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EVALUATION OF TOXICITY PROFILES OF *MUSA PARADISIACA* L (PSEUDOSTEM) JUICE

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ABSTRACT

Musa paradisiaca L is an herbaceous plant with a robust tree like pseudostem, and a crown of large elongated oval deep green leaves with a prominent midrib. *Musa paradisiaca* L (Musacaea) is popularly known as "Banana". Due to the enriched food value and versatile medicinal value, banana is one of the most important fruits and vegetable crops of several countries. *Musa* species possess various biological activities such as anti diabetic, anti ulcerogenic, anti diarrheal, antitumor and anti mutagenic. In the present work pseudostem juice of *Musa paradisiaca* L was evaluated for its toxicity profiles. Toxicity studies were carried out using two methods, namely acute oral toxicity and Repeated dose 28-day oral toxicity as per OECD 425 and 407 respectively. During the entire period of study, behavioural changes, food intake, water intake and weekly body weight changes were evaluated. At the end of the treatment, serum samples were subjected to biochemical analysis. The data of the results obtained depicted that the pseudostem juice of *Musa paradisiaca L* is not toxic, hence can be used as an adjuvant in cancer and diabetic therapies to prevent toxic effects that might result due to the long term administration of chemo therapeutic agents.

Keywords: *Musa paradisiaca L,* Anti diabetic and anti tumor, Toxicity studies.

INTRODUCTION

Toxicity is the degree to which a substance can damage by an organism. In the Indian traditional Medicine and the ancient Persia is regarded as nature's secret of perpetual youth. *Musa paradisiaca* L is known as a promoter of health digestion and creating a feeling of youthfulness. They are help in retention of calcium, phosphorus and nitrogen. *Musa paradisiaca* L is used as a dietary food against intestinal disorders [1]. *Musa paradisiaca L* (Pseudostem) is rich in fiber and helps in cholesterol metabolism [2]. *Musa paradisiaca* L(Pseudostem) juice finds use in treating kidney stones. This juice contains potassium which contributes in the effective functioning of muscles and maintains fluid balance with in the body. It is diuretic and helps in detoxification processes of the body [3]. It also contains Vitamin B_6 which helps in the production of Haemoglobin and insulin [4]. It is also a source of calcium, iron, magnesium and phosphorus used as a laxative and in constipation. In the present work such as eco friendly herbal and is evaluated for its toxicity profiles.

MATERIALS AND METHOD

Collection and preparation of plant extract

Musa paradisiaca L (Pseudostem) was collected from Trichy identified and authenticated at the RAPINAT of St. Joseph college, Trichy. The Pseudostem bits were cut in to small pieces, cleaned, boiled and juice were collected for analysis and subjected to preclinical toxicity studies as per OECD guidelines.

Acute Toxicity Testing (OECD-425)

Acute oral toxicity of *Musa paradisiaca* in female rats was performed as per Organization for Economic Cooperation and Development (OECD) Test Guidelines 425 [5]. Five Rats were given a single dose of 2000 mg/kg. of extract and were kept under observation for 14 days. The feed intake, weekly body weight changes were recorded. On Day 14, all rats were sacrificed and gross pathology was carried out.

Repeated Dose 28-Day Oral Toxicity (OECD 407)

Repeated Dose 28-Day Oral Toxicity of *Musa paradisiaca* was performed as per Organization for Economic Cooperation and Development (OECD) Test Guidelines 407 [6]. In Repeated 28-day Oral toxicity study, the experimental animals were divided into six groups. Group I animals served as normal control. Group II, III and IV animals were treated with *Musa paradisiaca L*.(Rhizome) juice extract at a dose levels of 500 mg/kg bw,1000 mg/kg bw and 2000 mg/kg bw respectively for 28 days. On 28th day, all the animals were sacrificed; the blood was collected and analyzed for haematology and biochemical parameters. The Group V served as satellite-normal control and treated with vehicle alone. Group VI animals were given a dose of 2000 mg/kg bw for 28 days and the treated animals were observed for further 14 days to see the reversibility in toxicity. On 42nd day the animals were sacrificed, the blood was collected and analyzed for biochemical parameters.

The serum samples were subjected to various biochemical parameters by employing standard procedures. Glucose [7], Urea by Diacetylmonoxime method [8], Cholesterol [9], Creatinine by the Jaffe reaction [10], Alanine Transaminase and Aspartate Transaminase [11] and total protein [12].

RESULT

Table 1: Effect of *Musa paradisiaca* on weekly body weight change after treating with single dose of 2000 mg/kg orally in healthy female normal rats

Animal ID	Body weight (g)		
	Day 0	Day 7	Day 14
Head	183.16	205.76	226.58
Neck	179.57	197.56	223.13
Body	176.3	183.38	220.8
Body middle	155.93	172.13	189.68
Colourless	183.23	200.44	219.33
Mean	175.64	191.85	215.90

Standard deviation	11.39	13.79	14.91

Table 2: Effect of *Musa paradisiaca* (MP) on weekly body weight changes in 28 days repeated toxicity study in male rats

Group Description	Day0	Day 7	Day 14	Day 21	Day 28
Normal control	243.50±15.20	298.15±19.73	325.76±15.30	338.06±20.12	339.06±18.81
MP (500 mg/kg)	239.12±21.60	287.79±27.27	305.96±29.22	327.97±33.47	329.30±37.44
MP (1000 mg/kg)	237.84±19.62	279.42±18.31	291.00±19.17	308.39±19.23	311.27±21.11
MP (2000 mg/kg)	239.37±23.28	268.76±24.04	297.73±27.32	317.82±30.99	315.52±31.42

