

ABSTRACT

This study was carried out to explore some of the possible effects of aniseed extract, administered during the last trimester of gestation, on rat mammary gland growth, development and performance, as indicated by its lactogenic and galactopoietic activity. Five experiments were conducted to test the effect of the extract.

The first experiment aimed to assure the ethnopharmacologic effect of aniseed administration on increasing mammary gland performance of lactating mothers, and to determine the suitable solvent for their extraction. Thirty primiparous pregnant rats were randomly divided, at the 15th. day of pregnancy, into three equal groups. Animals of the first group were administered drinking water (control), the second group were given drinking water containing aniseed alcoholic (70%) extract (0.3 g/Kg B.wt.), and the third group were administered drinking water containing aniseed extract (0.37 g/Kg B.wt.). After parturition, five animals from each group were randomly isolated and their body weight (B.wt.) and mammary gland wet weight (MGwW) were recorded. The remaining animals were allowed to suckle their litters (litter size was adjusted to nine pups / mother). Suckling continued for the first eleven days of lactational period, during which the percentage of daily litter weight gains (LWGs) were calculated. The results showed that alcoholic (70%) extract administration produced the highest increase in percentage of MGwW and daily LWGs.

The objective of the second experiment was to determine the effective dose (ED_{50}), which produced half of the maximum response, of aniseed extract by studying the dose-response curve. Fifty primiparous pregnant rats,

b

at the 15th. day of pregnancy, were randomly divided into five equal groups (control and four treatment groups). Animals of the treatment groups received the alcoholic extract of aniseed orally in four gradual increasing doses (0.03, 0.15, 0.3, 0.45) g/Kg B.wt. respectively. After parturition, five animals were randomly isolated from each group, and their B.wt. and MGwW were recorded. The remaining animals were allowed to suckle their litters for the first eleven days of lactational period. During this period, daily LWGs.% were calculated. The results showed that the dose of (0.3 g/Kg B.wt.) aniseed extract produced the highest increase in MGwW% and daily LWGs%. On the other hand, the result showed a linear relationship between the aniseed extract doses and the obtained responses (MGwW% and daily LWGs%). By using these two parameters, the (ED_{50}) was calculated, which was equal to (0.152 g/Kg B.wt.).

The effective dose (0.152 g/Kg B.wt.) of alcoholic aniseed extract was used in the third experiment to evaluate mammary gland performance indicated by the following parameters: MGwW% at the first day after parturition, daily LWGs% for the first eleven days of lactational period, concentrations of some biochemical constituents in the mammary tissues at the 1st. and 11th. days of lactational period, and the structural-functional characters and some histological measurements in mammary tissue sections at the 1st. and 11th. days of lactational period. Twenty five primiparous pregnant rats, at the 15th. day of pregnancy, were randomly divided into two groups: control (10 rats) and treatment (15 rats). Animals of treatment group received the (ED_{50}) of alcoholic aniseed extract (0.152 g/Kg B.wt.). After parturition, five rats from each group were randomly isolated, and their B.wt. and MGwW were recorded. Tissue samples from mammary glands

were prepared for histo-physiological study and biochemical measurements. The remaining animals of control group continued suckling their pups, whereas half of the remaining animals of treated group continued receiving the extract during lactation, and the other half not, to study whether the extract produces an additional effect during lactational period. Daily LWGs were recorded during the first eleven days of lactational period. After that, the animals were sacrificed and mammary tissue samples were taken for the same purposes mentioned above. The results revealed that aniseed extract leads to a significant increase in: percentage of MGwW at the 1st. day after parturition, percentage of daily LWGs during lactational period, DNA conc. at the 11th. day, RNA conc. at the 1st. & 11th. days, RNA/DNA ratio at the 11th. day, height of epithelial cells at the 1st. day, nuclear diameter of epithelial cells at the 1st. and 11th. days, number of nuclei / alveolus at the 1st., and diameters of alveoli at the 1st. and 11th. days of lactational period. Also, the histo-physiological results revealed a marked developmental stages of treated mammary gland in comparison with control.

In the fourth and fifth experiments, the mechanism of action of aniseed extract on mammary development was studied. The fourth experiment tested the role of prolactin in the presence of bromocriptine (prolactin hormone inhibitor). Forty primiparous pregnant rats, at the 15th. day of pregnancy, were randomly divided into four equal groups, treated as follows: the first received drinking water (control), the second received the aqueous solution of aniseed extract (0.152 g/Kg B.wt.), the third received the aqueous solution of bromocriptine (0.07 mg/Kg B.wt.), and the fourth received an aqueous solution containing aniseed extract and bromocriptine (0.152 g and 0.07 mg/Kg B.wt.), respectively. The results showed that bromocriptine

d

administration produced a significant decrease in MGwW% and daily LWGs%, which were partially prevented by the administration of bromocriptine and extract together.

The last experiment aimed to study the involvement of estrogen in the mechanism of action of aniseed extract, by the use of clomiphene (estrogen inhibitor at the hypothalamic level). The same steps of the previous experiment were conducted, except that clomiphene (0.7 mg/Kg B.wt.) was used instead of bromocriptine. The results showed that clomiphene produced a significant decrease in MGwW% and daily LWGs%, whereas the aniseed extract failed to prevent the inhibitory effect of clomiphene.

It is concluded that aniseed extract administration (0.152 g/Kg B.wt.), during the last trimester of gestation has a positive effect on rat mammary gland development and performance. These effects may be produced by an increase in number and activity of the secretory epithelial cells of the mammary tissues. These changes may be brought by an indirect effect through the hypothalamo-hypophysial axis. These outcome may be induced by increasing the secretion and/or activity of one or more of the hormones (or other factors) that are responsible for mammary growth and development.