

Evaluation of Possible Toxic Effect of Tartrazine Food dye on Swiss Albino Mice, and Histology of Testis

¹Geeta Meena, ²Beena Meena

¹ Assistant Professor, Department of Zoology, University of Rajasthan, Jaipur 302004 (India),

² Research Scholar, Department of Zoology University of Rajasthan, Jaipur

Email: ¹gtmeena1982@gmail.com

Abstract: Tartrazine is a colorant generally utilized in food items, medications and makeup. The current examination assesses the impact of 72 days Sub chronic ingestion of low dose (100 mg /kg body weight) and high dose (200 mg/kg body weight) of tartrazine on general health and histopathology of *swiss albino* mice exposed for 72 days through drinking water. Results showed a significant increase in body weight (11.18-16.14%). This study is aimed on estimation of the variation in the activity of effect of food dye on histopathology organ testes of male mice Swiss Albino Mice *Mus musculus L.* exposure to lethal oral doses (100mg/kg body weight) and (200mg/kg/b.w.)72 days. It is concluded that tartrazine dye effects adversely in both low and high dose categories of the experimental animals.

Key Words: Tartrazine, Sub chronic toxicity, histopathology testes, Swiss albino mice.

1. INTRODUCTION:

Tartrazine is an artificial yellow azo dye having trisodium salt of 3-carboxy-5-hydroxy-1 (p-sulfophenyl) -4-(sulfophenylazo) pirazolone. Food additives are substance added to food to preserve flavour or improve its taste, or previous merits. (Tawfek, N. *et al.* 2015) Many products likeIt is generally utilized as colorant in desserts, biting gum, puddings, juices, jams, soft drinks, medications and beauty care products. Since it is a nitrous subordinate (azo class), it is decreased to a sweet-smelling amine in the life form which is exceptionally sharpening. Moreover, some food additives have hepatic toxic effects as they cause damage of hepatocytes membranes, cytoplasmic vacuolization, and blood clot in central veins, disorganized hepatocytes cords, lymphocyte and neutrophiles infiltration. (Chen, X. *et al* 2013; Saxena, B and Sharma S.2015; Ali, A *etal.*2016; Karakahya, F and Koca, Y. 2016.)

2. REVIEW OF LITRATURE:

Tartrazine has been implicated as the food additive affecting individuals in the long run with allergy, asthma, purpura and eczema etc. A few of these amines are toxic, carcinogenic, and mutagenic (Chung *et al.*, 1992; Zhang and Ma, 2013). FY4 induceinstigate the clutters, for example, gastritis (Moutinhoet *al.*, 2007), neurotoxicity (Mohamed *et al.*, 2015), hepatotoxicity, nephrotoxicity, genotoxicity (Amin *et al.*, 2010; Khayyatet *al.*, 2017), and reprotoxicity (Boussadaet *al.*, 2017; Mehediet *al.*, 2009).Some countries such as Sweden, Switzerland and Norway have withdrawn tartrazine use on the grounds of its anaphylactic potential but unfortunately it is widely used in the developing countries like India in the food stuffs.

3. MATERIAL:

Test Material: Tartrazine CA.S. No – 1934-21-0

Test Animal: 4 weeks old male Swiss albino mice *Mus musculus L.*

4. METHOD:

Animals reared in the animal house under standardized conditions as per recommendations of Institutional Ethical Committee (1678/GO/a/12/CPCSEA) were divided in to 3 groups each with 5 animals and were kept individually in the polypropylene cages. Two doses of dye were given orally mixed with the drinking water for 72 days as detailed below.

Group 1 (As Control Group): Standard feed + potable water

Group 2(As Tartrazine treated Group)

(A) Standard Feed + Potable water mixed low dose of Tartrazine (100 mg/kg /b.wt.)

(B) Standard Feed + Potable water mixed high dose of Tartrazine (200 mg/kg /b.wt.)

After 72 days exposure of Tartrazine, animals were sacrificed to evaluate its effects on body weight, histopathology study of treated mice. At the end of the experiment five animals of body weight (20-22gm) of each group were anaesthetized by chloroform.

5. Animals: 10 Healthy male Swiss Albino Mice *Mus musculus L.* weighing 4 weeks old were used. The mice were kept in clean propylene cages in a temperature controlled room with 12 hours light / dark schedule. They were fed with balanced diet with free access of water.

