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Toxicity Study of Textile Effluent of Udhna, Surat Region (Gujarat) on Wistar Albino Rat

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Abstract:

The Sub-acute oral toxicity study was designed and conducted to determine the toxicity profile of Textile Effluent Sample (SR1) when administered by oral route daily for 28 days to wistar albino rat. Effluent sample (SR1) was collected from Textile industry of Udhna, Surat. Textile Effluent Water Sample (SR1) dissolved in distilled water was administered to Rat by oral route at the dose levels of 0 mg/kg to 20 ml/kg i.e. 0 mg/kg, 2.5 ml/kg, 10 ml/kg and 20 ml/kg body weight. Histopathology, Hematological and serum Biochemical study were carried out on wistar albino rat. In this study, body weight and food consumption decreased in the 10.0 and 20.0 ml/kg dose groups, and hepato cellular hypertrophy and minimal bile duct proliferation were found at a higher incidence in animals in the 20.0 ml/kg dose group, while inflammation of the prostate were recorded at a higher incidence in the 10.0 and 20.0 ml/kg dose groups. In Textile Effluent Sample (SR1) treated groups, serum triglyceride level decrease significantly. The No Observed Adverse Effect Level (NOAEL) of Textile effluent (SR1) was considered to be 2.5 ml/kg body weight/day.

Keywords: Hematological, Sub-acute Toxicity, Serum Biochemistry, Textile effluent, Wistar albino Rat.

1. Introduction:

The pollution of water is arguably the most serious threat to current human welfare .Water is polluted not only by household but by industries also. Industrial effluent contains chemicals and biological matter that impose high demands on the oxygen present in water. Polluted water thus contain low levels of dissolved oxygen as a result of the heavy biological oxygen demand (BOD)and Chemical Oxygen Demand (COD) placed by industrial effluent discharged in to water bodies. Industrial effluents also contain chemicals and metals that are directly harmful to human health and the ecosystem. The industrial effluents will pollute the nearby water bodies affecting the growth of vegetation and aquatic life. These toxic heavy metals when released in aquatic environment will enter the food chain through bio-magnification (Lokhande, et Al., 2011). At present, environmental protection is the main need of the society .The industrialization and developments in agriculture are necessary to meet the basic requirement of people, but it is also necessary to preserve the environment. The discharge of textile wastewater into aquatic habitats is of great concern since the discharges are mostly made untreated or partially treated due to poor enforcement of existing laws in the developing world including India (Sharma et Al, 2007).The effluent from textile industries carries a large number of dyes and other additives which are added during the colouring process (Wang et. al., 2002). The use of dyes is a very mature practice used to modify the colour characteristics of different substrates, such as fabric, paper, leather, among others.(P.B. Kammradt ,2004 & D.P Oliveira,2005) global consumption of dyes and pigments approximates 7x105 tons/year and only in the textile industry it consumes about two-thirds of all the world production (Nigam et al,1996 & Robinson et al,2001).

Residues of dyes either are discharged in waters that pass by treatment systems of the companies or are released directly into the environment, causing a severe contamination of water bodies, fact mainly observed and aggravated next to areas with high concentration of textile industries [A.Stolz, 2001 & Krunz et al 2002]. The uncontrolled discharge of azo dyes in water bodies causes serious environmental problems, such as: reduction of the light absorption due to the organisms that inhabit the aquatic environments and production of different amines under anaerobic conditions (Chung, stevens, 1994,

