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Hepatoprotective Potential of Aqueous Fruit Extract of *Solanum Xanthocarpum* against The Rifampicin and Ionized Induced Liver Injury in Wistar Albino Rats

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ABSTRACT
Traditional ancient medical system use the plants as drugs to cure many chronic as well as inflammatory diseases among them one of Indian system is ayurveda that is a repository of many medicinal plants. Some of the medicinal plants are reported as very good hepatoprotectiv drugs on of which is Solanum Xanthocarpum .In this study hepatoprotective potential of aqueous fruit extract of Solanum Xanthocarpum was investigated by causing the liver damage by using the antitubercular drugs Rifampicine (RIF) and Isoniazid (INH) in wistar albino rats. Liver injury done by administrating the 25, 50, & 100mg/kg/day RIF and INH for seven days as a result serum alanin amino transferase (ALT), aspartate amino transferase (AST), alkaline phosphatage (ALP) and total Bilirubin increased. Following the liver injury aqueous fruit extract of Solanum Xanthocarpum (AFSX) 125,250 and 500 mg/kg/body wt. administered orally for 21 days that demonstrate the significant (p<0.05-0.001) dose dependent decrease in ALT,AST, ALP and total bilirubin. Result inferred that aqueous fruit extract of Solanum Xanthocarpum (AFSX) show the hepatoprotective effect against the liver injury caused by RIF and INH administration. Active constituent of fruit can be formulated and standardized as potent hepatoprotective supliment along with antitubercular drugs.
Keywords: Antitubercular, ALT,AST, ALP

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INTRODUCTION

Plants are potent source of phyto-active compounds that are used by human population from ancient times. According to world health organization about 80% population of world depend upon the traditional medicine[1]. *Solanum xanthocarpum* (SX) Schrad. & Wendl. (Family: Solanaceae) this is a perennial plant commonly known as Choti Kateeli, Jahar kateeli, Bhutkatya or Bhumiringani in Hindi is used in various form of medicine as in ayurveda, siddha, unani and in tribals in preparation such as decoction, aswa, ghrita, quatha etc. Dasmula Ashva contain the root of SX [1] described in the ancient Indian medicine system Ayurveda and in the "Charak sanhimta" commonly known as the Indian night shade or Yellow berried night shad [2, 3]. It has spiny leafs , bright yellow green fruits and found wildly all over India [4]. In traditional ayurvedic medicine *Solanum xanthocarpum* was use to treat asthma and bronchitis. It's hot aqueous extract has the immunomodulatory potential [5],antimicrobial activity and antioxidant activity [6]. Phytochemical studies of whole plant aqeous extract showed the presence of phenolics [7], flavonoids, steroidal glycoside and steroidal saponins [8]. In the hepatic toxicity hepatic cell become less functional and marker enzyme like alanin transaminase (ALT) , aspartate amino transferase (AST) and Alkaline phospatase (ALP) level become high [9]. In the streptozotocin induced diabetic rat significant increase of ALT, AST and ALP takes place but when these rats are fed with the aquous leaf extract of Solanum surattense the level of hepatic marker enzyme markedly decreased [10]. In this present study liver function was suppressed by oral feeding of antitubercular drugs and hepatoprotective activity of aqueous extract of SX fruit was evaluated in Wistar albino rats.

MATERIAL AND METHODS

Rifampicin Inh 450 mg/300 mg Capsule of Zydus Cadila was purchased from local medical store and prepare a suspension in distilled water stored at 4 °C for further use.

Berry Fruits of SX was collected from the Mathura and authenticated by Agarkar institute Pune with voucher deposition number 28. Fruits of SX was shade dried and crushed in pastel and mortar , hot aqueous extract was prepared by the help of shoxlet apparatus by taking the 100 gram of SX fruit powder. Extract was dried by rotary evaporator and lyophilized by lyophilizer . Percentage yields was calculated was 18.2%. Phytochemical screening confer the presence of glycosides, triterpine, flavanoids, saponine and quersetine.

