EFFECT OF VOLUNTARY RETENTION OF URINE ON PLASMA AND URINARY BIOGENIC AMINES AS WELL AS CIRCULATORY AND RESPIRATORY RESPONSES

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Summary : Stress caused by voluntary retention of urine in 25 normal healthy volunteers has been estimated by measuring the levels of biogenic amines (Serotonin, catecholamine) n blood and urine. Estimations were done before and after voluntary retension of urine. Plasma and urine catecholamines and 5-HT significantly ncreased after retention. Simultaneously rise in BP, PR, RR were also observed. Inference has been drawn that retention of urine may induce stress.

Key words : catecholamine (CA) serotonin (5–HT)
urge sensitivity time 5–hydroxyindole acetic acid (5-HIAA)

INTRODUCTION

As early as 1899, Sherrington demonstrated that reflex vascular responses are obtained by the distension of certain hollow visceras. Later on the same has been established in experimental animals as well as in human subjects (7, 11,13,16). It has been suggested that the pressor response was brought about reflexly by splanchnic vasoconstriction and active vasoconstriction in the renal circulation (11, 13) as this pressor response was totally abolished after the bilateral splanchnicotomy (11). On the contrary, Prabhaker *et al.* (13) have observed that even after the ganglion blockade and reserpine the rise in blood pressure was not abolished, indicating the release of some vasoconstricting humoral substances in the circulation responsible for the increase in blood pressure.

In the literature of Indian medicine, the voluntary retention of urine and the other natural urges also have been considered to be very important factor in the etiology

of several endogenous stress disorders. Therefore, the present investigation has been undertaken to observe the level of vasoconstricting humors (catecholamine (CA), serotonin (5-HT) alongwith measurement of blood pressure before and after voluntary retention of urine.

MATERIALS AND METHODS

In a series of 25 normal healthy human volunteers of 20–45 years, the effect of retention of urine on biogenic amines and certain physiological parameters has been examined.

In the morning at about 8 A.M., the blood and urine samples were collected and the blood pressure, pulse rate, respiration rate were recorded. Then the volunteers were given 1.5 litres of water to drink and instructed to hold the urine as long as possible and report the first feeling of micturition After maximum voluntary holding, the blood sample was collected and the blood pressure, pulse rate, and respiration rate were recorded Then volunteers were allowed to pass urine which was collected. The time of drinking water, the first feeling of micturition and passing of urine were also recorded.

Blood samples were collected in heparinized tubes and plasma was subjected for the fluorometric estimation of catecholamine (4) and serotonin (15). Urine samples were collected over con. HCl to maintain pH between 2–3 for stability of catecholamine. Urine was analysed for the catecholamine (1) and 5–hydroxyindoleacetic acid (5-HIAA) estimation (6) which were expressed in terms of creatinine. (cr.).

The results were expressed as mean ± SEM and comparison was done by student 't' test.

RESULTS

Biogenic amine changes :

There was a significant rise in plasma ($P<0.01$) as well as urinary catecholamine level ($P<0.001$) after retention of urine. The plasma 5–HT was also increased but not very significantly ($P<0.05$) while the urinary 5–HIAA (metabolite of 5–HT) increase was quite significant ($P<0.001$), (Table I).

Physiological changes :

As regards the blood pressure, both the systolic and diastolic pressures were

increased significantly ($P<0.05$). The respiration rate and pulse rate were also increased significantly ($P<0.001$ and $P<0.02$, respectively, Table I).

TABLE I : Effect of urine retention on biogenic amines and physiological responses.

S. No.	Parameters	Before retention (a)	After retention (b)	'P' value (a vs b)
A.	*Biogenic amines :*			
1.	Urinary CA, (μg/25 mg of Cr.)	2.06±0.34	4.85±0.60	<0.001
2.	Urinary 5-HIAA, (mg/gm of Cr.)	3 0±0.36	8.28±0.81	<0.001
3.	Plasma CA, (μg/ml)	10.86±0.45	13.77±0.75	<0.01
4.	Plasma 5–HT (ng/ml)	0.0510±0.01	0.148±0.39	<0.05
B.	*Physiological parameters :*			
5.	B. P. (mm. Hg)			
	(i) Systolic	114.15±3.05	123.4 ±2.19	<0.05
	(ii) Diastolic	71.46±2.02	79.62±2.57	<0.05
6.	Respiration rate	19.72±0.65	24.77±1.16	<0.001
7.	Pulse rate	72.71±2.41	83.51±3.23	<0.02

DISCUSSION

Haemodynamic changes have been reported by various workers following the distension of pelvic organs specially the bladder and rectum (7,11,13,16). The increased blood pressure level in the present study is consistent with the result of these workers. The increased catecholamine and serotonin level in this study support the suggestion of Prabhaker *et al.* (13) that some vasoconstricting humors also participate in the blood pressure increment in addition to reflex mechanism. Catecholamine and serotonin are supposed to cause the blood pressure increase due to their vasoconstricting property (10,14,17).

It is an established fact that normal individuals respond to stress with the increased blood pressure and catecholamine execretion due to sympathetic stimulation (3,8,9,10) In the present study the bladder distension due to voluntary retention of urine causes rise in pulse rate, respiration rate, blood pressure and catecholamine alongwith the increase in 5–HT level, which are also reported to be increased in the stressful situations (2,5,12).

Thus it is obvious that retention of urine is capable to produce stress in the body which is reflected in the physiological as well as biochemical parameters. Hence, in day

to day life, it may be a contributory factor in the aetiology of endogenous diseases in general and psychosomatic disorders as envisaged in the Ayurvedic literature.

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