banat et al 1996 & Slokar,Lemarechal 1998) about 10 to 15% of the total dye used by the industries are lost during the dyeing process and, thus, are being released into the environment. (Nam and Renganathan & Jarosz-Wilkolazka et al)These are difficult to remove in conventional water treatment procedures and can be transported easily through sewers and rivers especially because they are designed to have high water solubility. They may also undergo degradation to form products that are highly toxic and carcinogenic (Rindle& Troll, 1975). The effluents usually contain toxic metals such as Cd, Hg, Ag, Pb, Sn and Cr, and others like Zn, Cu and Ni which are toxic at elevated concentrations (Sunda and Huntsman, 1998). The interaction of toxic substances in the wastewater with red blood cells may cause metabolic disorders decreasing their haemoglobin carrying capacity (Eaton and Klaassen 1996).Long term irrigation with such effluent increases organic carbon content and the chance of their entrance in food chain and this ultimately causes significantly health concern. Heavy metals emerging from the textile industrial effluents can contaminate the soil and groundwater in their proximity. There is no absolute criterion for selecting a particular animal species in toxicological analysis. Rodents (mice and rats) have been wildly used in acute and chronic toxicity tests for industrial wastewater (Bertoldi et Al 2012; Zhang et Al 2010). Hematological parameters, such as hematocrit, hemoglobin, and numbers of erythrocytes and white blood cells, can be used as indicators of toxicity and have a broad potential application in environmental and occupational monitoring (Sancho *et al.*, 2000; Barcellos *et al.*, 2003). Toxicity evaluation studies would help the industry management to take necessary pollution control measures before effluent discharge in to the natural streams.

2.0 Materials and Methods:

This study was conducted in compliance with the Schedule Y guideline, Good Laboratory Practice (GLP) Regulations for Non-clinical Laboratory Studies (21 CFR Part 58), OECD Good Laboratory Practice Principles (GLP) and in accordance with regulation of the Committee for the Purpose of Control and Supervision on Experiments on Animals (Reg.No. Reg.No.1568/RO/c/11/CPCSEA dated 22nd December, 2012).

2.1 ***Sample Collection:***

Sample was collected from effluent water discharged by Textile industry of Udhna, Surat in clean sterilized 1 liter bottle and coded it as a SR1.

2.2 Acute Oral Safety Study of Textile Effluent Water Sample (SR1) in Rats:

Acute oral (gavage) toxicity studies were conducted with Textile effluent water sample (SR1) in female Wistar rats approximately 7 weeks of age. Rats were housed in a group of 3 in Polycarbonate cages with autoclaved corn cob bedding under standard laboratory conditions. Animals were fed with standard Amrut pellet diet (Pranab Agro Industries, Maharashtra, India) and sterilized water was provided ad libitum. After an overnight fast, rats were dosed orally with a limit dose of 2000 ml/kg (OECD 425). Rats were observed for mortality and clinical signs. At the end of a 14 days observation period, the rats were necropsies, examined and the weights of the liver and kidney were recorded.

2.3 Sub-Acute Toxicity Study of Textile Effluent Water Sample (SR1) in Rats:

Male and female healthy Wistar albino rats (120-135 gm body weight, 6-8 weeks old) were maintained in regulated environmental conditions (well-ventilated with > 10 air changes/h; 12-h light/dark photoperiod; temperature 22±3^{0}C; relative humidity, 50±10%), according to CPCSEA guidelines. Animal experiments were approved by Institutional Animal Ethics Committee (IAEC) of Pretox Research Centre, Surat, and were performed as per the Guidelines for Animal Care as recommended by the Indian National Academy, New Delhi (1992). Animals were fed with standard Amrut pellet diet (Pranab Agro Industries, Maharashtra, India) and sterilized water was provided ad libitum. Seven days after acclimatization, animals were used. The doses were selected according to OECD Guidelines No. 407 for 'Repeated dose 28-day oral toxicity study in rodents' (OECD 407, 1995). Accordingly one highest dose of 20.0 ml/kg p.o was selected with the aim of inducing some observable toxic effects but not death or severe suffering. Thereafter, descending sequences intermediate and low dose was selected.

