ON THE PROTECTIVE ROLE OF VITAMIN B2 IN MICE ADMINISTERED DIMETHYLNITROSAMINE

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Abstract

Protective Nitrosamine research has emphasized upon the preventive role of vitamin A and vitamin B in relation to nitrosamines and their precursors. The role of Vitamin B_2 is also preventive and it protects the liver from injury by dimethylnitrosamine (DMN). This relation may be dose response related and further evaluation is needed(JPMA 29:141, 1979).

Introduction

Protective Nitrosamine research has emphasized upon the preventive role of Vitamin A (Schweinsberg and Schott-Kollat, 1976) and vitamin C (Ivankovic et al., 1974; Fong and Chan, 1976) in relation to nitrosamine and their precursors. Contradictory data exists upon the role of vitamin B_2 in cancer and as such information is lacking which may explain the total role of this vitamin or the vitamins of the B-Complex group against cancer induced by nitrosamine.

Material and Methods

Twelve white mice JPMC strain, 6 males and 6 females aged 4 weeks weighing 40 to 45 grms were given DMN in concentration of 0.05mg/mice/day for 26 days. Total dose administered was 1.3mg/mice. Dose of vitamin B_2 administered for 26 days was 2.6mg/mice in doses of 0.1mg/mice/day. DMN and vitamin B_2 was dissolved in 0.25ml water and injected subcutaneously. The animals were administered a laboratory made diet and weighed every week. All animals were sacrificed on the 63rd day.

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The mice were administered the following diet:

Carbohydrate	53.7%	Crude fat	3.5%
Crude Protein	24 %	Ash	6.0%
Crude Cellulose	10 %	Minerals	2.8%

Results

The diet administered was B-vitamins free.

Mortality Time and Weight in Grm.

Animal	*Sex*	*Time of Study*								
Group A		1	2	3	4	5	6	7	8	9
1	M	40±2	38.0	37.5	36.5					
2	M	40±2	37.2	36.5	35.5					
3	M	40±3	38.2	38.3	37.6	37.4				
4	F	40±2	39.3	38.2	37.6	37.3				
5	F	40±3	39.3	38.5	37.0	37.0				
6	F	40±2	38.2	37.5	36.2	36.3	36.0			
Average wts		40±2	38.3	37.7	36.7	37.0	36.0			
Group B										
7	M	40±2	39.5	38.8	38.2	37.8	38.0	38.3		
8	M	40±3	39.6	38.7	38.3	38.0	37.9	38.0	38.2	40
9	M	40±2	38.5	37.7	37.3	37.1	36.8	36.6	36.5	39.2
10	F	40±3	39.8	38.6	38.4	38.2	37.9	38.2	38.8	40.5
11	F	40±2	39.3	38.5	38.3	37.8	37.8	38.0	38.0	40.1
12	F	40±3	39.4	38.6	38.4	37.9	37.9	38.4	39.0	40.4
Average wts		40±2	39.0	38.4	38.1	37.8	37.6	37.8	38.1	40.0

Mortality Rates

Groups	*Time of Study in Weeks*								
	1	2	3	4	5	6	7	8	9
A				2 Males					
					1 Male				
					2 Females				
						1 Female			
B								1 Male	

Cancer Rates

Group	*Lung Adenoma*	*Liver Carcinoma*
A	4/6	2/6
	(3 Males, 1 Female)	(2 Females)
B	1/6	0/6
	(1 Male)	