Testes of each animal were excised and used for histological study. A portion of each testis was fixed in 10% neutral buffered formalin for stained with hematoxylin eosin and the prepared slides were examined under light microscope.

Statistical test: The results were subjected to statistical analysis to examine its significance. The data obtained from the quantitative studies have been expressed as Mean ± SEM.

The data was carried out using SYSTAT computer program version 5.0 Statistical tests (Student's t-test) were applied to find significant difference between values of various parameters recorded for control and treated animals.

6. Discussion:

Body weight:

Tartrazine exposure increased feed intake of mice at higher dose but their body weights increased at both at lower and higher dose (Table 1). Our results are in agreement with other workers reported increase in body weights of the experimental animals exposed to sunset yellow (Somia *et al.* 2016), tartrazine (Mehedi *et al.* 2013), 4 synthetic food and drug colourants (Osman *et al.* 1995), chocolate brown (Sharma *et al.* 2005a), orange red (Sharma *et al.* 2005b), malachite green (Chakravarty *et al.* 2005), apple green (Sharma *et al.* 2006), orange G (Chakravarty *et al.* 2006), tomato red (Sharma *et al.* 2006, 2008) and lead chromate (Chakravarty *et al.* 2007). Kesari powder (Dr. Gunjan Sharma 2015).

Histopathology: Result obtained the fundamental and very much separated seminiferous tubules and Leydig cells, with their standard direction were seen in charge rodent testicles. Though Tartrazine organization had diminished the space seminiferous tubules which came about in shrunken and limited Leydig cells. The ordinary and roundabout state of seminiferous tubules and spiral separation of their spermatogenic cells were likewise seriously upset by the food color treatment rather than roundabout shape, the tubules were ovally prolonged and demonstrated ineffectively separated spermatogenic cells. Extra, the treatment brought about limited intertubular space and decreased luminal space for spermatogenic products; Tartrazine (Ali *et al.* 2016), similarly Tartrazine B. (Visweswaran and G. Krishnamoorthy 2012), Food yellow 4 (Yaser *et al.* 2019), sunset yellow and curcumin (Mohamed A. Ismail 2016), sunset yellow (Magdy and Eman 2015), Natural and synthetic food colorants (Metwally *et al.* 2018).

7. ANALYSIS:

The poisonous impact of a food color Tartrazine on swiss albino mice *Mus musculus L.* discovered that body weight of increased in low and high dose treated animal's comparison to control group. Histopathological impact of mice examined compelling correlation with control bunch indicated that in low gathering Leydig cell harm, Sertoli cell diminished, Spermatazoa decline, Seminiferous Tubules shape changed. In this manner examined that tartrazine food color successful after long term utilized and hurtful.

8. FINDINGS: Effect of food dye Tartrazine showed in table control group and experimental group:

	Control group	Experimental Group LD (100mg/kg/b.w.)	Experimental Group HD (200mg/kg/b.w.)
Body weight	Normal	Increased	Increased
Sertoli cell	Normal	Damaged	Damaged
Spermatozoa	Normal	Decreased	Decreased
Seminiferous tubules	Normal	Shape changed	Shape changed
Leydig cell	Normal	Damaged	Damaged

9. RESULT:

Body Weight:

The toxic effect of a dye could be analyzed by monitoring alternations in the body weight of the animals in the present study administration of tartrazine caused a significant increase body weight of mice. It was noted in both low (11.18%) and (16.14%) high dose of tartrazine treated mice in comparison to control mice; hence, it can be inferred in the view of observation that dye somehow raised body wt. and obesity in experimental animals.

Table: 1 Effects of Tartrazine on the body weight of Swiss albino mice:

Control	LD(100mg/kg/b.w.)	HD (200mg/kg/b.w.)
32.200±1.483	35.800±0.837* (11.18%)	37.400±0.548 (16.14%)

Data in parenthesis represent % decrease/increase in the values in comparison to control. Significant at 5%*, 1%**, and 0.1%***.