Four groups comprising five Wistar albino rats in each group were made. G-I was control and G-II,G-III & G-IV were given 25, 50, & 100mg/kg/day RIF and INH for seven days on 8^{th} days blood from all wistar albino rats were collected in EDTA coated vials from retro orbital plexus for Quantitative analysis of alanine aminotransferase (ALT), aspartate amino transferase (AST), Alkaline phospatase (ALP) and bilirubin (liver function test) were determined using span diagnostic kit. Reading was taken with UV-visible double beam spectrophotometer. Hot aqueous fruit extract of *Solanum xanthocarpum* (AFSX) of concentration 125mg, 250mg, and 500 mg/kg body weight doses given to all G-I, G-II,G-III & G-IV respectively along with rat food pellets and water *ad libitum* for 21 days. On 22^{nd} day again the blood was collected and estimated for level of ALT, AST, ALP and total bilirubin.

RESULT

It was investigated that treatment with anti tubercular drugs Rifampicin Inh 25, 50, & 100mg/kg/day to groups G-II,G-III & G-IV show the dose dependent increase in ALT, AST, ALP and total bilirubin. Table 1. Same group of Wistar albino rats were fed with hot aqueous fruit extract of *Solanum xanthocarpum* (AFSX) of concentration 125mg, 250mg, and 500 mg/kg body weight that show the significant ($p<0.05$-0.001) dose dependent decrease in ALT, AST, ALP and tolal bilirubin Table 2.

DISCUSSION

Liver is a very important organ of body that is associated with several metabolic function and one of the important function of liver is the protection against several toxic substance and participate in xenobiotics [11, 12]. Metabolism of xenobiotics depend upon the enzyme ctyochrome P450 that is present in hepatic cell [13]. It was observed that liver injury caused by different factors decrease the different metabolic activity of liver like metabolism of amino acid and proteins by the help of alanine transaminase (ALT), aspartate transferase (AST) and alkaline phospatase (ALP) [14]. Bilirubin is a catabolic product of Red blood cell degradation that is scavenge by the liver cell so its concentration decreased in blood while in injured liver bilirubin cannot catabolised so its level increased in blood [15]. Liver injury can be diagnose by the liver function test that show higher level of ALT, AST, ALP and bilirubin as compare to normal level [16]. These three tests are routinely used to examine the health status of liver [17]. In our investigations Rifampicin Inh 25, 50, & 100mg/kg/day show ALT value in G-II,III & IV(32.12^{bc}±1.68, 36.2^{a}± 0.61, 41.45^{a}±0.82) respectively as compared to control 27.47^{c}± 2.23, AST level 65.67^{a}± 1.28, 68.44^{a}± 3.76 and 73.83^{a} ±1.32 in all three groups of rats fed orally as compared to control 62.35^{b} ± 2.70 and ALP value 87.76^{a}± 1.47, 92.34^{a}± 2.71, 103.63^{a} ±1.34 in all three respective group as compare to control 78.13^{b} ± 2.70. Level of bilirubin also showed increased trend but not as remarkable as AST, ALT and ALP level. Same group of Wistar albino rat when fed with hot aqueous fruit extract of *Solanum xanthocarpum* (AFSX) of concentration 125mg, 250mg, and 500 mg/kg body weight doses along with normal rat diet for 21 days that result show dose dependent lowering of ALT, AST and ALP significantly but level of bilirubin not decreased significantly. This study supports that all the three doses have no adverse effect on liver. Results of present study show that AFSX has the hepatoprotective effects that was also reported by several workers who investigated the hepatoprotective activity of *Solanum xanthocarpum* fruits and leaf extract in carbon tetra chloride induced liver injury in Wistar albino rat [18, 19]. It was also observed that hepatoprotective activity of Jigrin a polyherbal formulation containing SX in rats with liver damage induced by galactosamine [20].

