

ANTI-OXIDANT ACTIVITY OF *MORINDA CITRIFOLIA* ON LYMPHOMA-BEARING MICE

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Abstract

Oral treatment with 50 mg Kg⁻¹ day⁻¹ of crude methanol extract of *Morinda citrifolia* leaves for 14 days significantly increased the anti-oxidant enzymes, like catalase, glutathione peroxidase (GSHPx) and superoxide dismutase (SOD), and anti-oxidants like glutathione (GSH) and ascorbic acid decreased in lymphoma-bearing mice.

Keywords: Anti-oxidant activity; *Morinda citrifolia*; Lymphoma

INTRODUCTION

Morinda citrifolia L. belongs to the family Rubiaceae. In India, the plant is commonly known as 'A1 Achi' *Morinda citrifolia* (Noni) in Southeast Asia (Indonesia) and Australia it is given the name canary wood [1]. In classical Indian Ayurveda literature, it is considered to be one of rejuvenator drugs and it is said to improve the texture of skin and hair, enhance immense, circulatory, digestive, Nervous, metabolic systems and prolong life. The plant is claimed to possess anti cancer [2], anti inflammatory [3] and anti-diabetic [4] activities. In this study, the anti-oxidant property of crude methanolic extract of *Morinda citrifolia* on cell line-induced lymphoma-bearing mice is reported.

MATERIALS AND METHODS

Plant Material

Morinda citrifolia was collected from Coimbatore, Tamilnadu, India. A Voucher specimen (Herbarium No. 93558) was deposited in Botanical survey of India, Coimbatore, Tamilnadu, India.

Extraction

Dried finely powdered leaves (20 g) was Soxhlet extracts with MeOH. The solvent was evaporated under reduced pressure to give a solid residue (2 g).

Animals

Swiss male mice 2 months of age, weighing 20±5 g, purchased from

Veterinary college, Mannuthy, Thrissur, Kerala, India were used for the study. They were maintained in standard environmental conditions of temperature, relative humidity and fed on a standard diet (Gold Mohur mouse chow) and water *ad libitum*.

Anti-oxidant activity on lymphoma-induced mice

Animals were grouped into three groups consisting of nine mice each.

Group I. Normal group which received only normal lab diet (Gold Mohur mouse chow).

Group II. Control group which received intraperitoneal injections of 1×10^5 Dalton's lymphoma cells (DLA)⁵ and not treated.

Group III. Experimental group which received intraperitoneal injections of 1×10^5 lymphoma cells and given 50 mg Kg⁻¹ day⁻¹ of methanol extract of *Morinda citrifolia* for 14 days.

After the experimental period (14 days), the mice were fasted overnight, killed by cervical dislocation and liver and kidney were used for the evaluation of Catalase, Glutathione peroxidase (GSHPx) and Superoxide dismutase (SOD), according to standard procedures⁶⁻⁸. The levels of anti-oxidants, which include reduced glutathione (GSH) and ascorbic acid were determined by the methods of Roe⁹ and Patterson¹⁰, respectively.

Statistical analysis

All statistical analysis were done by Student's 't'-test according to Freed¹¹.

RESULTS AND DISCUSSION

Lymphoma-bearing mice showed a significant decrease in the activities of the anti-oxidant enzymes (catalase, GSHPx and SOD) and in the level of anti-oxidants (GSH and ascorbic acid) as compared to normal mice both in liver and kidney.

The activities of anti-oxidant enzymes (Table 1) and anti-oxidant levels (Table 2) were found to be increased significantly in both the liver and kidney after oral treatment with crude methanolic extract of *Morinda citrifolia* leaves on lymphoma-bearing mice.

It is well known that lymphoma progresses by a mechanism driven out by reactive oxygen species (ROS) like $O_2^{\bullet-}$, OH^{\bullet} , which occur during normal metabolic processes¹². More over it was found that as the lymphoma progresses, the anti-oxidant enzymes like Catalase, GSHP_x and SOD and the anti-oxidants GSH and ascorbic acid were seriously affected by the ROS^{13,14}. The decrease in activities of catalase, GSHP_x and SOD liver and kidney may be due to either the direct in activation of the enzymes¹⁵ or by decreased aerobic metabolism in lymphoma bearing cells¹⁶. Decreased levels of anti-oxidants GSH and ascorbic acid may be due to the damage of the cells¹⁷.

CONCLUSION

Treatment with methanolic extract of the *Morinda citrifolia* leaves brought the anti-oxidant system to a normal level, indicating that it exhibits an anti-oxidant properly in cell line-induced lymphoma-bearing mice. Although it has been suggested that, xeronine present in the

extract of *Morinda citrifolia* to possess anti-oxidant like properties. Further investigations are needed to elucidate the

mechanism responsible for the anti-oxidant property of *Morinda citrifolia*.

Table 1

Effect of crude methanolic extract of *Morinda citrifolia* leaves on anti-oxidant levels in lymphoma bearing mice

Groups	Super-oxide dismutase (SOD)		Catalase		Glutathione peroxidase (GSHP _x)	
	Liver	Kidney	Liver	Kidney	Liver	Kidney
I	4.85 ±1.10	4.26 ±1.50	50.35 ±1.50	30.57 ±1.73	7.18 ±1.25	5.37 ±1.35
II	1.80 ±0.94 ^a	1.20 ±0.52 ^a	15.10 ±1.61 ^c	8.40 ±1.40 ^c	4.35 ±1.68 ^b	2.36 ±1.40 ^c
III	6.15 ±1.28 ^b	6.57 ±1.50 ^c	46.40 ±1.57 ^c	27.52 ±1.40 ^c	6.45 ±1.40 ^c	5.38 ±1.59 ^c

N=9

SOD= values are expressed as 50% inhibition of nitroblue tetrazolium min⁻¹ mg⁻¹ protein.

Catalase = values are expressed μmoles of H₂O₂ consumed min⁻¹ mg⁻¹ protein.

GSHP_x = values are expressed as μg glutathione min⁻¹ mg⁻¹ protein

^aP <0.01; ^bP <0.025; ^cP <0.001, Student's 't' test

*I = normal mice, II= control mice bearing lymphoma, III= mice bearing lymphoma treated with 50 mg Kg⁻¹ day⁻¹ of methanol extract of *Morinda citrifolia* for 14 days.

Table 2

Effect of crude methanolic extract of *Morinda citrifolia* leaves on anti-oxidant levels in lymphoma bearing mice

Groups*	Glutathione (GSH)		Ascorbic Acid	
	Liver	Kidney	Liver	Kidney
I	3.26 ±1.72	2.75±1.52	102.83±20.81	78.29±5.80
II	0.85±0.11 ^a	0.80±0.10 ^b	72.40±9.10 ^d	69.35±6.10 ^d
III	3.82±1.00 ^c	2.65±1.35 ^b	89.40±1.25 ^d	77.68±1.78 ^d

N=9

GSH = values are expressed as mg/g tissue.

Ascorbic acid = values are expressed as mg/100 tissue.

^aP <0.025; ^bP <0.05; ^cP <0.005; ^dP <0.001, Student's 't'- test

*I = normal mice, II= control mice bearing lymphoma, III= mice bearing lymphoma treated with 50 mg Kg⁻¹ day⁻¹ of methanol extract of *Morinda citrifolia* for 14 days.

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