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Herbal Spermicide -II

KISHU TRIPATHI[1], SN. PANDEYA[2] and SHOBHA KULSHRESHTHA[3]

[1]Reader, Saroj Institute of Technology and Management, Lucknow (India)
[2]Professor,Saroj Institute of Technology and Management, Lucknow (India)
[3]Head,Department of Pharmacology, S.N.Medical College, Agra (India)

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ABSTRACT

Plants used as spermicide affect sperm production,motility, progression,count,viability, plasma membrane, superoxide dismutase activity, spermatogenesis, testicular mitochondrial respiratory chain, sperm density,semen volume, sperm membrane proteins, swimming, acrosomal content and external acrosome membrane,sperm membrane lipid peroxidation,etc

Key words: Spermicide,Herbal Spermicide.

INTRODUCTION

Plants have been used worldwide for treatment of various human ailments since antiquity. Their use is still quite prevalent in developing countries in the form of traditional / folkloric system of medicine. Intensive chemical and pharmacological studies on traditional / folkloric medicinal plants during the last 5 decades have led to the validation of traditional claims in many cases and facilitated identification of their active principles.The active principles have provided leads in the development of several life saving drugs, which are in clinical use today. A large number of these plants are used for birth control in different countries. Approximately 318 different plants are in traditional / folkloric use worldwide, of which 227plants are of Indian origin.So far, 74 plants have been screened for their anti-fertility potential, 48 of them have been found to be effective. Active principles of about 15 plants have been identified.

Abrus precatorius

The study examined the inhibitory effects of a methanol extract of *Abrus precatorius* seeds on the motility of washed human spermatozoa. The extract caused a concentration-related impairment of percentage sperm motility; with the EC50 concentration being 2.29 mg/ml. This effect on motility was essentially irreversible. With the highest concentration tested (20.0 mg/ml), the onset of the antimotility action was almost immediate. In addition, this concentration impaired the functional integrity of the plasma membrane (hypoosmotic swelling test) and viability (nigrosin-eosin stain) of spermatozoa. In contrast, with a lower concentration (5.0 mg/ml), such effects were not evident. It is concluded that at the lower concentrations the antimotility action may result from a rise in intracellular calcium (not via influx) and/or a decline in cAMP content and/or enhanced generation of a reactive oxygen species[26].

Tripteryglum regeli[27]

Ten triterpenoids were isolated from the ethanol extract of the roots of *Tripteryglum regeli* collected from Jilin Province, north-eastern China. They were identified as wilforlide A(1), wilforlide B(2), regelide (3) 3β-hydroxy-olean-ll,13(18)-diene (4), orthosphenic acid (5), salaspermic acid (6), 3-epikatonic acid(7), maytenfolic acid (8), 3β-acetyl-oleanolic acid (9), and celastrol (19), by spectroscopic analyses and chemical correlations. Compound 3-10 were isolated from *T. regeli* for the

first time, among them regelide 3 was a new comound and its structure was elucidated to be 3-keto-22α-hydroxy-olean-ll,13(18)-dien-29-oic acid(29, 22α)-lactone. 3-epikatonic acid(7)showed obvious spermicidal effect, while cealstrol (10) revealed significant immunosuppressive activity.

At least six of the compounds isolated to date have a contraceptive effect: triptolide, tripdiolide, triptolidenol, tripchlorolide, 16-hydroxytriplide and a compound known only as T7/19. Low doses of various *Tripterygium* preparations produce significantly lowered sperm density, with the remaining sperm incapable of swimming effectively.

Panax notoginseng

The purpose was to investigate the effects of *Panax notoginseng* extracts on inferior sperm motility in vitro. Semen samples were collected from 23 patients with sperm motility between 20% and 40%. The sperm count was over 20 × 10(6)/ml in accordance with the World Health Organization standard. 1.0 mg/ml and 2.0 mg/ml of *Panax notoginseng* extracts including aqueous extract, n-butanol extract, and polysaccharide fraction on sperm motility and progression were evaluated by computer assisted semen analysis. The results demonstrated that sperm motility as well as progression on inferior sperm motility were enhanced at 1 hour and 2 hours after incubation with all three types of extracts[28].

