

SHORT COMMUNICATION

ALTERATIONS IN URINARY VMA LEVELS FOLLOWING CIGARETTE SMOKING, COFFEE DRINKING AND ALCOHOL CONSUMPTION

T.R. SHARMA, J.P.N. CHANSOURIA AND K.N. UDUPA

*Surgical Research Laboratory, Institute of Medical Sciences,
Banaras Hindu University, Varanasi-221 005*

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Summary : In eighteen normal healthy volunteers, the effect of cigarette smoking, coffee drinking and alcohol consumption on adrenomedullary sympathetic function was assessed in terms of urinary VMA levels. Following the indulgence in all these social habits, urinary VMA levels are significantly increased. The maximum and minimum increase in VMA levels were recorded following coffee drinking and alcohol consumption respectively.

Key words : coffee cigarette alcohol 3-methoxy-4-hydroxymandelic acid

INTRODUCTION

In the past, the influence of various drugs and chemicals on catecholamine metabolism has been investigated by many workers in great detail (2,3). Likewise, caffeine and nicotine have also been found to affect the catecholamine metabolism (4). In addition, the blood and urinary levels of catecholamines have been shown to be increased after coffee intake and cigarette smoking (1,5). In alcoholic suicides also, noradrenaline levels were found to be enhanced in various parts of the brain (6). However, the effect of these social habits on urinary 3-methoxy-4-hydroxymandelic acid (VMA) excretion levels, a metabolite of catecholamines, has not yet been investigated in detail.

Therefore, the present investigation was undertaken to elucidate the effect of cigarette smoking, coffee drinking and alcohol consumption on the urinary VMA excretion in normal volunteers.

MATERIALS AND METHODS

Eighteen healthy normal male volunteers, between the age range of 24-30 years, were included in the present experiment. All of them were Indians with similar food habits and were residing in Varanasi for the last five years. Each volunteer was asked to collect urine prior to experiment in a polythene container and these samples were used for the determination of urinary VMA. Volunteers were then divided into the following groups:

Group I – Cigarette smoking : The volunteers of this group were casual smokers. They were asked to smoke three cigarettes (Capstan, W.D. and H.O. Wills, India), consecutively, within 15 min. Subsequently, urine samples were collected individually after 30 min. of last smoke in a polythene container.

Group II – Coffee drinking : 750 mg of coffee (Nescafe, India), dissolved in 30 ml of hotwater with light sugar was given to each volunteer and after 30 min, their urine was collected as mentioned above.

Group III – Alcohol consuming : 90 ml of rum (XXX) with equal amount of water was given to each volunteer within 15 min time. Their urine was collected after 30 min of the drink.

These urine samples were then subjected for the assay of VMA (7) and the data expressed as mg/g of creatinine.

RESULTS

Group I – Cigarette smoking : The mean urinary VMA level in normal volunteers was found to be 1.8 ± 0.738 mg/g creatinine. Following smoking; a sharp and significant increase in the urinary VMA was recorded ($P < 0.001$) (Table I).

Group II – Coffee drinking : In this group of healthy volunteers, the average VMA excretion was 2.153 ± 0.479 mg/gm creatinine, which was increased significantly following the intake of strong black coffee ($P < 0.001$) (Table I).

Group III – Alcohol consuming : The mean VMA excretion of normal volunteers of this group was found to be 1.35 ± 0.476 mg/gm creatinine. Following alcohol consumption significant elevation in the urinary VMA levels was observed ($P < 0.05$) (Table I).

TABLE I : Effect of cigarette smoking, coffee drinking and alcohol consumption on urinary VMA levels.

(Values are mean \pm SD.)

	<i>Cigarette smoking</i>	<i>Coffee drinking</i>	<i>Alcohol consumption</i>
Control (before experiment)	1.893	2.153	1.350
VMA (mg/g creatinine)	± 0.74 (6)	± 0.48 (6)	± 0.48 (6)
After experiment	3.373	3.935	1.750
VMA (mg/g creatinine)	± 1.84 $P < 0.001$ (6)	± 0.30 $P < 0.025$ (6)	± 0.47 $P < 0.05$ (6)

Figures in parentheses indicate the number of observations.

