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DISSOCIATION OF FEEDING AND HOARDING AFTER BILATERAL DESTRUCTION OF LATERAL SEPTAL NUCLEI IN RATS

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Summary : The interrelationship between Feeding and Hoarding of food pellets was observed to be distrupted following bilateral destruction of lateral septal nuclei in adult male albino rats. The significance of forebrain areas and neuro-endocrinal connection to hypothalamus is discussed.

Key words : feeding hoarding and lateral septal nuclei

INTRODUCTION

Hoarding as observed in rodents is considered as an anticipatory response so as to enable the animals to feed themselves in adverse environmental conditions (1, 2, 3). This is considered as an instinctual behavior closely associated with feeding In the earlier studies carried out in our laboratory it was observed that the animals motivated to hoard food pellets crossed the electric grid through which graded currents were passed (4). It was concluded that with stronger electric current the animal picked up food pellets enough to feed itself and did not hoard any more. It was thus possible to dissociate feeding from hoarding as feeding is probably a stronger motivational response without which the immediate survival of the animal would have been threatened. The present work was planned to study the role of septal nuclei in influencing the feeding-hoarding association.

MATERIALS AND METHODS

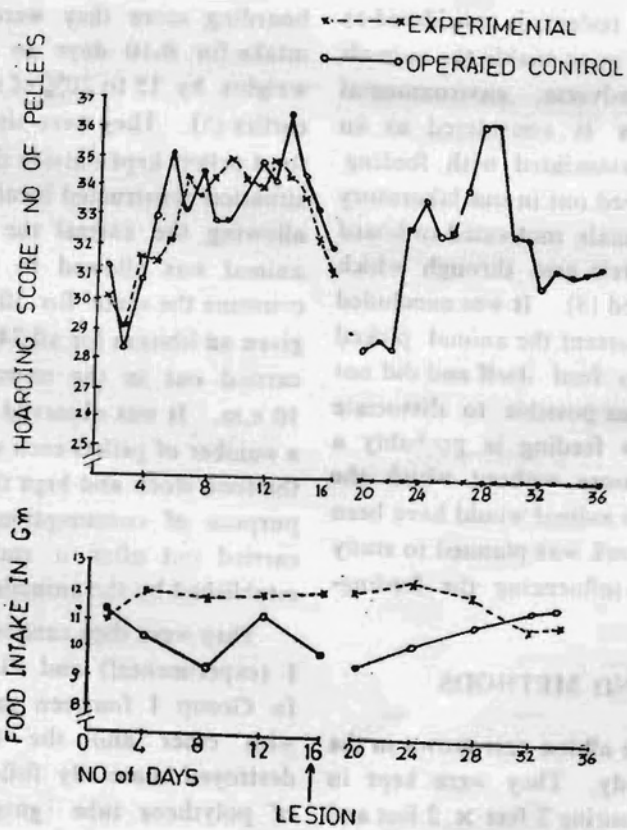
Twenty Four adult male albino rats grown in the colony were used in the study. They were kept in separate home cages measuring 2 feet × 2 feet and 1 feet and their food intake and body weights were determind. In order to develop a measurable hoarding score they were kept on restricted food intake for 8-10 days so as to reduce their body weights by 15 to 20% of the basal level as described earlier (5). They were simultaneonsly administered food pellets kept outside the cage in an open maze situation constructed locally for some other purpose allowing the animal the free access to food. The animal was allowed to pick up food pellets and consume the same for 30 minutes only. Water was given ad libitum for all 24 hours. All the tests were carried out in the morning between 9 a.m. and 10 a.m. It was observed that the animal picked up a number of pellets each weighing about 5 gm from the food stock and kept them in the home cage for purpose of consumption. Further procedure was carried out after a stable hoarding score was established by the animals.

