Amelioration of antidepressant behavior by Granulocyte colony stimulating factor (GCSF) in depressed rats: Exploring the preclinical role of brain derived neurotrophic factor (BDNF) and neurotransmitters

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Objective: This is the first study which explored the role of GCSF in ameliorating the depression like behavior in rat animal model.

Methods: Male adult Wistar rats weighing 200-250 gm were used in the study and were divided into 6 experimental groups, Control group, depression group, GCSF (10 $\times$ 10⁶U/kg, s.c.) group, GCSF (35 $\times$ 10⁶U/kg, s.c.) group, GCSF (70 $\times$ 10⁶U/kg, s.c.) group and fluoxetine group. The interventions were administered as per parallel designed method.

Result: The entry of FST rats in open arm were significantly reduced than the naive control rats ($p < 0.001$) and entry into the closed arm were significantly increases in FST rats compared to the naive rats ($p < 0.001$). Different doses of GCSF had significantly ameliorate the depression like behavior in day 7 and 14 ($p < 0.05$); significantly reduced the entry of FST rats in closed arm and correspondingly increases in the open arm entry on day 7 and 14. ($p < 0.001$) The immobility time of FST rats were significantly increases on day 1 in all FST rats whereas after the treatment of GCSF in different doses increases the mobility of rats in FST. ($p < 0.05$) The GCSF (70 $\times$ 10⁶U/kg, s.c.) was found to be highly significant than other GCSF (10 and 35 $\times$ 10⁶U/kg, s.c.) treatment in reducing the immobility time in FST performance on day 7 and 14. ($p < 0.05$) Behavior findings were compared with the direct correlation of 5-HT and BDNF in the hippocampus of rat brain. The level of 5-HT and BDNF were found to reduce on day 1 after FST i.e. in the depressed rats. The GCSF (10, 35 and 70 $\times$ 10⁶U/kg, s.c.) treatment significantly increases the level of 5-HT and BDNF on day 14. When the overall comparison was made in the different doses of GCSF, the GCSF (70 $\times$ 10⁶U/kg, s.c.) was found statistically significant compared to GCSF (10 and 35 $\times$ 10⁶U/kg, s.c.) in ameliorating the behavior and physiological improvement of BDNF in FST rats.

Conclusion: In present study we concluded that GCSF significantly improve the antidepressant activity in the depressive rats and also have ameliorative role in neurotransmitters associated with the depression.