Group I (Control Group) Testes:

The testes in the control mice was composed of well organized, round or oval Seminiferous tubules and distinct Leydig cells in the intertubular elements. All the stages of the seminiferous epithelium from Spermatogonia to mature Spermatazoa could be seen in the tubules. The epithelium of the Seminiferous tubules comprise of germ cell and supporting Sertoli cells arranged in order with the Spermatogonia attached with the basement membrane , spermatocytes and spermatids. The nuclear and cytoplasmic characteristics of germ cells appeared normal. Leydig cells in the interstitium were distinct with centrally placed nucleus and granular cytoplasm. The lumen of the seminiferous tubules was filled with Spermatazoa (Plate.1)

Group II (Low and High dose) Treated Group: (Plate: 2&3)

In the present investigation, a number of alternations (Plate.2&3) were observed in the histology of testes of the treated mice after exposure of Tartrazine food dye on mice.

1. Shape of Seminiferous tubules starts to lose its integrity.
2. Leydig cell damage.
3. Sertoli cell decreased.
4. Spermatazoa decrease less number of Spermatazoa in the lumen of seminiferous tubule.
5. Initiation of loosing arrangements in layers of epithelial cells.

Results are observed in treated mice Comparison to control mice.

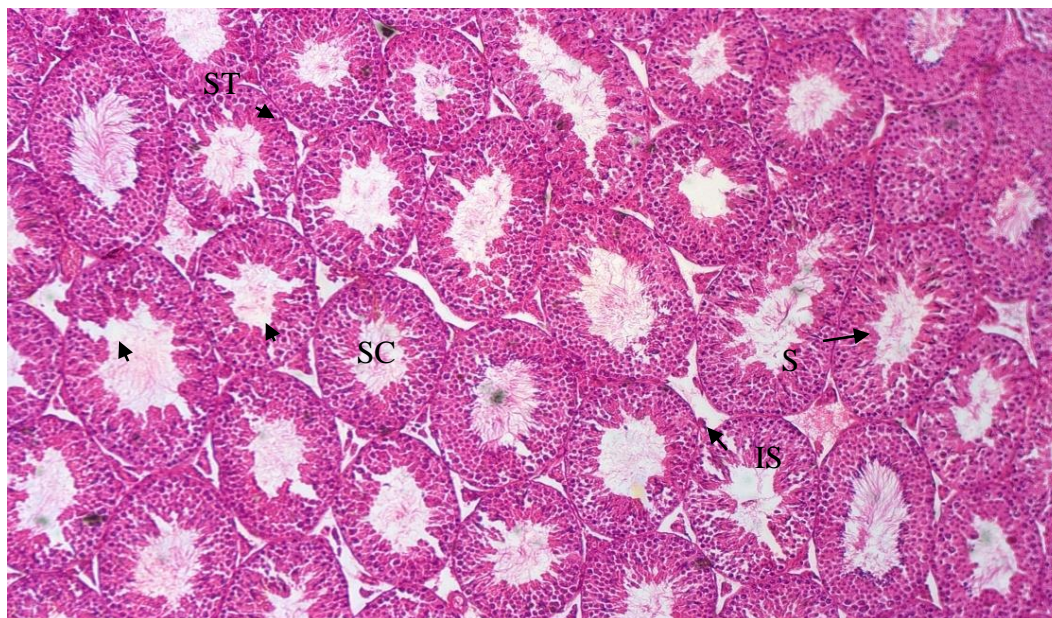


Plate: 1.1 T.S. of Testes of Swiss albino mice of Group I (Control Group at X 200)
 ST= Seminiferous Tubules, L= Leydig Cell, S= Spermatozoa, SC= Sertoli Cells,
 IS= Interstitial Space

