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Curcuma Longa: A coloring agent or a miracle spice

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ABSTRACT

The traditional medicines (i.e. herbal medicines / Spices) are cost effective & have negligible side effects. There is a need for credible research to investigate the proper use, adverse effects and precautions associated with these products. Hence, the current study was carried out to observe the hepatoprotective effect of Curcuma Longa (C.L) in Nitro-Methane Sulfonamide (N-MS) induced hepatotoxicity. 40 male albino wistar rats were divided into four groups. In group A, normal diet was given for 09 days while in group B, N- MS was given for 09 days followed by CL powder for next 09 days; while CL powder for 09 days followed by N- MS for next 09 days was used in group C. Group D received N-MS in adjunct with C.L powder for 09 days. Blood samples from each group were taken for biochemical analysis of serum levels of ALT, AST, Alkaline Phosphatase and GGT. The results of present study have concluded that the administration of C.L significantly offered protection against damaging effects of N-MS.

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Introduction

Curcuma Longa (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. [1] 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. [2]

Its use is world renowned as an antioxidant when applied topically in form of "Ubtan". It cleanses and refreshes the skin, removes blemishes. Internal use has also been reported widely to its immune enhancing properties, and as a tonic for liver, pancreas and blood. [3] It is also reported to be used as a natural food preservative agent. Unfortunately, recent trends in different cultures which used the herbal products has led to severe decline in the use of the latter in favor of homeopathic and allopathic medications which are in their most part synthetic and have extreme adverse effects.

The current study was carried to illuminate the hepatoprotective and antioxidative properties of Curcuma Longa (C.L), when taken internally; taken internally alone as a homeostatic booster and in combination with Nitromethane sulfonamide (N-MS) (a known hepatotoxic agent) to determine the curative properties of Curcuma Longa following hepatic injury.

Materials And Methods

Animals:

40 Healthy male Albino Wistar rats were used in the present study. The animals were divided into 4 groups (10 in each) and housed in separate cages at a controlled temperature of 18-26°C and a constant light-dark schedule (10 hours light and 14 hours dark cycle). [4] 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. [5] 2.5 Kilograms of rat chow was prepared under aseptic and hygienic conditions of which the individual constituents are given below:

Whole Wheat flour, Milk powder, Jaggery, boiled chicken meat, hard boiled eggs, meshed boiled chick peas, powdered egg shell, 25 Gram Curcuma longa powder and 300 milligrams N-MS powder. The whole formulation except for the last two ingredients, gave a total weight of 3 kilograms which was kneaded into a dough and divided equally into 10 cakes for 09 days equals to 90 cakes of 33 grams per animal. Thus for forty animals the same procedure was used 03 more times to give a verifiable and quality/ quantity controlled diet. The addition of C.L was thus calculated as being 0.5 mg / day / animal. The dose of N-MS was thus calculated to be 3.3 mg / animal / day as equivalent to the therapeutic dose for adult humans.

Chemicals:

N-MS was purchased from standard pharmacist.

Dried Rhizomes of Curcuma Longa were obtained from the local market.

Preparation of curcuma longa powder:

The dried rhizomes were completely desiccated and to insure absence of atmospheric moisture, the rhizomes were further dehydrated in a hot air oven at 70°C for 06 hours. Thereafter, they were ground in a high-speed grinder to get a fine powder that was kept in an airtight jar until used.

Experimental procedure:

The animals were equally divided into four groups of 10 each as follows: Group A: used as the control group and was fed the normal diet for 09 days. Group B: was fed with N-MS for 09 days followed by Curcuma longa for another 09 days. Group C: was given Curcuma Longa for 09 days followed by Nitro-MS for another 09 days. Group D: were given Nitro-MS and Curcuma longa in combination for 09 days. After 24 hours of feeding, Blood samples from groups A & D were drawn from dorsal tail vein for biochemical analysis of serum levels of ALT, AST, Alkaline Phosphatase and GGT at days 0 and 09. For groups B & C blood samples were collected at day 0, day 09 and

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day 18. The rats were heated with infrared heating lamp for 5-6 minutes. The blood was drawn from dorsal tail vein, which is impossible without prior heating the animal. [6]

Results:

The control Group A did not receive either of substances. Hence gave us the normal mean values for the hepatic enzymes in the rat model (Table I).

