ORIGINAL ARTICLE

PROTECTIVE ROLE OF TURMERIC ON BIOCHEMICAL PARAMETERS OF LIVER IN NIMESULIDE INDUCED HEPATIC INJURY IN RATS

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Background: Damage to hepatocytes, e.g., necrosis, inflammation and degenerative disease causes release of liver enzymes into the circulation and they are measured both for diagnosis and prognosis of disease. The objective of this study was to see the protective effect of turmeric powder on liver enzymes against Nimesulide-induced hepatic injury in rat model. **Methods:** Forty (40) male albino Wistar rats were divided into four groups. In group A, normal diet was given for 9 days while in group B, Nimesulide was given for 9 days followed by turmeric powder for next 9 days; while turmeric powder for 9 days followed by Nimesulide for next 9 days was used in group C. Group D received Nimesulide in adjunct with Turmeric powder for 9 days. After 24 hours of feeding, Blood samples from groups A and D were taken for biochemical analysis of serum levels of ALT, AST, Alkaline Phosphatase and γ-GT at days 0 and 9. For groups B and C blood samples were collected at day 1, day 9 and day 18. The results were statistically analyzed by using SPSS-21 and Statistix 8.1. **Results:** In control group A, the results were found almost same on day 1 and 9. The group B shows a high value on day 9 in comparison to day 1, but after treatment with turmeric there is a marked reduction towards normal in all parameters on day 18. The group C show initially reduction in the values of all parameter on day 9 after taking the turmeric powder but there is an incline after taking Nimesulide. The group D received Nimesulide in adjunct with Turmeric powder for 9 days show slight increase in the results from day 1 in all parameters. The results were found significant ($p<0.05$) in the three treated groups. **Conclusion:** Turmeric has hepatoprotective properties against hepatotoxicity produced by Nimesulide.

Keywords: Turmeric, Hepatic injury, LFTs, Nimesulide, Enzymes, Hepatotoxicity
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INTRODUCTION

Estimation of certain enzymes as liver function test are usually considered to be reliable indicator of liver metabolism. Any damage to hepatocytes, e.g., necrosis, inflammation and degenerative disease causes release of these enzymes into the circulation and they are measured both for diagnosis and prognosis of disease. The enzymes may have much more restricted occurrence and even mainly found in a single organ. The serum is a reliable and sensitive indicator of liver malfunctioning due to xenobiotic agents.[1]

The human diet contains a wide variety of herbage which contains a wide spectrum of secondary metabolites referred to as polyphenols. These active metabolites have been shown a remarkable effect in stabilizing liver function tests.[2] Among these bioactive compounds, turmeric, the rhizome of *Curcuma longa*, is gaining attention of researchers due to its versatile role in maintenance of homeostatic mechanisms in human body. Turmeric, belonging to *Zingiberaceae* family, is cultivated in Asian countries.[3] Its active metabolite curcumin imparts antiviral, anti-protozoal, and anti tumour actions.[3–5] Curcumin is capable of scavenging oxygen derived free radicals due to presence of phenolic groups in its structure. The free radicals which can be eliminated by the curcumin are hydroxyl radical, singlet oxygen, superoxide radical and NO.[6–9] Curcumin protects cells against lipid peroxidation. This may be due to the anti-oxidative effects of the phenolic groups of curcumin. Curcumin was found to decrease serum aspartate transaminase and alkaline phosphatase activity, and free fatty acid, cholesterol and phospholipid levels. The exact mechanism of action is still unclear.[10,11]

The current study was conducted to evaluate the hepatoprotective role of turmeric in nimesulide-induced hepatotoxicity in albino Wistar rats.

MATERIAL AND METHODS

This study was carried out from July 2012 to Dec 2012. A total of 40 healthy male Wistar rats weighing 150–200 gm were included in the study. All animals were acclimatized to animal house's condition for a fortnight before commencement of the experiment.

The animals were randomly divided into 4 groups of 10 each and housed in separate cages at a controlled temperature of 18–26 °C (64–78 °F) and a constant light-dark schedule (10 hours light and 14 hours dark cycle). Animals were fed with diet that was formulated according to the guidelines provided by the Institute for Laboratory Animal Research, and mineral

water was given *ad libitum* as specified in the journal of Institute of Laboratory Animal Resources in 2011.[12]

Nimesulide was procured from locally. Dried rhizomes of *Curcuma longa* were obtained from the local market. The dried rhizomes were completely desiccated and to ensure absence of atmospheric moisture, the rhizomes were dehydrated in a hot air oven at 70 °C for 6 hours. Thereafter, they were ground in a high-speed grinder to get a fine turmeric powder that was kept in an airtight jar until used.

Group A was used as control group and was fed normal diet. Group B was fed with nimesulide for 9 days followed by turmeric for next 9 days. Group C was given turmeric for 9 days followed by nimesulide for next 9 days. Group D was given nimesulide in combination with turmeric for 9 days. After 24 hours of feeding, blood samples from group A and D were taken from dorsal tail vein for biochemical analysis of serum levels of ALT, AST, Alkaline Phosphatase and γ-GT through automated analyzer at Clinical Laboratory, Isra, University Hyderabad, on days 0 and 9. For groups B and C blood samples were collected at day 0, 9, 18.

Statistical analysis was done using SPSS-21 and Statistix 8.1, and Student's *t*-test and Pearson's correlation were applied considering $p \leq 0.05$ as statistically significant.

RESULTS

In current study 40 male albino Wistar rats were analyzed to evaluate the protective role of Turmeric against hepatotoxic effects of Nimesulide. The results are highlighted in Table-1. In control group A, the results were found almost same on day 1 and 9. In group B the results show a high value on day 9 in comparison to day 1, but after treatment with turmeric there is a marked reduction towards normal in all parameters on day 18. In group C the results were initially reduced on day 9 after taking the turmeric powder but there is an incline after taking Nimesulide. The group D received Nimesulide in adjunct with turmeric powder for 9 days shows slight increase in the results from day 1 in all parameters. The results were statistically analysed and were found significant in all three treated groups.

Table-1: Hepatic enzyme levels of control and experimental groups on various days (IU/L)

Group	Days	ALT	AST	ALP	GGT	*p*
A	1	23	38	65	12	0.35
	9	22	36	66	11	
B	1	20	38	50	12	<0.05
	9	168	279	274	80	
	18	40	75	80	23	
C	1	18	38	65	10	<0.05
	9	10	38	64	11	
	18	50	100	120	14	
D	1	21	10	53	12	<0.05
	9	30	40	77	15	

DISCUSSION

Turmeric has been traditionally used throughout the Indian sub-continent, China, Middle East, South East Asia, Africa, since ancient times for its medicinal properties which include its use as a poultice in sprains, fractures and contusions with successful outcomes.[13]

It is also used orally dissolved in milk to alleviate wide range of conditions including heart burn, weakness, diabetes, hypertension, glaucoma, inflammatory bowel diseases, Hyper-acidic conditions of gastrointestinal tract, acute and chronic joint pain and melancholy.[14]

The current study was done to highlight the hepatoprotective role of turmeric in nimesulide induced hepatic injury. Many researchers[15–17] have evidenced the hepatotoxic effects of nimesulide by raised serum levels of hepatic biochemical parameters just as confirmed by the results of our study. Kim Y *et al*[18] noticed the ameliorating effects of turmeric against carbon tetrachloride induced hepatotoxicity. However, they studied the different hepatic biochemical parameters with a dose of 300 mg/Kg. Singh *et al*[19] also got promising results of hepatoprotection via administration of turmeric.

CONCLUSION

Turmeric has a protective role against hepatotoxic effects of Nimesulide.

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