2.4 Observations of Animals:

The animals were observed daily for clinical signs and mortality. Body weights were recorded every week during the study period. The amounts of supplied and remaining food and water were

measured daily and average weekly consumption was calculated. On day 28 rats were housed in metabolic cages to collect urine samples. Urine examination was done for volume, specific gravity, pH, protein, glucose, occult blood, and ketone, using Multistix 10 SG (Bayer Diagnostics, Baroda, India), Urinary sediments (pus/epithelial cells, casts and crystals of calcium oxalate) were examined microscopically. Blood was collected by retro-orbital plexus from the overnight fasted animals. Hematology analysis was performed using an automated hematology analyzer (Humacount; Human, Weisbaden, Germany). The following parameters were recorded: RBC and WBC and differential leukocyte count, hemoglobin (Hb), platelet, reticulocyte (Rt) In the serum obtained after centrifugation of whole blood (1000 g, 10 min) following parameters were measured: glucose, triglyceride (TG), cholesterol, total protein, bilirubin, alkaline phosphatase (ALP), alanine aminotransferase (ALT), aspartate aminotransferase (AST), blood urea nitrogen (BUN), creatinine, sodium, calcium, phosphorus and potassium. Measurements were made using commercial kits procured from Bayer Diagnostics, Baroda, India with the aid of a clinical chemistry analyzer Chem-7 (Erba, Manheim, Germany). Animals were sacrificed by CO_2 inhalation and the vital organs such as brain, heart, lungs, liver, spleen, kidneys, testes/ovaries were removed and weighed. All organs were fixed in 10% buffered formalin. Tissue slices were embedded in paraffin and sections stained with hematoxylin and eosin. Light microscopic examination of multiple tissue sections from each organ in all groups was performed in all groups and images representative of the typical histological profile were examined with the aid of a Motic imaging software (Motic, Hongkong). The scoring scales were as follows: 1 = normal; 2 = occasional focus of necrosis; 4 = periportal inflammation; 8 = peribronchial lymphoid aggregates; 10 = focal areas of necrosis + vacuolation and 11 = median hypertrophy of blood vessels.

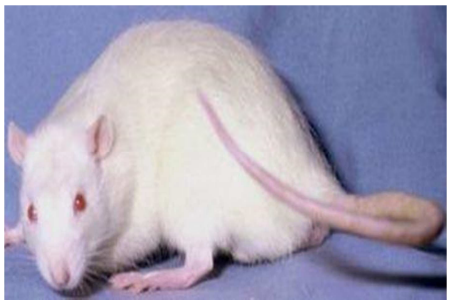

Figure 1: Wistar Albino Rat

Figure 2: Experimental Laboratory

2.5 Statistical Analysis:

Data were expressed as mean ± SD and statistical analyses were performed using Graph Pad Prism 6.0 (Graph Pad Software, Inc., San Diego, CA). Differences in body weight at different time point (Weeks 0-4) among the groups, differences of Clinical data, hematological data, urine analysis and organ weight in control group, treatment group were assessed by one-way analysis of variance (ANOVA) followed by Dunnett-test. A statistical notation of (*) indicates a statistically significant difference as compared to the control group at $p \leq 0.05$.

3.0 Results and Discussion:

3.1 Clinical Observations:

There was no treatment-related mortality of animals at any dose level tested. Gross observations did not reveal any treatment-related changes and all animals both in control and Textile effluent water sample (SR1) treated groups appeared healthy. There were no abnormalities with respect to hair coat, eye color, salivation, touch response, tail pinch and grip strength. Any clinical symptom of locomotor dysfunction, tremors or convulsions was absent, and all animals survived until necropsy. Animals of both sexes in control as well as in 2.5 ml/kg Textile effluent water sample (SR1) treated dose groups

showed identical pattern of body weight changes except 10.0 and 20.0 ml/kg dose groups shows significant body weight loss in both male and female animal (Tables1). Body-to-organ weight ratios (Tables2) and absolute organ weight (Tables3). Textile effluent water sample (SR1) treatment schedule had no effect on feed and water consumption (data not shown).