Fruits of *Solanum xanthocarpum* contain high amount of alkaloid solosodine, which is shown the variation in yield 1.1%–4.6% [21]. Berries collected in October that show the presence of alkaloids solasonine and solamorgine as compare to fruits collected in summer show presence of alkaloid solasonine [22]. In this study it may be concluded that its hepatoprotective activity will also depend upon the seasonal fruit extract and for this another line of study required. Active constituent of fruit can be formulated and standardized as potent hepatoprotective supplement along with antitubercular drugs.

Table1. Effects of Rifampicin Inh 25, 50, & 100mg/kg/day on liver function blood serum parameter of Wistar albino Rat.

Biochemical Parameter	Group I Control	Group II	Group III	Group IV
ALT (IU/L)	27.47^{c}± 2.23	32.12^{bc}±1.68	36.2^{a}± 0.61	41.45^{a}±0.82
AST(IU/L)	62.35^{b} ± 2.70	65.67^{a}± 1.28	68.44^{a}± 3.76	73.83^{a} ±1.32
ALP(IU/L)	78.13^{b} ± 2.70	87.76^{a}± 1.47	92.34^{a}± 2.71	103.63^{a} ±1.34
Billirubin (mg/dl)	0.23 ± 0.30	0.28 ± 0.02	0.37±0.06	0.41 ± 0.5

Table2. Effects of AFSX on liver function blood serum parameter treated with Rifampicin Inh 25, 50, & 100mg/kg/day on Wistar albino Rat.

Biochemical Parameter	Group I Control	Group II	Group III	Group IV
ALT (IU/L)	28.26^{c}± 1.23	31.02^{bc}±0.61	30.2^{a}± 0.41	$2713.^{a}$±0.72
AST(IU/L)	61.27^{b} ± 1.58	58.38^{a}± 1.32	57.24^{a}± 1.76	59.42^{a} ±1.64
ALP(IU/L)	79.13^{c} ± 2.30	81.43^{a}± 1.09	79.39^{a}± 3.76	77.41^{a} ±0.64
Billirubin (mg/dl)	0.28 ± 0.32	0.27 ± 0.01	0.29±0.06	0.26 ± 0.31

