

Evaluation of the spermicidal action by the action of majority compounds of essential oils

Avaliação da ação espermicida pela ação dos compostos maiores de óleos essenciais

DOI:10.34117/bjdv7n4-155

Recebimento dos originais: 07/03/2021

Aceitação para publicação: 07/04/2021

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1 INTRODUCTION

The use of contraceptives is a recurrent method among sexually active teenagers belonging to this populational group, reiterating the psychosocial questions and the negative approach of gestation in this age range. The epidemiological numbers obtained in the last decade in Brazil registered by the Sistema de Informações Sobre Nascidos Vivos (SINASC) and the Sistema Único de Saúde (SUS), currently, 66% of pregnancies in adolescents are unwanted, stimulate the use, and primarily, the production of new methods to prevent pregnancy (BRASIL, 2017; OLIVEIRA, 2012).

Nowadays, several contraceptive methods are described by the medical literature as an alternative to avoid unplanned pregnancy. Among the best-known are the mechanical methods with the male condom as its foremost representative, besides the vaginal diaphragms (GÓMEZ et al., 2007). There are also chemical barrier methods, such as vaginal spermicides; among these are creams, gels, foaming aerosols, along with others, which are, for the most part, made based on Nonoxynol-9. This compound is capable of causing cervical and vaginal irritative effects that can indulge the appearance of infectious microorganisms and/or the increase of proliferation of microorganisms specific to this microbiota, such as lactobacilli (SCHREIBER et al., 2006).

Several pieces of research are being developed in countries like the United States, England, India, and China in search of new spermicidal contraceptives that do not result in significant side effects (SILVA et al., 2003). Thus, there is a need to replace these spermicidal agents with safer and more effective alternatives, such as natural contraceptives. The objective of this work was to investigate the action of alternative spermicidal agents, evaluating *in vitro* spermicidal activity of plant extracts from endemic plants in Northeastern Brazil.

2 METHODOLOGY

The project was developed in partnership with Dr. Luís Cláudio Nascimento da Silva from the Universidade Federal de Pernambuco (UFPE/Recife), who already has a license from the ethics committee for collection and analysis of human semen (Plataforma Brasil, Parecer N° 02604312.6.0000.5203). Semen samples were collected by voluntary donors after a period of sexual abstinence and sent to the Laboratory of Cellular and Molecular Biology and Microscopy of the UPE *Campus* Garanhuns, for *in vitro* tests.

The method was followed according to Gallego et al. (2012), where the semen was thinned in a saline solution and incubated with four types of oily plant extracts from the plants *Myracrodruon urundeuva* (casca de aroeira), *Leonotis nepetaefolia* (flor de cordão-de-frade), *Hymenaea courbaril* (casca de jatobá) e *Stryphnodendron barbatiman* (casca de barbatimão), from a quilombola community in Garanhuns town.

In the Cellular and Molecular Biology laboratory, each type of extract was added to fresh human semen in a 1:1 ratio, where 10 μ L of the mixture was collected to assess mobility/viability using an optical microscope (40X) in a range from 0 to 30 minutes.

3 RESULTS AND DISCUSSION

Both samples of human semen used were in the standards indicated by the World Health Organization (2010), which guides relevant aspects such as volume (≥ 1.5 mL), total motility ($\geq 40\%$), and sperm vitality ($\geq 58\%$). It was determined that *M. urundeuva*; *L. nepetaefolia*; *H. courbaril*; and *S. barbatiman* extracts designated, in the course of 30 min, an effect on the decrease of the progressive sperm motility, which is fundamental for the success of fertilization. It was also observed that the rate of the spermicidal effect was assorted according to the types of extract. The extracts of *H. courbaril* and *S. barbatiman* resulted in a 50% decrease in the viability of the sperm cells, while the other extracts displayed a reduction of 20 to 35% (Figure 1).

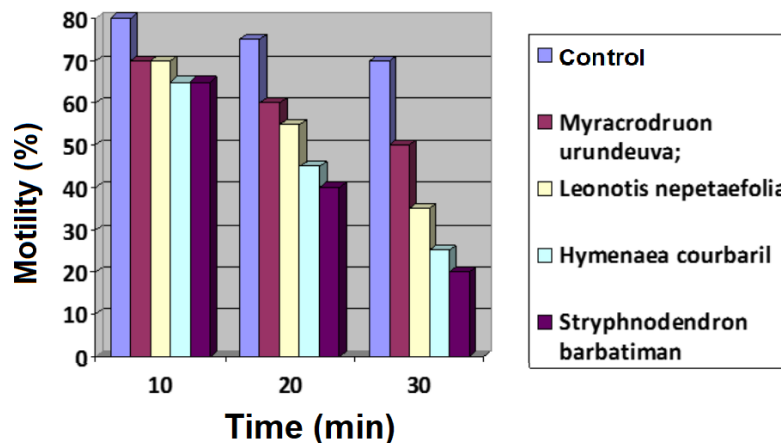
The results suggest that at least two extracts manifested favorable results in the decay of sperm mobility, compared to the control group, which had a higher index of viable cells. The research by Paul et al. (2006), demonstrated similar results found in the current study, sperm viability decreased significantly around 50%, within the same 30 min. Also taken into consideration, when exposed to the extract of *Achyranthes aspera* and *Stephania hernandifolia*. Gallego et al. (2012), also appraised and obtained satisfactory results regarding the spermicidal activity of vegetables (*Muehlenbeckia platyclada*, *Zanthoxylum lenticulare* and *Piper subpedale*) in more than 40% in immobilization on human sperm, similar results to two of the tested extracts.

Another study carried out in 2013, by Medina et al., indicated that the extract of the plant *Sapindus saponaria* L. produced an immobilizing but non-lethal effect on human sperm, due to extracts have much more marked effect on mobility (decrease progressive mobility or increased immobility), this characteristic of a larger effect on mobility also coincided with extracts from plants in the Northeast. It is observed that some

extracts have an action that reflects more on the mobility parameter, instead of viability. Notwithstanding, both results are important factors for sperm infeasibility, thus, hence presenting spermicidal activity. Therefore, it is proven that endemic plants of the Northeast region can be used and further investigated as to their action as chemical barrier agents, which make sperm viability impossible for a potential pregnancy.

The plants utilized in the referring research *in vitro* and reported in the literature by other researchers can perform as subsidies that minimize the irritative-inflammatory damages in the vaginal flora, provoked by the current spermicides manufactured with the base of Nonoxynol-9. Since, the different chemical components of spermicides that exist today can cause damage to the vaginal epithelium due to lack of cell specificity, which implies that it affects not only the viability of the sperm but also the superficial cells of the epithelium (AITKEN et al., 2011).

Fig. 1. Effect of plant extracts of *Myracrodruon urundeuva*, *Leonotis nepetaefolia*, *Hymenaea courbaril* e *Stryphnodendron barbatiman* on the *in vitro* sperm motility of human semen.



4 FINAL CONSIDERATIONS OR CONCLUSIONS

It may be concluded that all plant extracts, especially the extracts obtained from *H. courbaril* and *S. barbatiman* have some factor with spermicidal properties, reducing the motility of human sperm *in vitro*. However, this reduction can still be considered low, since compromises contraceptive efficiency. Therefore, other extracts will be tested *in vitro*, to obtain a product with greater efficiency in the spermicidal action.

Keywords: Spermicidal Activity, Essential Oil, Major Compounds.

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