3.1 Hematology and Serum Biochemistry:

The result of hematology examination is shown in Table 4. There were no statistically significant difference in the values of RBC, WBC, and differential leukocyte counts. The other hematological and biochemical parameters showed no alteration by Textile effluent water sample (SR1) treatment. Serum biochemistry parameters are summarized in Table 5. The levels of serum glucose, total protein, albumin, urea and creatinine in Textile effluent water sample (SR1) treated groups remained within the normal range but triglyceride levels in the treatment groups decreased significantly as compared with those in the control group (Table 5). Among the indicators of liver function AST, ALP, ALT, bilirubin, sodium, calcium, phosphorus and potassium was not affected by Textile effluent water sample (SR1). However AST and ALP seemed to rise in rats treated with Textile effluent water sample (SR1), which was also observed in the satellite group treated with a dose of 20.0 ml/kg Amin et al(2010). evaluated the toxic effects of two azo dyes used as food additives, tartrazine and carmoisine, by oral administration of two concentrations (one low and other high), in albino male rats, for 30 days and found significant increase in the rates of ALT, AST, ALP, urea, creatinine, total protein and albumin in the serum of rats treated with tartrazine and carmoisine, especially in the higher concentrations. The increase in transaminase activities (AST and ALT) and bilirubin has been ascribed to their leakage from the injured hepatic parenchyma and other tissues into the serum as reported in hepatocellular disease (Mathur et al. 2003). Sharma et al had studied the toxic effect of textile waste water on Swiss albino rat and stated that textile waste water is highly toxic to test animal.(Sharma et al,2007). Sharma et al reported glomerulonephrosis and degeneration of tubular epithelium in kidney of textile wastewater exposed rats, along with alteration in serum biochemical parameters.(Sharma et al. 2006).Odjegba and Bangbose also studied the toxic effect of textile effluent and stated that treated effluent of textile having toxic substances.(Odjegba and Bangbose,2012).many evidences are available which is showing the toxic effects of industrial effluent. Faisalabad showed that soil and plants contained many toxic metals, that received irrigation water mixed with industrial effluent (Khan *et al*., 1994; Qadir, 1999). Similarly, Jaffer *et al*. (1995) found many fish containing higher concentrations of heavy metals in the area of Southeast Arabian Sea where polluted industrial water is thrown though Malir River.

3.2 Urine Analysis:

Urine analysis showed that Textile effluent water sample (SR1) treatment did not cause any significant changes in urine volume, specific gravity and pH. The occurrence of protein, pus/epithelial cells in traces was similar in control and treated groups. The presence of glucose, ketones, occult blood, casts and calcium oxalate was not observed.

3.3 Histopathology:

The macroscopic examination of vital organs showed no abnormality. The histological evaluation of brain, heart, spleen, stomach, small intestine and testes/ovary did not reveal any pathology after Textile effluent water sample (SR1) treatment except atrophy of the testes and prostate gland. However liver of treated rats showed a periportal inflammation in Textile effluent water sample (SR1) treated groups (1 animal in the lower dose (2.5 ml/kg) group, three each in median (10.0 ml/kg) and higher (20.0 ml/kg) groups. In one rat of higher (20.0 ml/kg) group, a mild bile duct hyperplasia was also noted. In one rat of higher (20.0 ml/kg) group, hypertrophy hepatocellular was found. Kidney histology showed signs of multiple foci of in one animal in the lower dose (2.5 ml/kg) group.As per the Lin et al studied in 1994,they stated that the treated effluent does not exceed the discharge limits but the results of toxicity tests show potential toxicity.