Eugenia jambolana

Oleanolic Acid ,plant compound is extracted from the flowers of a myrtle family tree native to southern Asia, *Eugenia jambolana*. The tree has been naturalized in Hawaii, southern Florida, Australia, the Philippines, Zanzibar and Kenya. Studies of oleanolic acid in rats show that low, sustained doses result in reversible infertility [29]. The studies reported no changes in body weight or libido. The compound alters the way sperm pass through the epididymis. Normally, immature spermatids are converted in the epididymis to fully functioning, motile sperm. The sperm of rats treated with oleanolic acid emerged from the epididymis with decreased forward motility. Rats treated for 30 days became infertile; the contraceptive effect was reversed 14 days after ending treatment[30]. Doses within an order of magnitude of the therapeutic contraceptive dose showed immunosuppressive side effects in mice [31]. A group of researchers in South Africa are working towards studies of oleanolic acid in male monkeys. *Sedum praealtum* Ethanol extract of *Sedum praealtum* in intravaginal doses of 10, 20, 40, 50, 100 and 150mg/kg body weight showed a toxic effect in spermatozoa viability after 24h of administration. Spermatozoa viability was 94, 83, 58 and 24%, respectively, for extract doses of 10, 20, 40 and 50mg/kg body weight, while only dead spermatozoa were found in the vagina of the treated female mice with doses of 100 and 150mg/kg body weight[32].

Pongamia glabra

The medicinal properties of seed oil of *Pongamia glabra* are well known in traditional Indian medicine. It has antimicrobial activity against several organisms. It is used in the treatment of herpes and scabies and, systemically, it is also used in the treatment of dyspepsia with sluggish liver. *Pongamia* oil has strong spermicidal activity[33]. *Echeveria gibbiflora* Guinea-pig spermatozoa in the presence of a purified fraction from *Echeveria gibbiflora* aqueous crude extract suffer a hypotonic-like effect. The phenomena exhibited included a distension of the plasma membrane over the acrosome region, inducing the formation of a huge head-bubble. The agglutination effect was so enhanced that instead of inducing sperm clusters, it produced cane-like stalk structures. The immobilizing activity was induced instantaneously after the addition of the purified fraction. At electron microscope level it was possible to observe a heavy amount of electron dense material of the purified fraction embedded or intercalated along the plasma membrane. It was also possible to corroborate the dispersion of the acrosomal content and the disappearance of the external acrosome membrane. The purified fraction induced loosening of the plasma membrane all along the sperm cell, however, the distension of the membrane was only produced in the apical portion of the sperm head and not in the post equatorial region. The results suggest that the plant may yield a compound suitable for use as a vaginal barrier or male contraceptive agent[34].

Mollugo

The ethyl acetate fraction of Mollugo

pentaphylla, a tropical herb, contains an antifungal saponin (mollugogenol-A). It was report here the spermicidal effects of this saponin. Washed sperm (> 100 x 10(6) with > 50% motility) from normal volunteers were incubated with varying concentrations (0-300 micrograms/ml) of mollugogenol-A at 30°C. Sperm motility, velocity and viability were assessed at 0, 30, 60 minutes both manually and by using computer assisted semen analysis (CASA). Samples collected at 0 and 60 minutes were evaluated for membrane lipid peroxidation, superoxide dismutase (SOD) activity and transmission electron microscopy. A dose- and time-dependent effect of this saponin on sperm motion and viability was observed. The maximal spermicidal effect (4-5 fold decrease in motility and viability) was observed with 300 micrograms/ml dose of saponin. A three-fold increase in sperm membrane lipid peroxidation with corresponding inhibition of SOD activity were observed after 60 minutes incubation with this spermicidal agent. Transmission electron microscopy of saponin-treated samples revealed significant damage to the sperm membrane in both head and tail regions, and the acrosomal membranes were notably swollen and disrupted. These results indicate that this natural saponin has a potential spermicidal effect besides its known antifungal activity. The likely mechanism of its action involves sperm membrane damage by increased lipid peroxidation[35].

Combinations

In order to identify potent spermicidal agents which are free from the side effects of currently available agents, spermicidal activity of purified neem seeds extract (Praneem), reetha saponins and quinine hydrochloride was studied individually and in combination. Sander-Cramer test was used to assess the activity on human sperm. Under the test conditions, minimum effective spermicidal concentrations for Praneem, reetha saponins and quinine hydrochloride were 25%, 0.05% and 0.346%, respectively. At these concentrations, 100% of the sperm were immobilised within 20 seconds. A positive synergistic effect in the spermicidal activity of these components, if used in combination, was observed which implies the use of reduced concentrations of each to bring about the desired action. The selected combination formulated into a suitable dosage form is likely to offer dual benefit of a potent contraceptive and an antimicrobial preparation[36].

Mangrove

Mangrove plants are rich sources of saponins, alkaloids and flavonoids. Plant saponins have been shown to have interesting biological activities such as spermicidal and molluscicidal activity.

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