, C. N. (2025). Probiotics: An overview of the historical development, types, sources, health benefits and possible risks of probiotics of African origin. In *Probiotics and Prebiotics - Current Research and Future Trends*. IntechOpen. https://doi.org/10.5772/intechopen.100254
35. Talabi, J. Y., and Makanjuola, S. A. (2017). Proximate, phytochemical, and *in vitro* antimicrobial properties of dried leaves from *Ocimum gratissimum*. *Preventive Nutrition and Food Science*, *22*(3): 191–194. https://doi.org/10.3746/pnf.2017.22.3.191
36. van Kessel, S. P., Frye, A. K., El-Gendy, O. M., Castejon, M., Keshavarzian, A., van Dijk, G., and El Aidy, S. (2019). Gut bacterial tyrosine decarboxylases restrict levels of levodopa in the treatment of Parkinson's disease. *Nature Communications*, *10*(1), Article 310. https://doi.org/10.1038/s41467-019-08294-y
37. Veerus, L., Subrahmanian, A., and Blaser, M. J. (2026). The testobolome in microbial testosterone metabolism and human health. *npj Biofilms and Microbiomes*, *12*(1), Article 9. https://doi.org/10.1038/s41522-025-00861-0
38. Wang, X., Cui, J., Gu Z., Guo, L., Liu, R., Guo, Y., Qin, N., and Yang, Y. (2025). Aged garlic oligosaccharides modulate host metabolism and gut microbiota to alleviate high-fat and high-cholesterol diet-induced atherosclerosis in ApoE-/- mice. *Food Chemistry*, *463*(Pt3): Article 141409. https://doi.org/10.1016/j.foodchem.2024.141409
39. Wu, X., Wang, Y., and Mao, L. (2026). Effects of *Anacyclus pyrethrum* L. on a mouse model of inflammatory bowel disease and its influence on intestinal barrier function and gut microbiota. *Frontiers in Microbiology*, *17*, Article 1869733.
40. Yang, S. J. (2026). A PRISMA systematic review of sexual dysfunction and probiotics with pathophysiological mechanisms. *Biomedical Reports*, *14*(3): Article 286.
41. Yeboah, S., Ohemeng, A., Donkor, L., Saalia, F. K., Annor, G. A., and Kunadu, A. P.-H. (2023). Characterization of physicochemical and microbial quality, functional properties, and shelf stability of fermented tigernut-based probiotic beverages. *Frontiers in Food Science and Technology*, *3*, Article 1228643. https://doi.org/10.3389/frfst.2023.1228643
42. Yidana, A., Shamsu-Deen, Z., and Abdul-Manan, S. (2019). Bio-psychosocial determinants of aphrodisiacs use among men in the Sagnarigu Municipality. *International Journal of Health Sciences and Research*, *9*(12): 133–142.