Table 1*:* Weekly body weight (g) of rats treated with Textile effluent water sample (SR1) for 28 days

Treatment (ml/kg/day)	Days						
	0	7	14	21	28	35	42
Male rats							
Control	132.2±5.4	144.3±5.3	159.5±6.6	176.8±5.3	196.5±12.3	213.4±3.9	227±6.2
2.5	130.1±4.2	146.2±3.9	163.5±7.8	178.9±7.8	192.6±10.6	203.6±8.1	
10.0	131.5±5.7	143.8±4.1	158.4±6.4	168.4±12.4	182.8±5.8*	194.9±6.3*	
20.0	126.7±7.2	139.4±8.3	151.2±10.2	160.2±7.2*	169.7±6.7*	181.5±4.4*	187.2±9.2**
Female rats							
Control	131.2±7.6	149.2±7.2	167.9±9.6	179.6±6.1	200.1±5.9	211.7±8.2	225.4±5.3
2.5	128.7±3.6	151.3±4.6	164.2±7.4	177.3±8.0	199.8±6.3	206.8±7.4	
10.0	133.3±5.8	142.8±3.5	158.7±3.6	164.0±5.9	178.3±4.2*	191.1±6.8	
20.0	127.9±4.4	139.6±9.0	155.6±5.3	167.1±11.6	175.4±9.8*	188.8±4.5*	194.3±7.3**

Data are expressed as the mean ± S.D. (n=6/sex/dose), * P<0.05 ** <0.01 compared with control group.

Table 2:- Organ -to-body weight ratios (relative organ weight) of rats treated with Textile effluent water sample (SR1) for 28 days

Organ	Treatment (ml/kg/day)				Organ	Treatment (ml/kg/day)			
	0	2.5	10.0	20.0		0	2.5	10.0	20.0
Male rat:					**Female rat**				
Liver	3.4±0.61	3.3±0.38	3.3±0.51	3.7±0.38	Liver	3.1±0.56	3.4±0.45	3.2±0.49	3.1±0.42
Kidneys	0.85±0.07	0.81±0.06	0.88±0.17	0.87±0.17	Kidneys	0.76±0.11	0.79±0.08	0.82±0.12	0.84±0.09
Heart	0.30±0.05	0.34±0.04	0.34±0.05	0.34±0.03	Heart	0.34±0.06	0.37±0.03	0.43±0.07	0.57±0.06
Brain	0.55±0.07	0.52±0.08	0.65±0.10	0.61±0.07	Brain	0.48±0.09	0.52±0.10	0.57±0.13	0.63±0.08
Lungs	0.31±0.05	0.48±0.21	0.33±0.06	0.28±0.09	Lungs	0.37±0.13	0.36±0.17	0.38±0.09	0.41±0.07
Trachea	0.12±0.01	0.11±0.01	0.13±0.01	0.14±0.02	Trachea	0.09±0.01	0.08±0.01	0.08±0.01	0.11±0.01
Stomach	0.64±0.04	0.53±0.08	0.68±0.12	0.67±0.07	Stomach	0.69±0.09	0.71±0.06	0.74±0.07	0.63±0.08
Spleen	0.35±0.05	0.30±0.04	0.38±0.05	0.35±0.04	Spleen	0.39±0.07	0.41±0.08	0.46±0.09	0.40±0.09
Adrenals	0.03±0.00	0.03±0.00	0.03±0.01	0.03±0.01	Adrenals	0.02±0.00	0.02±0.00	0.03±0.01	0.03±0.01
Testes	1.48±0.15	1.23±0.16	1.15±0.20	1.09±0.10	Ovaries	0.003±0.01	0.003±0.01	0.002±0.01	0.002±0.01
Seminal vesicles	0.28±0.04	0.26±0.03	0.30±0.06	0.34±0.07	Uterus	0.28±0.07	0.33±0.09	0.41±1.3	0.48±1.1

Data are expressed as the mean ± S.D. (n=6/sex/dose), * P<0.05 ** <0.01 compared with control group

Table 3: Absolute organ weight of rats treated with Textile effluent water sample (SR1) for 28 days