DISCUSSION

In the present study, the effect of various common social habits, like cigarette smoking, coffee drinking and alcohol consumption on the adrenomedullary activity was assessed in normal volunteers in terms of urinary VMA excretion. There was a significant elevation in the urinary VMA levels following acute indulgence in all these social habits. However, the maximum and minimum response was recorded following coffee and alcohol consumption respectively. Similar to our observations, various other studies have also shown elevated circulating and urinary catecholamine levels following coffee drinking and cigarette smoking (1,5). In addition, caffeine and nicotine are also known to induce excessive release of catecholamines from adrenal medulla (9,10,11). Similarly, various workers have observed that even in moderate dosage, alcohol produces a prompt increase in urinary excretion of adrenaline, noradrenaline and their metabolites (8). Thus, our observations tend to suggest that chronic indulgence in the above-mentioned social habits may enhance the catecholamine release leading to elevated catecholamines and their metabolite levels. Furthermore, in such situations, persistently increased catecholamine levels might ultimately induce a number of metabolic alterations. In extreme cases with persistently increased catecholamines levels some of the stress disorders may be precipitated in which the involvement of consistently increased catecholamine levels are considered to be of aetiological significance.

REFERENCES

1. Berkowitz, B., J.H. Traver and S. Spector. Release of norepinephrine in central nervous system by theophylline and caffeine. *Eur. J. Pharmac.*, **10** : 64-71, 1970.
2. Clouet, D.H. and M. Ratner. Catecholamine biosynthesis in brains of rats treated with morphine. *Science*, **168** : 854-856, 1970.
3. Goller, M. and I. A. Michaelson. Growth behaviour and brain catecholamine in lead exposed neonatal rats. *Science*, **187** : 359-360, 1975.
4. Katsuthiko, Y., G.G. Rhoads and A. Kagan. Coffee, alcohol and risk of coronary heart disease in Japanese-Americans. *New Eng. J. Med.*, **297** : 405-409, 1977.
5. Malthis, I., Atone S. Macchione and C. Fabris. Effect of cigarette smoke on plasma levels of NEFA and urinary excretion of catecholamines after administration of a beta blocking drug. *Bull. Soc. Ital. Biol. Sper.*, **45** : 1170-1172, 1969.
6. Mossesylviya, G. and R. Eli. Regional distribution of norepinephrine and dopamine in brains of depressive suicides and alcoholic suicides. *Psychopharmac. Commun.*, **1** : 327-330, 1975.
7. Pisano, J.J., J.R. Crout and D. Abraham. Determination of 3-methoxy-4-hydroxy mandelic acid (VMA) in urine. *Clin. Chim. Acta*, **7** : 285, 1962.
8. Ritchie, J.M. The Aliphatic alcohols : In : *The Pharmacological Basis of Therapeutics*, Ed.: L.S. Goodman and A. Gilman. Macmillan Publishing Co. Inc., New York, pp. 137-151, 1970.
9. Ritchie, J.M. Central Nervous System Stimulators. The Xanthines. : In : *The Pharmacological Basis of Therapeutics*. Ed. : L.S. Goodman and A. Gilman. Macmillan Publishing Co. Inc., New York, pp. 367-378, 1970.
10. Robertson, D., J.C. Frolich, R.K. Carr, J.T. Watson, J.W. Nollifield, D.G. Shand and J.A. Oates. Effects of caffeine on plasma renin activity, catecholamines and blood pressure. *New Eng. J. Med.*, **298** : 181-186, 1979.
11. Volle, R.L. and C.B. Koelle. Ganglionic Stimulating and Blocking Agents : In : *Pharmacological Basis of Therapeutics*. Ed. : L.S. Goodman and A. Gilman. Macmillan Publishing Co. Inc., New York, pp. 565-574, 1970.