REFERENCES

1. Sen, S. and Chakraborty, R. (2016) Revival, modernization and integration of Indian traditional herbal medicine in clinical practice: importance, challenges and future. J Tradit Complement Med, 7(2):234–44.
2. Sharma, N., Sharma,A.K., Zafar, R.(2010) Kantikari: a prickly medicinal weed ~ ecosensorium. J Phytol Res, 9(1):13–17
3. Parmar,S., Gangwal, A., Sheth, N.(2010) *Solanum xanthocarpum* (Yellow Berried Night Shade): a review. Der Pharmacia Lett; 2(4):373–83.
4. Parmar, K.M., Itankar, P.R., Joshi, A., Prasad, S.K. (2017)Anti-psoriatic potential of *Solanum xanthocarpum* stem in imiquimod-induced psoriatic mice model. J Ethnopharmacol, 2017; 198:158–66
5. Ahmed MM, Andleeb S, Saqib F, Hussain M, Khatun MN, Ch BA, Rahman H. Diuretic and serum electrolyte regulation potential of aqueous methanolic extract of *Solanum xanthocarpum* fruit validates its folkloric use in dysuria. BMC Complement Altern Med, 2016; 16:166.
6. Choudhary, P.K., Khandelwal, V., Gupta, S.,Chaubey, K. K., Singh, S.V., Goel, A. and Bhatia,A.K. (2019) Immunosuppressive and anti-cancer potential of aqueous extract of *Solanum Xanthocarpum* Indian Journal of Traditional Knowledge,18(3), pp. 451-457,2019.
7. Choudhary, P., Bhatia.A.K. and Goel, A. (2016) Efficacy of Antimicrobial and Antioxidant Activity of *Solanum Xantocarpum* Whole Plant hot Aqueous Extracts, Journal of pure and applied microbiology,10,2,1403-1408.
8. Kumar, N., Prakash, D., Kumar, P.(2010) Wound healing activity of *Solanum xanthocarpum* Schrad. & Wendl fruits. Indian J Nat Prod Res, 1(4):470–5.
9. Choudhary, P., Bhatia, A.K. and Goel, A, (2016) Efficacy of Aqueous Extract of Solanum xanthocarpum on Hematological and Biochemical Parameters of wistar albino rat, Advances in Bioresearch,7,3,155-161
10. Gupta, R.K., Hussain, T., Panigrahi, G., Das, A., Singh, G.N., Sweety, K., Faiyazuddin, M., Rao, C.V. (2011a) Hepatoprotective effect of *Solanum xanthocarpum* fruit extract against CCl4 induced acute liver toxicity in experimental animals. Asian Pac J Trop Med, 4(12):964–8.
11. Sridevi,M., Senthil, S., Pugalendi, K.V. (2007) Antihyperglycemic effect of *Solanum xanthocarpum* leaf-extract in streptozotocin induced diabetic Rats. J Pharmacol Toxicol, 2:621–9.
12. Funk, C. (2008) The role of hepatic transporters in drug elimination. Expert opinion on drug metabolism & toxicology. Apr 1;4(4):363-79.
13. Anzenbacher, P., Anzenbacherova, E. (2001) Cytochromes P450 and metabolism of xenobiotics. Cellular and Molecular Life Sciences CMLS. May 1;58(5-6):737-47.
14. Jalali Ghassam ,B., Ghaffari, H., Prakash, H.S., Kini, K.R. (2014) Antioxidant and hepatoprotective effects of *Solanum xanthocarpum* leaf extracts against CCl4-induced liver injury in rats. Pharm Biol, 52(8):1060–8
15. Vitek, L., Schwertner, H.A. (2007) The heme catabolic pathway and its protective effects on oxidative stress mediated diseases. Advances in clinical chemistry. Jan 1;43:1-57.
16. Singh, H., Prakash, A., Kalia, A.N., Majeed, A.B. (2015) Synergistic hepatoprotective potential of ethanolic extract of S*olanum xanthocarpum* and *Juniperus communis* against paracetamol and azithromycin induced liver injury in rats. J Tradit Complement Med ; 6(4):370–6.
17. Giannini, E. G., Testa, R., & Savarino, V. (2005). Liver enzyme alteration: a guide for clinicians. Canadian medical association journal, 172(3), 367-379.
18. Gupta, R.K., Hussain, T., Panigrahi, G., Das, A., Singh, G. N., Sweety, K. et.al. (2011) Hepatoprotective effect of *Solanum xanthocarpum* fruit extract against CCl4 induced acute liver toxicity in experimental animals. Asian Pacific journal of tropical medicine, 4(12), 964-968.
19. Hussain,T., Gupta, R.K., Sweety, K., Khan, M.S., Hussain, M.S., Arif, M.D., Hussain, A., Faiyazuddin, M.D., Rao, C.V. (2012) Evaluation of antihepatotoxic potential of *Solanum xanthocarpum* fruit extract against antitubercular

drugs induced hepatopathy in experimental rodents. Asian Pacific journal of tropical biomedicine.Jun 1;2(6):454-60.
20. Najmi,A.K., Pillai, K.K., Pal, S.N., Aqil, M.(2005) Free radical scavenging and hepatoprotective activity of jigrine against galactosamine induced hepatopathy in rats. Journal of Ethnopharmacology. Mar 21;97(3):521-5.
21. Singh, O.M., Singh, T.P.(2010) Phytochemistry of *Solanum xanthocarpum*: an amazing traditional healer. J Sci Ind Res, 69:732–40.
22. Parmar, S., Gangwal, A., Sheth, N. (2010) *Solanum xanthocarpum* (Yellow Berried Night Shade): a review. Der Pharmacia Lett, 2(4):373–83.

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