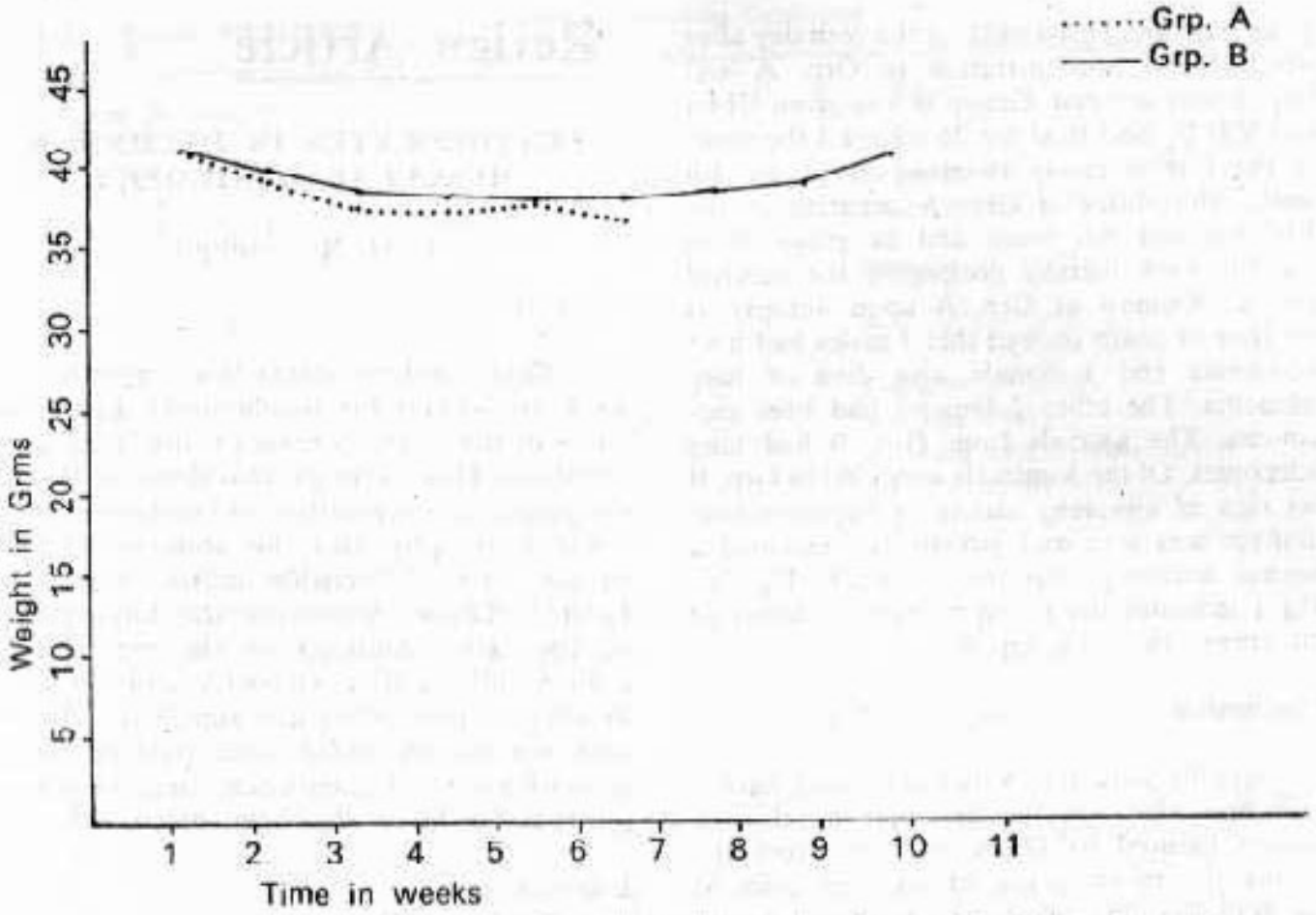

Figure 1 : Graph to show rate of growth of Grp. A and B

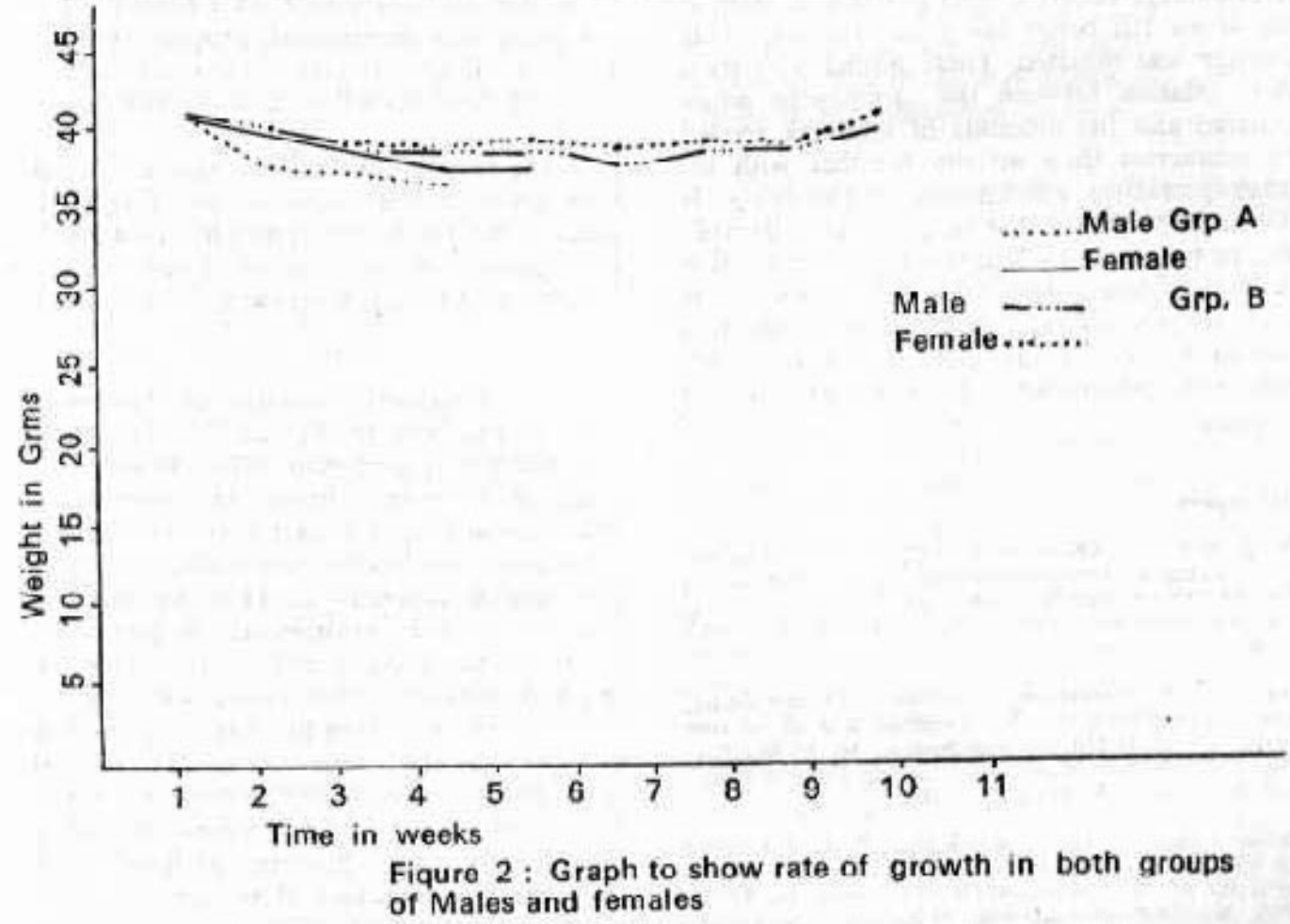

Figure 2 : Graph to show rate of growth in both groups of Males and females

Fig. I and II shows the growth rate of both groups and sex oriented responses to carcinogens and Vit. B_2. First mortality occurred in Grp. A which consisted of 6 mice that were

given food and DMN only, at the 26th day after which DMN administration to Grp. A and Grp. B was stopped. Group B was given DMN and Vit. B_2 and food for 26 days till the onset of the first mortality in group A in the 4th week. Mortalities in Grp. A occurred in the 4th, 5th and 6th week and in group B in the 8th week thereby prolonging the survival period. Animals of Grp. A upon autopsy at the time of death showed that 3 males had lung adenomas and 1 female also died of lung adenoma. The other 2 females had liver carcinoma. The animals from Grp. B had lung adenomas. Of the 5 animals surviving in Grp. B no sign of any lung cancer or hepatocellular damage was seen and growth rate resumed a normal tendency after the 6th week (Fig. II). Fig I indicates the recovery effect in terms of the growth rate in group B.

Discussion

Results show that Vitamin B_2 may have a protective effect on the development of liver tumors induced by DMN. As seen from the results the major organ attacked in mice is the lung. The findings show that while Vitamin B_2 levels in the liver were sustained no lung or liver damage occurred in Grp. B and as soon as the levels fell below the protective level lung damage was initiated. There probably exists a dose relation between the carcinogens administered and the amounts of vitamins needed to counteract their activity together with the other protective mechanisms of the body. It is evident therefore that lung and liver damage can be prevented by Vitamin B_2 administration in higher doses. The role of Vitamin B_2 in protein metabolism and cancer production should be further investigated and B_2 levels should be determined to know the dose related response.

References

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