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**ANTI-GENOTOXIC EFFECT OF GARLIC EXTRACT AND
VITAMIN C AGAINST *IN VIVO* TRICLOSAN INDUCED
GENOTOXIC DAMAGE IN ZEBRA FISH
Brachydanio rerio (HAM).**

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Summary of the Findings

Nowadays several synthetic chelators, trace elements, vitamins and antioxidant phytochemicals have been used to manage/reduce the triclosan induced toxic manifestations. These agents especially synthetic antibacterial and antifungal agents are shown to have several side effects and prolonged usage leads to several ailments. The use of medicinal plants and their active constituents can help to a greater extent in minimizing the side effects and help to alleviate TCS induced toxic consequences. Therefore, in the present investigation, Garlic organo sulfur compound, have been tested for its efficacy against TCS induced oxidative stress mediated complications in the organs of zebra fish *Brachydanio rerio* (Ham). Induction of TCS toxicity dissolve into water. TCS increased oxidative stress in liver and alters other biochemical parameters. Supplementation of garlic extract and vitamin C showed a significant improvement in the following histopathological, haematological, biochemical and chromosomal aberration and DNA damage in zebra fish.

1. Garlic extract and vitamin C significantly reduced lipid peroxidation in plasma and increases the non-enzymatic antioxidant levels in triclosan treated fish. Further the *in vivo* studies have also shown that the garlic and vitamin C at a dose of 1gm/1ml exhibits highest free radical scavenging and antioxidant effects has been proved by antioxidant activity.
2. Garlic and vitamin C administration mitigates TCS-induced oxidative stress in zebra fish.
3. Administration of Garlic and vitamin C in TCS exposure hematological variables and blood biochemical profiles. Garlic extract and/or vitamin C significantly

reduction of DNA damage in blood of TCS treated fish. Therefore from these findings, we have concluded that the garlic organosulfur compound and vitamin C is remarkably effective in the protective effect of experimentally induced triclosan hematotoxicity in zebra fish.

4. Triclosan exposure significantly increased the number of chromosomal aberrations (CA), frequency of micronuclei (MN) and DNA damages in the liver cells. In contrast, the mitotic index in these cells was significantly reduced. In zebra fish treated with garlic extract, the altered parameters were significantly recovered when compared with Vitamin C treated rats.
5. Garlic extract and vitamin C pre-treatment significantly improved TCS-induced serum biochemical, and histopathological alterations.
6. The protective effect of garlic extract and vitamin C against *in-vivo* triclosan induced DNA damage in zebra fish on the blood and the head length and tail length were measured. Supplementation of garlic and vitamin C against TCS treated fish recovery in DNA damage.

From our results, it is assumed that antioxidant system was enhanced in blood and tissues of TCS treated zebra fish, through the haematological, biochemical, histopathological and DNA damage evidence. Garlic extract also, it acts as a indirect chelator by boosting up the sulphhydryl content and thereby enhanced the TCS chelation from the body. Garlic extract and vitamin C doses used in this study could not reveal any toxicity to the animal model. Hence, it could be advocated for the effective chelation therapy against TCS intoxication in people suffered with TCS contamination through the cosmetics, household products and occupational exposure.

Contribution to Society

As contamination is an mounting issue in today's world which is responsible for numerous ailments in exposed populations. Traditionally many medicinal plants and their active phyto constituents were consumed for the recovery of TCS induced complications, in which garlic extract is one of the major bioactive inorganic polysulfide from garlic, which has been traditionally used as a culinary food ingredient through out the world for centuries. Generally, phytoconstituents have little side effects, hence lot of investigations are undergone on medicinal plants and their active constituents for the development of new oral chelative drug/supplement without any serious side effects. Conventionally, the garlic was used as a major spice and also added in many food preparations. Our investigational outcomes clearly disclose that, garlic extract, which is one of the major active constituent of garlic, is responsible for antitoxic activity against Triclosan induced toxic extensive antioxidant activity. Thus, garlic extract and vitamin C can be used as a prospective naturally available antioxidant and antitoxic candidate for treating Triclosan intoxications and in addition we can also prevent the toxic manifestations induced by industrial effluents exposure by the regular intake of garlic and vitamin C as one of the major dietary substances or supplements.