Male rat:					Female rat:				
Organ	Treatment (ml/kg/day)				Organ	Treatment (ml/kg/day)			
	0	2.5	10.0	20.0		0	2.5	10.0	20.0
Liver	7.8±1.2	7.4±1.0	7.6±1.1	8.1±1.4	Liver	7.3±1.1	7.1±1.0	6.9±1.2	7.4±1.0
Kidneys	1.9±0.1	1.8±0.2	1.8±0.1	1.6±0.2	Kidneys	1.7±0.1	1.6±0.2	1.5±0.1	1.6±0.1
Heart	0.7±0.1	0.7±0.1	0.8±0.1	0.7±0.2	Heart	0.7±0.1	0.7±0.1	0.7±0.1	0.7±0.1
Brain	1.2±0.2	1.1±0.1	1.3±0.1	1.2±0.1	Brain	1.1±0.1	0.8±0.1	1.3±0.1	0.9±0.1
Lungs	0.7±0.1	1.0±0.1	0.8±0.1	0.9±0.1	Lungs	0.7±0.1	0.6±0.1	0.7±0.1	0.6±0.1
Trachea	0.2±0.03	0.2±0.05	0.2±0.04	0.3±0.03	Trachea	0.2±0.02	0.2±0.03	0.2±0.05	0.2±0.03
Stomach	1.4±0.1	1.1±0.1	1.2±0.2	1.3±0.1	Stomach	1.2±0.1	1.1±0.1	1.1±0.1	1.2±0.1
Spleen	0.7±0.1	0.6±0.1	0.6±0.1	0.7±0.1	Spleen	0.6±0.1	0.6±0.2	0.7±0.1	0.7±0.1
Adrenals	3.4±0.3	2.5±0.4	2.9±0.5	3.2±0.4	Adrenals	0.40±0.02	0.32±0.05	0.41±0.02	0.37±0.03
Testes	0.64±0.07	0.57±0.04	0.61±0.04	0.59±0.05	Ovaries	7.3±1.1	7.1±1.0	6.2±1.2	5.8±1.0
Seminal vesicles	7.8±1.2	7.4±1.0	7.6±1.1	8.1±1.4	Uterus	0.54±0.12	0.69±0.17	0.87±0.21	1.21±0.19

Data are expressed as the mean ± S.D. (n=6/sex/dose), * P<0.05 **<0.01 compared with control group

Table 4: Hematological parameter of male rat treated with Textile effluent water sample (SR1) for 28 days

Biochemical parameter		Treatment (ml/kg/day)			
		0	2.5	10.0	20.0
Hb (g %)		17.67±0.77	17.65±0.63	17.33±0.69	16.73±0.82
PCV (%)		49.08±2.43	48.57±1.36	45.93±2.23	44.30±1.37
Total RBC (x10^6/cmm)		8.11±0.58	8.38±0.52	7.65±0.48	7.40±0.59
Rt (%)		2.17±0.75	2.50±0.55	2.83±0.75	2.17±0.58
RBC indices	MCH (Pg)	22.95±1.19	21.82±1.04	22.40±0.75	22.63±0.95
	MCV (Fl)	60.00±2.61	64.67±3.61	59.67±1.21	59.83±1.29
	MCHC (%)	34.93±2.57	35.93±1.02	37.55±1.02	37.72±1.08
Total WBC (x10^3/cmm)		7.08±1.41	5.57±0.68	5.62±0.60	7.97±0.17
Differential WBC	N (%)	13.83±2.14	13.17±3.31	10.17±2.40	9.67±1.91
	L (%)	78.83±2.64	80.83±3.49	82.83±1.72	81.67±1.26
	E (%)	2.17±0.75	1.33±0.52	1.50±0.84	1.67±0.96
	M (%)	5.67±0.52	5.00±0.89	5.50±1.05	7.00±1.29
	B (%)	0	0	0	0
Platelets (x10^5/cmm)		678.17±60.95	662.17±77.72	638.17±60.41	643.67±70.42

Data are expressed as the mean ± S.D. (n=6/sex/dose), * P<0.05 **<0.01 compared with control group.

