SUMMARY
The present investigation was aimed at fulfilling several objectives like:

(i) To understand the profile of hemolytic responses of PHH in male rat in sexually immature condition, i.e. how far the juveniles are responsive in comparison to the adult rats;

(ii) To demonstrate whether there is any role of thyroid hormone for protection (counteraction) of the hemolytic responses of PHH in juvenile rats;

(iii) To know whether PHH-induced oxidative stress affects thyroid gland morphology and function.

To fulfill the philosophy with the objectives the whole work has been presented in as thesis which contains four chapters like -

(i) Phenyldihydrazine hydrochloride (PHH) - induced hematological changes in juvenile and adult rat: Evidence of thyroid hormone counteraction of the drug effect,

(ii) Changes in blood acetylcholinesterase activity in vivo and in vitro, and Heinz body formation in vivo after phenyldihydrazine hydrochloride (PHH) injections in juvenile rat and influence of thyroid hormone on these parameters,

(iii) Alteration in the serum thyroid hormone levels after phenyldihydrazine hydrochloride (PHH) injections in juvenile rat, and

(iv) Histological study of the thyroid gland of juvenile rat injected with phenyldihydrazine hydrochloride (PHH), thyroid hormone, and in PHH plus thyroid hormone treated condition.
In Chapter I, dose-specific effects of PHH on the hematological parameters like Red Blood Cell (RBC) count, Hemoglobin (Hb) content, Packed Cell Volume (PCV), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH) and Mean Corpuscular Hemoglobin Concentration (MCHC) have been studied in juvenile male rat and compared with adult rat treated with selected dose of PHH. Influence of different doses of thyroxine (T\textsubscript{4}) on the changes in the blood parameters in the PHH-treated juvenile rats have been demonstrated.

In Chapter II, the effects of injections of different doses of PHH on blood acetylcholinesterase (AChE) activity and the Heinz body formation in the juvenile rats have been studied. Role of thyroxine (T\textsubscript{4}) in altering the PHH-induced changes in these blood parameters have been investigated in vivo. Efforts have been made to understand the functional state of RBC membrane in various degrees of PHH insult through the assessment of the RBC membrane acetylcholinesterase activity in juvenile rat in an in vitro condition. The protective role of thyroid hormone in the PHH-induced red blood cell damage has also been demonstrated in this in vitro condition.

In Chapter III, thyroid gland function has been assessed in juvenile rats treated with various doses of PHH, through the determination of T\textsubscript{4} and T\textsubscript{3} levels in serum by radioimmunoassay.

In Chapter IV, the histological structure of thyroid gland in the juvenile rats has been studied after different doses of PHH treatment, thyroid hormone, and thyroid hormone plus PHH treated conditions. Our observation in brief are:

1. During the investigation we have demonstrated dose-dependent toxicity of PHH in hematological parameters of juvenile male rats and more responsiveness of the juvenile rats to PHH in comparison to the adult rats.
2. Partial counteraction of PHH toxicity in the hematological parameters was obtained by T4 in combination with PHH in the juvenile male rats.

3. Total blood acetylcholinesterase (AChE) activity and the red blood cell AChE activity measured in vivo and in vitro respectively, showed PHH-responsive inhibition in juvenile male rats. The PHH-induced inhibition in total blood acetylcholinesterase activity could be counteracted partially by simultaneous treatment of T4 with PHH in a dose-dependent manner. In vitro study showed total counteraction of PHH-induced inhibition of the red cell membrane AChE activity after simultaneous addition of T4 or T3 with PHH in the incubation medium in a dose dependent manner. Thyroid hormone analog like TRIAC was less effective compared to T4 or T3. The biological potency appeared as T3>T4>TRIAC.

4. Administration of T4 counteracted partially the formation of PHH-induced Heinz body (measured as turbidity) formation of blood in vivo, in juvenile animals.

5. PHH at lower dose induced rise in serum T4/T3 levels whereas higher doses significant lowered the hormone levels in comparison to the control animals. Antithyroid nature of PHH predicted.

6. Histological examinations of the sections of thyroid gland obtained from different doses of PHH-treated juvenile male rats demonstrate dose-dependent hypothyroid (goitrous) appearance. Simultaneous treatment of T4 with PHH mostly prevented the animals from such hypothyroid appearance of the thyroid gland.

The investigation indicated more responsive nature of the juvenile male rats to PHH toxicity compared to the adult males and protective role of thyroid hormone from the PHH-toxicity in such animals.