The results are expressed as means ± SD., N=5

Table 3: Effect of *Musa paradisiaca* (MP) on weekly body weight changes in 28 days repeated toxicity study in female rats

Group Description	Day 0	Day 7	Day 14	Day 21	Day 28
Normal control	180.32±13.46	198.74±11.66	203.18±14.29	211.63±12.06	203.00±11.41
MP (500 mg/kg)	172.14±5.30	191.75±6.25	194.13±4.48	204.10±3.93	194.86±5.47
MP (1000 mg/kg)	180.68±12.74	203.41±14.72	203.84±14.32	217.89±13.53	209.58±14.48
MP (2000 mg/kg)	178.91±12.11	194.67±12.58	204.36±12.14	214.99±16.96	211.05±12.90

Table 4: Effect of *Musa paradisiaca* (MP) on biochemical parameters in 28 days repeated toxicity study in male rats

Group Description	Albumin (g/L)	ALT (U/L)	AST (U/L)	Total Cholesterol (mg/dL)	Creatinine (mg/dL)	Glucose (mg/dL)	Total protein (g/dL)	Urea (mg/dL)
Normal control	2.99± 0.11	64.40± 15.87	133.00± 33.67	82.60± 9.29	0.79± 0.04	104.00± 10.77	6.41± 0.26	26.40± 3.85
MP (500 mg/kg)	3.26± 0.25	56.40± 6.11	108.20± 18.61	94.60± 14.62	0.79± 0.10	95.60± 9.07	6.81± 0.27	31.00± 1.58
MP (1000 mg/kg)	3.12± 0.30	49.60± 10.71	113.40± 20.60	80.20± 17.58	0.79± 0.02	94.60± 10.50	6.76± 0.40	31.00± 2.12
MP (2000 mg/kg)	3.08± 0.21	54.80± 10.23	117.80± 32.38	89.40± 9.24	0.76± 0.03	81.60± 15.08	6.42± 0.34	29.80± 4.87
Satellite Normal control	3.22± 0.24	69.40± 29.70	206.60± 30.90	81.20± 11.65	0.90± 0.06	93.00± 15.70	6.66± 0.26	31.80± 1.48
Satellite MP (2000 mg/kg)	2.93± 0.37	66.60± 14.05	150.40± 8.44	89.00± 10.79	0.81± 0.09	94.00± 17.48	6.10± 0.68	25.60± 5.59

Table 5: Effect of *Musa paradisiaca* (MP) on biochemical parameters in 28 days repeated toxicity study in female rats

Group Description	Albumin (g/L)	ALT (U/L)	AST (U/L)	Total Cholesterol (mg/dL)	Creatinine (mg/dL)	Glucose (mg/dL)	Total protein (g/dL)	Urea (mg/dL)
Normal control	3.42± 0.35	56.80± 16.56	113.40± 10.60	87.60± 7.33	0.80± 0.03	92.40± 9.34	5.65± 2.79	33.80± 4.87
MP (500 mg/kg)	3.27± 0.32	54.40± 9.21	122.40± 36.74	97.60± 14.22	0.80± 0.03	88.60± 10.95	6.79± 0.44	29.80± 3.11
MP (1000 mg/kg)	3.55± 0.30	37.60± 5.32	103.60± 27.90	102.60± 20.12	0.75± 0.05	87.60± 21.00	6.82± 0.31	32.00± 5.43
MP (2000 mg/kg)	3.29± 0.25	48.60± 6.39	144.20± 35.91	85.20± 15.25	0.80± 0.03	82.60± 12.72	6.55± 0.34	38.40± 2.88
Satellite Normal control	3.48± 0.26	62.60± 12.46	173.00± 43.35	96.80± 9.52	0.89± 0.04	88.00± 22.14	6.80± 0.31	32.60± 8.14
Satellite MP (2000 mg/kg)	3.38± 0.43	57.40± 18.47	153.60± 16.18	91.40± 6.02	0.87± 0.07	76.00± 15.03	6.41± 0.70	32.00± 4.36

In acute oral toxicity study, single dose (2000 mg/kg) was administered and observed for 14 days. During the observation period, weekly body weight and feed intake was observed. No significant change was observed in the body weight of the experimental animal (Table 1). In the present study, it was observed that there is no drug related toxicity by *Musa paradisiaca* juice and concluded that the maximum tolerated dose is greater than 2000 mg/kg.

In sub-acute toxicity study, Oral administration of *Musa paradisiaca* L(Pseudostem) juice at a dosage level of 500 mg/kg bw,1000 mg/kg bw and 2000 mg/kg bw showed no toxic effect in experimental animals. No significant change was observed in weekly body weight changes in both male and female rats (Table 2 and 3). The serum was subjected to various biochemical parameters and showed no significant changes in pseudostem juice treated rats when compared with normal control animals (Table 4 and 5). The behavior changes were observed in all the treated animals and found no significant changes in drug treated animals. In the present study it is concluded that *Musa paradisiaca* L(Pseudostem) juice administered at the dose level 2000 mg/kg for 28 days is very safe and has not produced any significant changes in both body weight changes and biochemical parameters.

CONCLUSION

Toxicity studies carried out in the present work suggested that the non toxic nature of the plant extract which is evidenced through increase in body weight and other biochemical parameters debased in the experimental animals.

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