

SHORT COMMUNICATION

ALKALINE PHOSPHATASE AND THIOCYANATE LEVELS IN THE  
BLOOD OF SMOKERS\*

AJIT SINGH BHOWN,\*\* MEERA BHOWN AND B.B. MAITRYA

*Department of Physiology and Biochemistry, Sardar Patel Medical College, Bikaner,*

**Summary :** Level of alkaline phosphatase and thiocyanate in the blood of beedi and cigarette smokers was determined. It was observed that there was a corresponding fall of alkaline phosphatase with an increase in the thiocyanate level and that this effect was more severe in beedi smokers than cigarette smokers.

**Key words:** alkaline phosphatase                      blood thiocyanate                      smoking

INTRODUCTION

It has long been known that one of the toxic substances of tobacco aerosol is cyanide which after its entry into the blood stream is primarily detoxified as thiocyanate. A higher thiocyanate level in the blood of smokers therefore, is likely to occur and many reports (6, 8, 9, 10) corroborate it. The inhibitory effect of tobacco aerosol on the enzymes has been reported by Benedict and Stedman (1). A low level of alkaline phosphatase in smoker's blood due to the presence of cyanate in tobacco aerosol might therefore be logical to anticipate. In this paper, we report the changes in the alkaline phosphate and thiocyanate levels of the blood of smokers.

MATERIALS AND METHODS

Normal, healthy male smokers ranging between 19 and 40 years of age smoking between 5 and 25 cigarettes or beedis per day were selected for this study. Non-smokers having no previous history of smoking served as controls. The subjects were divided into three groups :— (i) Beedi smokers, (ii) Cigarette smokers and (iii) non-smokers. Blood was collected in the way described earlier (2) and serum separated at low temperature. All the estimations were performed immediately after withdrawing the blood. Serum thiocyanate was estimated by the method of Bowler (4) and alkaline phosphatase by the method described by King and Wootton (7).

\* Financial assistance from University Grants Commission., New Delhi to support this study is gratefully acknowledged

\*\* Present address : Department of Physiology & Biochemistry, S.N. Medical College, Jodhpur (Rajasthan)

## RESULTS

The results have been shown in table I. An increase in the serum thiocyanate level in smokers as compared to non-smokers has been observed and is significant ( $p < 0.01$ ). However,

TABLE I : Serum alkaline phosphatase and thiocyanate level in smokers and non-smokers.

Estimation	Beedi smokers (15)	Cigarette smokers (15)	Non-smokers (15)
Alkaline phosphatase in K.A. Units	3.83 $\pm$ 1.2	6.64 $\pm$ 1.0	8.04 $\pm$ 3.0
Thiocyanate mg %	5.27 $\pm$ 0.84	2.48 $\pm$ 0.41	2.0 $\pm$ 0.3

Figures in parenthesis denote the number of subjects, value are mean  $\pm$  S.D.

this rise has been greater in beedi smokers than the cigarette smokers. Interestingly enough the level of serum alkaline phosphatase indicated an apparent fall in smokers ( $p < 0.1$ ), and more so in persons smoking beedi than cigarette.

## DISCUSSION

It is evident that a higher level of thiocyanate exists in the blood of smokers as reported earlier by other workers (6, 8, 9, 10). The values of thiocyanate level in normal individuals as determined in this study, however, are higher when compared to the values reported by Foulds *et al.* (6). Besides, the smokers of this study have also exhibited corresponding falls in alkaline phosphatase. Smoking of beedis and cigarettes both affect the alkaline phosphatase and thiocyanate levels of blood, but beedi smoking affects more than smoking of cigarettes. Although the exact mechanism as to why beedies affect more than the cigarettes still remains to be worked out, we have earlier reported the severity of beedi smoke over the cigarette smoke (3) and have stressed that the difference may be due to the quality of tobacco or to processing, and may also be due to the distinctiveness of the two varieties. Burton (5) has shown that tobacco aerosol composition does differ with the change in the wrapper or the filter used.

From the present and previously reported studies (2, 3) it may be inferred that beedi smoking affects the blood constitution more than cigarette smoking.

## REFERENCES

1. Benedict, R.C. and R.L. Stedman. Complexity of enzymatic inhibition by cigarette smoke. *Experientia*, **24** : 1205-1206, 1968.
2. Bhowan, A.S., B.B. Maitrya, and I.U. Haq. Blood carboxyhemoglobin level in beedi smokers. *Indian*

3. Bhowm, A.S., B.B. Maitrya and M. Bhowm. Ammonia retention by smokers : A comparative study. *Indian J. Med. Res.*, **59** : 1296-1299, 1971
4. Bowler, R.G. Determination of thiocyanate in blood serum. *Biochem. J.*, **38** : 385-388, 1944.
5. Burton, H.R. Pertinence of tobacco product modification to chemical composition and biological activity, *Proc. Tob. Health Conf.*, 3rd, p 21, 1970.
6. Foulds, W.S., J. M. Bronte-Stewart and I.A. Chisholm. Serum thiocyanate concentrations in tobacco amblyopia. *Nature*, **218** : 586, 1968.
7. King, E.J. and I.D.P. Wootton. *Micro-analysis in Medical Biochemistry*, 3rd edition, J & A Churchill Ltd. England, page 83, 1956.
8. Smith, A.D.M. Retrobulbar neuritis in Addisonian pernicious anamia, *Lancet*, *i* : 1001-1002, 1961.
9. Works, F. Tobacco amblyopia *Lancet*, *ii* : 526-527, 1958.
10. Wokes, F. and C.W. Picard. The role of vitamin B<sub>12</sub> in human nutrition. *Am. J. Clin. Nutri.*, **3** : 383-389, 1955.