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Evaluation of Teratogenic Potential of Capsicum on *Rattus Norvegicus*

Dr. Nandini Vaz Fernandes

Department of Zoology, Parvatibai Chowgule College, Gogol, Margao Goa, India – 403602.

ABSTRACT

In the present era of economic instability and need to stable the economical requirement women's are Working parallel with men creates the collision of male's ego & sometimes perceived as violence against women at workplace. Violence against women at the workplace is a widespread problem. However, its actual extent is difficult to measure. Women fail to report violence due to sum reason that takes place at eh workplace either in urban or rural areas. Violence against women is the manifestation of historically unequal power relationship between man and women. Violence against women does not end by merely best owing of judicial rights or by making women literate. Most urban women are literate today but they are also victims of violence at the workplace. It is imperative that women must be morally strong and empowered. Violence affects the workplace in a number of ways viz. Absenteeism, impaired job performance, and loss of experienced employees.

KEYWORDS : Embryotoxicity, Capsaicin

INTRODUCTION:

Capsaicin present in capsicum stimulates the circulation and alters temperature regulation. It has an established structure of N-(4-Hydroy-3-methoxy benzyl)-8-methyl trans-6-enamide which is known to be mutagenic and carcinogenic *(Lopez CL et al.,2003; Dan C and Zanmin W 2009)*. Studies have also shown mutagenic potential of capsaicin by inhibition of DNA synthesis in Swiss Albino mice *(Surh YJ et al., 1995; Park KK et al.,1997)*. Animal experiments have reported liver and intestinal tumours. Capsaicin was reported in DNA damage assays. Carcinogenic, anticarcinogenic, antitumorigenic, tumor promotion, and anti–tumor promotion effects of Capsaicin have been reported in animal studies *(Surh YJ et al., 1995; Miyashita T et al.,1995; Johnson and Wilbur, 2002; Yun TK, 2009)*.

Since there is widespread dietary exposure of Indians to Capsaicin in the form of chillipowder and because of the mutagenic potential of capsicin, the present study was undertaken to evaluate the embryotoxic or teratogenic potential of Chilly. There are limited studies evaluating embryotoxic potential of Capcicum.

MATERIALS AND METHODS:

The experiments were performed on mammalian system – Swiss Albino rat *Rattus norvegicus*. The Wistar rats were housed in polypropylene cages. The cages were bedded with paddy husk. They were fed with standard rat feed pellets, grains and vegetables. Food and water was provided *ad libitum*.

i) GROUPING: Two months old virgin were used for the present study. These females were grouped into three viz one control and two test groups. Each group consisted of five rats. The groups were named as A, B and C. members of group 'A' served as the control group. Group 'B' and 'C' served as experimental groups. All the females were marked with proper identification code.

ii) MONITORING OF ESTROUS CYCLE: Estrous cycle of each rat was monitored daily by vaginal cytology. The data was recorded in a tabulated manner for finding out the estrous phase of rats. Estrous phase was identified by cytological smear from the vagina. The slides were stained with eosin and examined for estrous.

iii) MATING: The females in estrous phase were mated with fertile males of the same strain, according to the method described by Rough R allowing one male with two females in one cage. They were allowed to mate.

iv) CHECKING FOR FERTILIZATION: The females were examined for vaginal plug or presence of sperms in the vaginal smear. Presence of any of these signs was considered as day one of pregnancy. They were then isolated from the males and caged separately.

v) DOSING: In studies involving short term administration it is usual to expose the animal to the test material during the critical period of organogenesis. This period is generally considered to be covered if the compound is administered on days 6-15 in the mouse or the rat. The route of administration of the test compound was by gavage for teratogenic studies since this method permits accurate amounts of test material to be given. Members of group 'B' were dosed with powdered chilly extract of 0.93gms/kg body weight, on the 6th to 15th day of pregnancy. Members of group 'C' were dosed with powdered chilly extract of 0.186gms/kg body weight/ day. The doses were administered along with water by gavage.

vi) SACRIFICING:Young ones are usually delivered by hysterectomy, 1-3 days prior to the anticipated day of partition (18th to 19th day). So on the 18th day of gestation the female rats (both control and experimental groups) were sacrificed by deep ether anaesthesia. The body of the female was dissected to expose the uterus.

The uterine contents were then examined for *Total implants, Live fetuses, Dead fetuses, Early resortions, Late resortions, Weight of each fetus, Length of each fetus, Examination for malformation*. The observations of both control and test groups were recorded, analysed and interpreted.

RESULT :

i) Control Group:

In the control group 'A' of the present study the uterine contents were examined by dissecting the female on the 18th day of gestation. The uterine contents were observed for total number of implants, live fetuses, dead fetuses, early resorptions, weight of each fetus, length of each fetus etc.

The total number of implants on an average was found to be 7.4±2.3. The average weight of the fetus was 6 ± 1.2gms. No dead fetuses were observed. No signs of early or late resorptions. No malformations were observed in the live fetuses.

ii) Experimental Group:

The experimental group viz. Group 'B' & 'C' were analysed for teratogenicity. At the tested doses viz 0.93gms/ kg body weight / day and 0.186 gms/kg body weight /day, there was evidence of embryotoxicity. The females treated with capsicum extract in both the experimental sets showed spontaneous abortion of pregnancies in all. Therefore it may be concluded that the doses administered to the rats may be embryotoxic.

DISCUSSION:

Capsaicin has an established structure of N-(4-Hydroxy-3-methoxy benzyl)-8-methyl trans-6-enamide which is known to be mutagenic and carcinogenic according to multiple studies of *Teel RW, 1991; Jung MY et al.,2001; Lopez CL et al.,2003; Dan C and Zanmin W 2009*. Studies have also showed mutagenic potential of capsaicin

by inhibition of DNA synthesis in Swiss Albino mice (*Surh YJ et al., 1995; Park KK et al.,1997; Teel RW, 1991)*. Since we observed pregnancy loss in all the treated mice, we attribute the embryotoxicity to the 'capsaicin' which is the major component of *Capsicum*. It can therefore be inferred that the property of capsaicin to inhibit cellular growth must be causing embryotoxicity by affecting the cell division in the developing zygote of the females treated with chilly extract.

The duration of exposure and gestational age at exposure are also very critical in the determination of teratogenic potential. During the period from conception to two weeks there is a relative resistance to drug effects. Usually exposure during this time produces an " all or none" effect, that is, the zygote dies from exposure to the teratogen or it is unaffected *(DiPiro JT et al.,1997; Dan C et al.,2009)*. The remainder of the 1st trimester is the most critical time for organogenesis*(DiPiro JT et al.,1997)*. Drugs / Substances that reach the embryo at this point may produce abortion (embryotoxity) or no effect at all or anatomical defect (teratogenesis) or a subtle metabolic or functional defect that may not be detected until later in life. Since the rats treated with Capsicum extract produced abortion of pregnancies it may be considered as embryotoxic at the specified dose.

CONCLUSION:

'Capsaicin' which is the major component of *Capsicum* is reported to be mutagenic and carcinogenic. More over it has been reported that capsaicin inhibits cellular growth of neuroblastoma and hepatocarcinoma cells through the induction of apoptosis. The present study shows that chilly has embryotoxic effects in the rats. The property of capsaicin to inhibit cellular growth may be causing embryotoxicity by affecting the cell division in the developing zygote of the females treated with chilly extract.

The value of animals screening is borne out of the fact that all chemicals that have tested as teratogenic in man can be shown to be teratogenic in animals. Likewise chemicals shown to be teratogenic in animals may be teratogenic in man under appropriate conditions of dosage and timings.

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