

**Results.** Consequently, the acute pain threshold was higher in the Down syndrome children at normal light. ( $p < 0.01$ ) The witness group's acute pain threshold didn't have a tangible change in the pink light as is the triable group it did increase significantly. ( $p < 0.05$ )

**Conclusion.** Based on this study and other researches, less react of triable group into pain in normal and pink environment and higher influence of triable group under the pink color factor in increasing the acute pain threshold is probably related to the 2 pain transfer paths:

1- Path of spinal – cord mesencephalon – amygdales and 2- Path of spinal cord – hypothalamic which is related with autonomic supra spinal cord controller and endocrine complex. Further investigations of this theory on mental retarded children are highly recommended.

**Keywords:** Cold pain test; Down syndrome; Thermal acute pain

## The Effects of Intrathecal Administration of hemoglobin on chemical Pain Sensation in Formalin Tests in Rat

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**Introduction.** Carbon monoxide (CO) is a colorless, odorless, and tasteless gas. It is toxic to humans and animals when encountered in higher concentrations, although it is also produced in normal animal metabolism in low quantities, and is thought to have some normal biological function. Main source of this gas in body is a reaction catalyzed by heme oxygenase enzyme. Hemoglobin is known as a potent inducer for heme oxygenase and causes exhaustive protection in lethal endotoxemia, on the other hand, the injection of carbon monoxide releasing molecules (CORMs), causes reduction in neuropathic pain sensation. So it would be predictable that intrathecal injection (i.t.) of hemoglobin may increase the amount of carbon monoxide and reduce pain sensation.

**Materials and Methods.** Male Wistar rat (200-250 g) were randomly divided into 3 groups:

I. Control with i.t. injection of saline. II. One i.t. treatment of hemoglobin (10 $\mu$ g/10  $\mu$ l). III. Daily treatments of hemoglobin (10 $\mu$ g/10  $\mu$ l) for 5 constitutive days. Pain behaviors was assessed using hind paw subplantar injection of 5ml formalin (2.5%) for one hour.

**Results.** Results were shown a significant decrease on pain sensation produced by acute i.t. treatment of hemoglobin both in the first and second phase of the formalin test ( $p < 0.01$ ). Same observation was repeated after chronic treatment of hemoglobin also ( $P < 0.001$ ) which was more potent than acute one ( $p < 0.01$ ).

**Conclusion.** Results of this experiment showed us that hemoglobin reduces pain sensation through increasing the level of CO in spinal cord tissue. This effect was higher in chronic group that is possibly due to effect of hemoglobin on the heme oxygenase gene expression.

**Keywords:** Carbon monoxide; Hemoglobin; Pain; Formalin Test