Group		Table I: Serum levels of hepatic enzymes of group A as mathematical mean on Day 01 & 09 (n = 10)									
A CONTROL		ALT		AST		ALP		GGT		p-Value	regression
		Day 01	Day 09	Day 01	Day 09	Day 01	Day 09	Day 01	Day 09		
		23	04	38	02	65	02	12	01		

The Test group B received N-MS for nine days and it is clearly visible that the mean ALT value in this group was 168 IU/L on 9th day which decreased to 40 IU/L on 18th day following nine days of C.L administration. The same pattern is visible for AST, Alkaline phosphatase and GGT (Table I).

Group		Table II: Serum levels of hepatic enzymes of group B as mathematical mean on Day 01, 09 & 18 (n = 10)											
B N-MS for 09 days then CL for 09 days		ALT		AST		ALP		GGT		p-Value	regression		
		Day 01	Day 09	Day 01	Day 09	Day 01	Day 09	Day 01	Day 09				
		20	168	40	38	279	75	50	274			80	12

Group C received Curcuma longa for nine days to assess any toxic effect of this on the Liver function tests (LFTs) and also to find out whether C.L. will or will not support the antioxidative capabilities of hepatic antioxidative systems (Table III).

Group		Table III: Serum levels of hepatic enzymes of group C as mathematical mean on Day 01, 09 & 18 (n = 10)											
C C.L for 09 days then N-MS for 09 days		ALT		AST		ALP		GGT		p-Value	regression		
		Day 01	Day 09	Day 01	Day 09	Day 01	Day 09	Day 01	Day 09				
		18	10	50	38	38	100	65	64			120	10

The results were self explanatory that on day 09, the LFTs showed mean value similar to control values, thereby alleviating the fears that Curcuma Longa induced hepatotoxicity. However, the results of day 18 of all the enzymes as compared to the same on day 09 of Group B shows a remarkable decrease in the hepatotoxic potential of N-MS given after Curcuma longa use. Thus showing a significant homeostatic boosting effect. We also wanted to observe the homeostasis boosting capability of Curcuma longa when given at same time as N-MS which was done in Group D (Table IV). The results were self explanatory when one compares the day 09 of group D with the day 09 of Group B which showed a very convincing argument in favor of Curcuma Longa.

Group		Table IV: Serum levels of hepatic enzymes of group D as mathematical mean on Day 01 & 09 (n = 10)								
D N-MS+ C.L for 09 days		ALT		AST		ALP		GGT		p-Value
		Day 01	Day 09	Day 01	Day 09	Day 01	Day 09	Day 01	Day 09	
		21	30	10	38	53	77	12	15	

Discussion

Overall in the south east asian countries, there is the growing trend to use most potent Non-Steroidal Anti-inflammatory Drugs (NSAIDs), without consulting either the literature (by physicians) or if once taken these drugs for any inflammatory condition, the patients tend to ignore the physicians altogether itself and self prescribed the drugs. [7]

As we all know that NSAIDs are known to be hepatotoxic, if and when taken without medical supervision; leading to moderate to sever dysfunction of the metabolic activities of the liver and other organs. [8] In general, NSAIDS disturb the homeostatically controlled metabolic pool. Currently most widely and injudiciously prescribed NSAID is N-MS which is though consider to be extremely friendly as far as the stomach and intestines are concerned. And extremely hepatotoxic as has been shown by FDA banning the drug in America within 2 years of its launching and in Europe also. [7] [8] This, however, is not the case in Pakistan where it is freely available and most commonly prescribed and most common over the counter (OTC) NSAID.

The current study was undertaken to determine as to why, (given the total disregard of the people for their health), these hepatotoxic drugs do not induce that level of hepatic stress as should be seen in our community due illiteracy.

We postulate that it could be the different herbs and spices (Garam masla) which is the mainstay of the South Asian cuisine, may have a homeostasis boosting effect on the liver and other organs. Thus supplementing the antioxidative chemicals already present in the liver like superoxide dismutase (SOD).

The mainstay of all the curries is curcuma longa powder, the active ingredient of which is called curcumin, which contains active flavonoids and has known anti-oxidative, anti-inflammatory and anti-proliferative activities [1].

In our study, administration of C.L powder was found to provide protection against N-MS induced elevation in serum levels of ALT, AST, ALP and GGT. Our results have shown statistically significant effect of the hepatoprotective activity of C.L against N-MS induced hepatic stress in male albino Wistar rats. And also that C.L as used in daily diet showed recovery after hepatic injury by lowering the hepatic enzyme's levels significantly.

Conclusion:

The results of present study have suggested that the administration of Turmeric (C.L) significantly offered protection against damaging effects of N-MS. Hence, it is concluded that Curcuma longa has hepatoprotective properties.

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