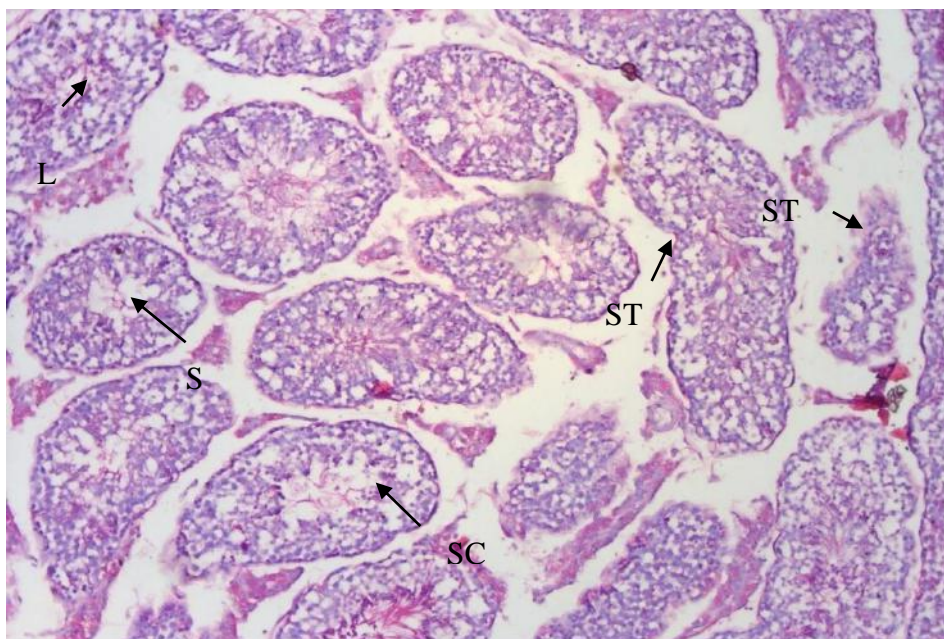


Plate: 2 T.S. of Testes of Swiss albino mice of Group II (Treated Group at X 200) L= Leydig Cell Damage, S=Spermatazoa decrease, Seminiferous Tubules shape changed, ST= Seminiferous Tubules damaged, SC= Sertoli cell decreased,

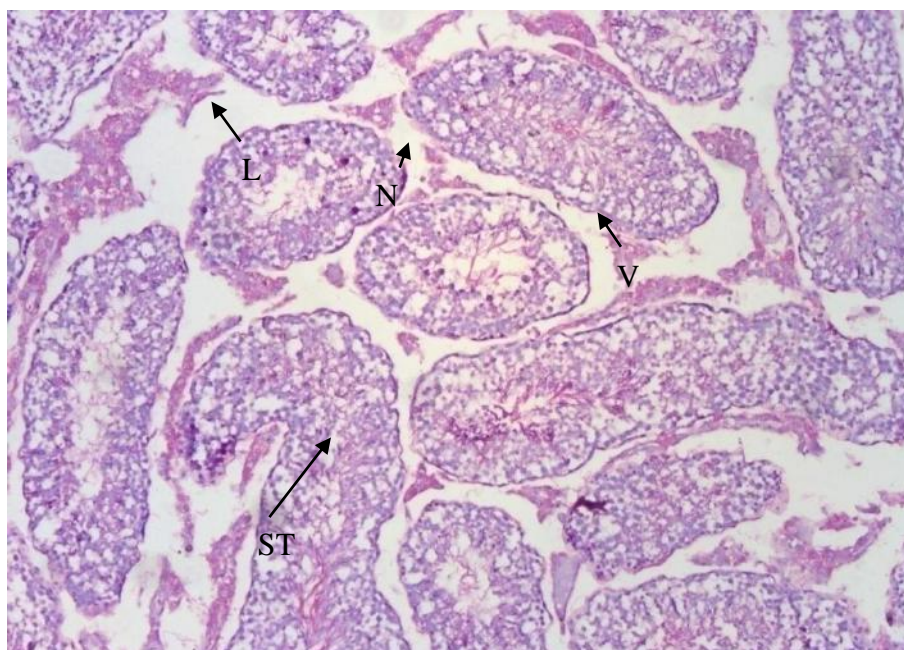


Plate: 2.1 T.S. of Testes high dose of Swiss albino mice of Group II (Treated Group at X 200) L= Leydig cell damage, ST= Seminiferous Tubule shaped curved, SC= Sertoli cell increase, V= Vacuolization, N= Necrosis

10 . Recommendations: In the present investigation, a number of alternations were observed in the histology of testes of the treated mice after exposure of Tartrazine food dye on mice. It is necessary to create public awareness regarding the negative health effects of synthetic food azo dyes and encourage consuming within ADI range limit.

11. CONCLUSION:-

Although being approved for use in the food and pharmaceutical industries, synthetic food azo dyes like Tartrazine can pose health risks. From results of the current study, it is evident that Tartrazine can affect adversely and alter function of vital organs (e.g., testis, liver and kidneys).It is necessary to create public awareness regarding the negative health effects of synthetic food azo dyes and it is suggested to consume it by people within ADI range limit.

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