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Buspirone could be Used as an Intranasal Formulation for Targeted Brain Delivery

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In therapeutic settings, anxiety is a common disorder characterized by stress, uncontrollable and persistent nervousness, worry, and a need for psychiatric or psychological treatment. A disappointingly small amount of improvement has been shown so far in the two-thirds of worried patients who respond to the currently available treatments. Previous research has shown that intranasal administration of therapeutics prevents first-pass metabolism, shielding it from the nasal metabolizing enzymes, increasing the uptake of the therapeutic moiety to the brain, avoiding systemic circulation and, as a result, increasing the amount of drug in the brain and improving brain bioavailability. According to Martins et al., nasal delivery technologies are created to get beyond natural anatomical and physiological obstacles and enable more effective and focused medicine delivery for disorders of the Central Nervous System (CNS).

By considering potential outcomes for brain delivery via the nasal route in the rat brain, it is aimed to evaluate the impact of buspirone-loaded in situ nano emulsion gel (BNG) on the various animal models in the current study. The supplier of buspirone was Yarrow Chem Products in India. SD Fine-Chem Limited provided HPLC quality methanol and acetonitrile for purchase (Ahmedabad, India). Deshpande Laboratories Limited's animal house provided 120 adults male Wistar rats (250–300 g) with registration number 1410/c/11/CPCSEA. Three experimental groups of six animals each were formed by randomly dividing the animals. Animals in Group I (Control) received saline as a vehicle as controls. Buspirone solution (IV) was administered to the group II animals (Standard), while BNG was given to the group III animals (Test).

The control group in the EPM model has been seen to exhibit a propensity to stick with the closed arm, which suggested an anxiogenic impact. The entrance and drainage times in the open arm have significantly increased because of the standard and BNG formulations of popular anxiolytics. BNG formulation administered nasally to rats reduces the behaviour of marble burying, and the reduction is considerable when compared to the control group. In Wistar rats, the brain blood ratio of BH formulations was assessed after (IN). At various intervals up to 8 hrs, the administration and concentration of (BNG, BNE, and BHP) and (IV) (BHS solution) were estimated.

The main finding of the current study reveals that buspirone can be delivered via the nasal route using a thermos reversible nano emulsion gel, and the present study is validated by pharmacokinetic investigations at various time periods and behaviour. In the current studies, the neurobehavioral profile

of animals taking an anxiolytic drug was evaluated. The results of the current study showed that marble-burying behaviour was reduced in the test group of animals, and the effect was comparable to that in the standard and control groups. Although the behaviour response suggests that the nasal route of formulation release was successful, the effect is not statistically significant according to ANOVA analysis. In the EPM model, the control group was observed to tend to stay in the closed arm, which supported an anxiogenic effect.

According to the current study, controlled release new formulations for nose-to-brain distribution of therapeutic molecules—which do not cross the BBB—are preferable to more traditional delivery methods.

Successful formulation of a buspirone-loaded thermos reversible nano emulsion gel was done. When compared to the outcomes of the drug's oral and nasal solutions, in vivo pharmacokinetic and behavioural experiments in Wistar rats demonstrated the superiority of the new formulation for brain targeting.

JOURNAL REFERENCE

Tripathi, K. and N.K. Manna, 2022. Enhanced Brain uptake and behaviour study of buspirone loaded *in situ* nanoemulsion gel. Int. J. Pharmacol., 18: 543-550.

KEYWORDS

Buspirone hydrochloride, brain uptake, nose to brain delivery, nano emulsion, brain targeting, intranasal administration, olfactory pathway