Table 5: Biochemical parameters of Male rat treated with Textile effluent water sample (SR1) for 28 days

Biochemical parameter	Dose (ml/kg)			
	0	2.5	10.0	20.0
Total protein (g/dl)	6.2±0.44	6.9±0.45	6.5±0.21	6.4±0.23
ALT (IU/L)	53.0±3.7	49.3±10.6	53.1±16.0	58.3±10.3
AST (IU/L)	169.5±25.03	103.6±9.52	157.7±20.18	146.5±32.40
ALP (IU/L)	196.2±61.02	203.3±37.66	218.2±58.2	204.3±73.27
Glucose (mg/dl)	86.7±5.4	90.8±5.3	80.7±5.1	94.2±6.6
BUN (mg/dl)	17.9±2.0	16.9±3.9	14.8±2.2	14.2±0.7
Triglyceride (mg/dl)	102.5±6.4	91.5±9.9	77.3±6.8*	71.7±6.1*
Bilirubin (mg/dl)	0.43±0.16	0.48±0.23	0.37±0.08	0.38±0.12
Creatinine (mg/dl)	0.45±0.19	0.48±0.08	0.63±0.10	0.62±0.08
Albumin (g/dl)	3.58±0.36	3.10±0.36	3.40±0.19	3.30±0.18
Sodium	148.5±1.6	150.6±2.7	146.5±2.8	148.3±5.0
Potassium	6.13±0.9	5.32±0.5	5.23±0.4	5.03±0.5
Phosphorus	7.17±1.9	7.18±1.1	5.75±0.8	5.63±1.1
Calcium	9.53±1.3	9.90±1.2	10.70±0.6	10.52±1.1

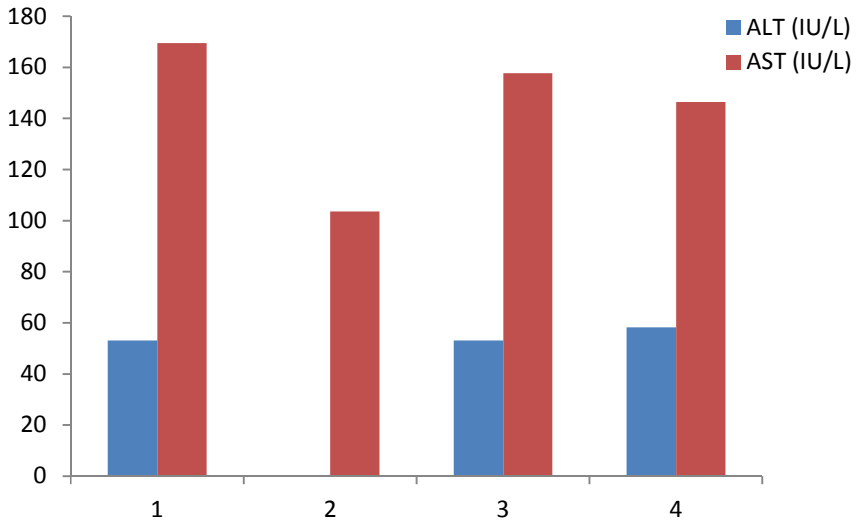

Fig. 3: ALT (IU/L) and AST (IU/L) at Dose 0 to 20(ml/kg) in Male rat

Table 6: Biochemical parameters of Female rat treated with Textile effluent water sample (SR1) for 28 days

