Summary
1. Stress plays an important role in causing and prolonging mental and physical illness. Exposure to any type of stress leads to neuroendocrine, endocrine and metabolic changes in the organism. Under normal situations, all these responses act as defense mechanism and help the organism to face the stressful situations more effectively. However, in case the organism fails to adapt to these conditions, the above mentioned response may last long and functional disability of one or more organs may develop and may precipitate in one or the other disorders commonly termed as stress disorders.

2. The malignant transformation of a normal cell and its further progression in the human body is a polygenic phenomena. The stress and strain of the competitive life style may be one of the predisposing factors for cancer.

3. The present study has been divided into two parts, clinical and experimental. In the clinical study, the circulating levels of AChE, MAO, cortisol, LDH, GOT and GPT were estimated in psychiatric (Anxiety neurosis), cancer breast and cancer liver patients. These have been compared with the values obtained from normal controls of both the sexes. A follow-up study was also carried out in all these patients after treatment in terms of the above mentioned parameters.
4. In the experimental part, the circulating levels of AChE, MAO, cortisol, LDH, GOT and GPT and tissue levels of SOD, GST, AChE and reduced glutathione (total, free and protein bound) were estimated in restraint stressed (immobilized), DMBA induced mammary cancer, DMBA induced cancer with pre and post restraint stress, DMBA induced cancer with pre and post garlic/salvia treated rats. These have been compared with values from their respective normal controls/restraint stressed/DMBA induced cancerous rats.

5. The activities of plasma MAO, RBC AChE and osmotic fragility and levels of serum LDH, GOT and GPT, tissues AChE, SOD, GST and reduced glutathione (total, free and protein bound) were determined by spectrophotometric procedures, while the levels of plasma cortisol was measured by use of spectrofluorometer.

6. In normal humans there is no statistically significant sex-based difference in the levels of AChE, MAO, cortisol, LDH, GOT and GPT. The observed levels of AChE, MAO and cortisol were slightly higher in females, while the levels of LDH, GOT and GPT were higher in males but the difference was statistically insignificant.

7. In the patients of anxiety neurosis, the circulating levels of cortisol, GOT, GPT and LDH were significantly raised and the activities of RBC AChE and plasma MAO were significantly decreased. The biochemical parameters reverted towards their corresponding normal values after one
month of chemotherapy in anxiety neurotic patients and were less significantly altered from normals. A slight but insignificant increase in the levels of SGOT and SGPT were observed after treatment.

8. Circulating cortisol, GOT, GPT and LDH levels were significantly raised while RBC AChE and plasma MAO activities were decreased in the patients of breast cancer. After one month of treatment (surgery, chemotherapy and radiotherapy), these levels reverted towards control values except the levels of GOT and GPT which showed a slight increase.

9. In the patients of cancer liver the circulating levels of cortisol, GOT, GPT and LDH were raised significantly as compared to controls whereas the activities of RBC AChE and plasma MAO were significantly decreased. After one month of therapy all these parameters remained significantly altered, the levels reverted towards control values but still remained significantly altered. There was a slight increase in the levels of SGOT and SGPT after treatment.

10. For the experimental part female Spraque-Dawley rats were selected and the study was performed as discussed below.

11. The circulating activities of AChE, MAO, levels of cortisol, GOT, GPT, LDH and RBC membrane osmotic fragility were estimated in normal female rats. The activities of AChE, SOD and GST, levels of reduced glutathione (total, free and protein bound) were estimated in various tissues (brain, liver, kidney, heart and spleen) of control rats. In comparision to
other tissues, the brain tissues had maximum activity of AChE while kidney tissues showed minimum activity. Maximum activity of GST was in the liver, while minimum was recorded in the heart tissues. The brain and spleen tissues had minimum SOD activity while liver had maximum as compared to other tissues.