They were then randomly distributed into Group I (experimental) and Group II (operated controls). In Group I fourteen animals were anaesthetised with ether and the lateral septal nuclei were destroyed bilaterally following the suction with help of polythene tube (guage 28) fixed to a suitabel

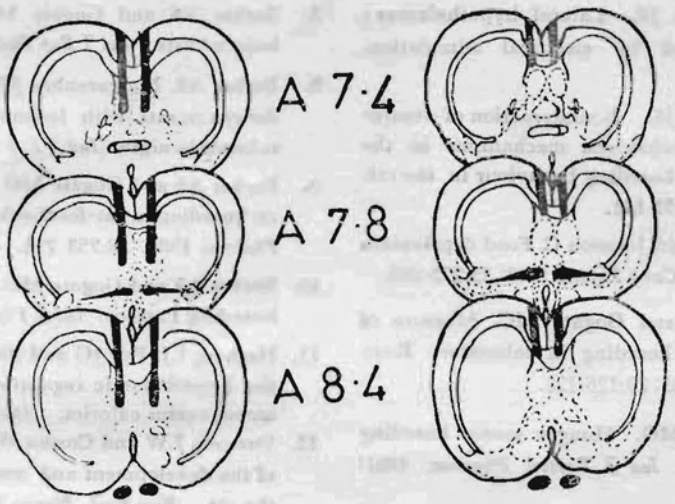
needle to the suction apparatus. The coordinates used for suction were A 7.4 to A 8.4 mm lateral and 4-6 mm deep as per Stereotaxic Coordinates (6). In the remaining ten animals the cortical area overlying the septal nuclei were lesioned bilaterally by suction. All the animals were then returned to their respective cages. All of them were put to hoarding sessions four days after the surgical procedures and the readings were obtained for 15 days postoperatively. At the end of the experiment the animals were sacrificed under ether. The brain was perfused through the heart with saline followed by 10% formalin, separated and preserved in formalin. The sites of lesions were confirmed histologically.

RESULTS

The food intake and hoarding scores in experimental and operated controls before and after the surgical procedures are displayed in Figure 1. The experimental animals exhibited aggressive behavior for two or three days during postoperative period. No such alteration in behavior was observed in operated control series. As can be seen in Figure 1, the experimental subjects did not hoard the food pellets but maintained the food intake which were monitored every third or fourth day. The body weights during the hoarding sessions were observed to be maintained in both the groups. The running activity of the experimental subjects monitored visually was not altered as compared to that in the operated control series.



The lesion sites in the two groups of subjects are exhibited in the reconstructed diagram in Figure 2.



DISCUSSION

The present results indicate that bilateral lesions of lateral septal nuclei disrupt the feeding-hoarding interrelationship. The experimental animals maintained the food intake and body weight but did not hoard the food pellets as before. Though hoarding in rodents appears to be a motivational response it is weaker than the motivational response observed with feeding (4) The exact neurophysiological mechanism of hoarding is not yet fully known. The lesions of caudate nucleus (7) ventral hippocampus and substantia nigra (8) decreased hoarding significantly. The role of female hormones in altering the hoarding score in adult rats is also worked out (9, 10, 11). Herberg and Blundell have shown that electrical stimulation of lateral hypothalamic feeding area in satiated rats can elicit intense hoarding activity (1) It is thus possible to account for motivation of hoarding with a simple model based on the hypothesis that the hoarding is motivated by long term regulatory mechanism acting ultimately through lateral hypothalamic feeding area and hypothaiamic feeding center plays a pivotal role in feeding as well as hoarding.

The present study suggested that lateral septal nuclei possibly exert their influence on hoarding behavior through their connections to hypothalamic nuclei. Even though such direct anatomical connections to the lateral hypothalamic feeding center are not described, the mammillary bodies receive massive and topograpically organized connections from septum (12) The septal fibers to the mammillary bodies travel through medial forebrain bundle in the lateral preoptic and lateral hypothalamic areas. It is likely that some of them may be in synaptic contact with the hypothalamic neurons along their pathway (12, 13). Further work will reveal separate neuraphysiological mechanism for hoarding if any.

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