Female rat:				
Total protein (g/dl)	6.4±0.49	6.9±0.60	6.8±0.40	6.6±0.32
ALT (IU/L)	52.0±7.8	37.3±7.2	26.0±3.8	44.3±10.6
AST (IU/L)	139.5±19.1	160.8±21.7	153.0±21.9	129.8±27.6
ALP (IU/L)	103.8±69.5	150.3±50.9	97.3±14.1	147.2±65.9
Glucose (mg/dl)	102.0±12.9	79.8±16.1	70.5±6.6*	79.8±12.5
BUN (mg/dl)	16.3±2.9	15.3±3.1	14.9±1.7	11.5±2.4
Triglyceride (mg/dl)	115.8±10.4	94.5±10.6	80.5±1.9*	64.0±2.0**
Bilirubin (mg/dl)	0.30±0.09	0.45±0.10	0.40±0.13	0.45±0.10
Creatinine (mg/dl)	0.45±0.20	0.60±0.06	0.67±0.08	0.78±0.08
Albumin (g/dl)	3.27±0.27	3.53±0.34	3.48±0.26	3.25±0.19
Sodium	148.5±4.6	147.0±5.2	146.8±3.2	146.3±3.3
Potassium	6.1±0.88	5.3±0.53	5.2±0.39	5.1±0.53
Phosphorus	7.2±1.9	7.2±1.1	5.8±0.8	5.6±1.1
Calcium	9.5±1.3	9.9±1.1	10.7±0.6	10.5±1.1

Data are expressed as the mean ± S.D. (n=6/sex/dose), * P<0.05 **<0.01 compared with control group.

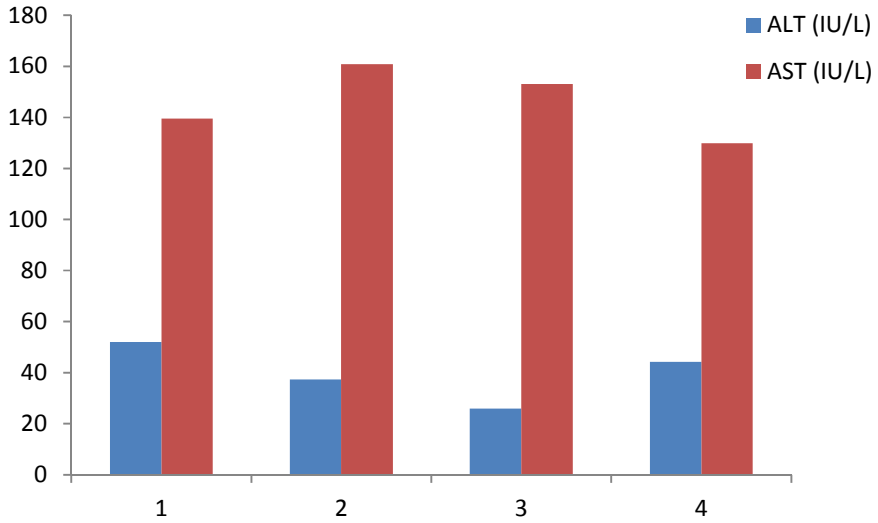

Fig. 4: ALT (IU/L) and AST (IU/L) at Dose 0 to 20(ml/kg) in Female rat

4.0 Conclusion:

In this study, body weight and food consumption decreased in the 10.0 and 20.0 ml/kg dose groups; Study report we have observed that Textile effluent water sample (SR1) treatment at doses of 10.0, and 20.0 ml/kg body weight/day in male rats, food consumption and body weight gain decreased, and hepato cellular hypertrophy and minimal bile duct proliferation were found at a higher incidence in animals in the 20.0 ml/kg dose group, while inflammation of the prostate were recorded at a higher incidence in the 10.0 and 20.0 ml/kg dose groups. Textile effluent water sample (SR1) has been reported to have effects on lipid profile and its beneficial for fat metabolism has already been proved. In this present study we have seen that in

Textile effluent water sample (SR1) treated groups' serum triglyceride level decrease significantly. Based on the clinical finding, functional and histopathological changes among Textile effluent water sample (SR1) treated dose groups; it is proposed that the no observed adverse effect level (NOAEL) of Textile effluent water sample (SR1) is considered to be 2.5 ml/kg body weight/day.

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