12. For the restraint stress studies the female rats were immobilized for different time intervals as 6, 12, 18, 24 and 30 hours. The above mentioned biochemical parameters were assayed after sacrificing these rats. The alterations seen in the activities of RBC AChE, plasma MAO and the levels of cortisol, LDH, GOT and GPT in the circulation were minimum at 6 and 12 hours, while a gradual alterations were recorded at 18 hours, a maximum change was observed at 24 hours. At 30 hours, a slight reversion towards normal was seen in the activities of AChE, MAO, the levels of cortisol and LDH. There was slight increase in the activities of GOT and GPT at 30 hours of restraint stress treatment.

13. As the changes observed in the above mentioned biochemical parameters were maximum at 24 hours of stress, thus, in further studies, the rats were exposed to 24 hours of stress to see it's effect on DMBA carcinogenesis. In these 24 hours stress treated rats, the activities of RBC AChE, plasma MAO were significantly decreased, while circulating levels of cortisol, GPT and LDH were significantly elevated. A less significant increase was seen in the serum GOT levels. The activities of AChE, GST and
SOD, the levels of total, free and protein bound GSH were significantly decreased in the tissues (heart, liver, kidney, spleen and brain) of restraint stressed rats as compared to values obtained from their respective normal tissues.

14. Cancer was induced by a single oral dose of DMBA (30 mg/kg body weight). The effect of pre and post restraint stress on DMBA infused rats was also studied.

15. The circulating activities of AChE and MAO were significantly decreased, while the levels of cortisol, GOT, GPT and LDH were significantly elevated in DMBA treated rats. The activities of AChE, SOD, GST and the levels of reduced glutathione (total, free and protein bound) were significantly decreased in these rats. While a further alteration was recorded in the levels of the above biochemical parameters in DMBA infused rats with pre and post-stress treatment. The post stress treatment to the DMBA infused rats caused maximum alterations, severe than pre-stress treatment as compared to the values obtained from their respective normal rats.

16. Irrespective of the treatment given to the rats the minimum RBC hemolysis observed was at 0.9% phosphate buffered saline (PBS) pH 7.4, while the maximum was as follows: For normal 0.1%, DMBA treated and restraint stressed rats 0.4%, pre-stress DMBA infused 0.3% and post stress DMBA infused 0.6% saline in 0.1 M phosphate buffer pH 7.4.
17. The maximum fragility of RBC membranes towards saline concentration was reverted to the control values after drug treatment. The pre-garlic treated DMBA infused rats showed maximum hemolysis of RBC at 0.2%. While post garlic treatment reverted it towards normal i.e. 0.1%. The RBC of pre and post salvia treated DMBA infused rats had maximum hemolysis at 0.2% phosphate buffered saline.

18. A gradual increase in the weights of normal rats was observed after commencement of the experiments till the end, while in DMBA treated or pre-and post stress treated rats with DMBA infusion either the weight was lost or there was a slight increase in weight. The weight of post stress DMBA treated rats was maximally effected. The treatment of DMBA infused rats with the indigenous drugs showed a slight improvement in weight. The post garlic treatment was found to be maximally effective in controlling the weight loss.

19. In the animals pre-treated with garlic and salvia before induction of cancer with the DMBA, the changes recorded above were less marked than in the untreated animals. The pre-treatment with garlic was more effective in preventing the changes in the above biochemical parameters than the pre-treatment with salvia. Eventhough the cancer was developed in these drug treated rats but their conditions were better than those of untreated DMBA infused cancerous rats in terms of either the weight or the above mentioned biochemical parameters.
20. The post-treatment of the rats with these drugs (garlic and salvia) after DMBA infusion brought about changes in all the parameters to bring these a little closer to the values in control animals. With both the drugs (garlic and salvia), post-treatment was more effective than the pre-treatment. Thus, both drugs can be said to have a better preventive effect on promotion than initiation of DMBA induced cancer so far as the biochemical parameters are concerned.

21. The post stress treatment on DMBA infused cancerous rats had more severe effect than pre-stress treatment in terms of changes in weight or biochemical parameters.

22. The effectiveness of garlic and salvia on DMBA carcinogenesis in terms of weight or biochemical parameters can be summarized as: post treatment with garlic > pre-treatment with garlic ≥ post treatment with salvia > pre treatment with salvia.