Chapter-5
Summary

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5.1 SUMMARY

In the present study, the anticancer and antioxidant properties of Ethanolic fruit rind extract of *Terminalia chebula*, alone and in combination with α-tocopherol on perchloroethylene (PER) induced cytotoxicity was studied in male albino rats of wistar strain.

Combinatorial treatment of *T. chebula* and α-tocopherol showed more significant tumour regression suggesting the anticancer effect of *T. chebula* on liver cytotoxicity when combined with α-tocopherol. Hepatoma bearing rats showed a significant decrease in their body weight and increased liver and kidney weight. Upon combined treatment the above changes were reverted back to near normal weights.

The reversal of the protein and non-protein nitrogenous compounds to near normal levels in combinatorial therapy rather than either α-tocopherol and *T. chebula* alone treated cytotoxic animals.

Nucleic acids (DNA and RNA) content increased in cancer conditions was found to be decreased after α-tocopherol treatment. But, more significantly controlled the nucleic acid synthesis in combined treatment of α-tocopherol and *T. chebula.*

Marker enzymes such as ALP, AST, ALT, LDH, 5'-NT and γ-GT were found to be elevated in hepatoma bearing rats and were controlled by α-tocopherol treatment. Further decrease in the enzyme level were observed in α-tocopherol and *T. chebula* – combination chemotherapy.

The serum albumin was level was decreased with compensating increase in globulins which results in fall of A/G ratio in hepatoma bearing animals. The A/G ratio was found to almost normal upon combination therapy rather than either α-tocopherol and *T. chebula* alone treated cytotoxic animals.

Lysosomal enzymes and glycoproteins levels were very much increased whereas ATPases were inhibited in hepatoma bearin rats. Administration of combination of α-tocopherol and *T. chebula* brought back these changes to near normal values which indirectly testified the membrane stabilizing properties of *T. chebula.*

Changes in carbohydrate metabolism as exemplified by high rate of glycolytic and decreased gluconeogenic enzymes with depletion of glucose and glycogen and resultant hypoglycemia among the first deviation encountered during hepatocarcinogenesis. The administration of combination treatment reversed these alterations almost to normal thus, allowing an

optimal use of carbohydrates depending upon the needs of the cell for the energy requirements.

Due to the excessive production of free radicals, increased levels of lipid peroxides and decreased content of enzymic and non-enzymic antioxidants were observed in cytotoxicity. Due to the antiperoxidative property of *T. chebula*, the increased rate of LPO was controlled and the antioxidant level was recouped back to the near normal, in alone and combination with α-tocopherol.

Lipid composition in liver and kidney of cancer bearing animals showed an increase in total cholesterol, Phospholipids and free fatty acid levels. These changes results in hyperlipidemic conditions. Administration of α-tocopherol in combination with *T. chebula* brought back all these lipid content to normal which shows its hypolipidemic activity.

Administration of *T. chebula* along with α-tocopherol increased the activities of the mitochondrial (TCA) key enzymes such as ICDH, SDH, α-KGDH and MDH and renders protection against PER induced cytotoxicity, which suggests that *T. chebula* is efficient in maintaining the mitochondrial membrane integrity.

Hepatic microsomal drug metabolizing enzymes play a vital role in perchloroethylene induced cytotoxicity, because of their involvement in activation and detoxification of PER. These changes were reverted back to around normal on combination treatment which makes us infer the microsomal protective ability of *T. chebula*.

The phase I biotransformation enzymes (NADPH-cytochrome C reductase) and phase II enzymes (GST, UDPGT) were significantly decreased in hepatoma bearing animals. *T. chebula* act as a bifunctional inducer, hence activities of all these enzymes were increased when combined with α-tocopherol.

The altered WBC, RBC, Hb, PCV and Platelet count were reversed to normal in α-tocopherol and *T. chebula* treated hepatoma bearing animals.

No significant variations of these parameters were observed in drug control (groupVII) animals reveals the non-toxic nature of *T. chebula.*

Histopathological observations of vital organs such as liver and kidney from cytotoxic and combination of drugs treated animals proves the anticancer potency of *T. chebula* with α-tocopherol, rather than *T. chebula* and α-tocopherol, when treated individually.