

Effect of Caffeine on Blood Pressure of Different Age Groups of Females of Quetta City, Baluchistan

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Abstract: Caffeine is a methylxanthine alkaloid. It is present in approximately 63 plant species. It causes an increase in diastolic and systolic blood pressure. BP of 800 volunteers was measured before and after regular intervals of oral administration of strong cup of coffee. Caffeine caused an increase in SBP and DBP in all volunteers.

Key words: Methylxanthine Alkaloid • Caffeine • Plant Species

INTRODUCTION

Caffeine is a natural chemical stimulant and an alkaloid belonging to a class of compounds called methylxanthines. The chemical formula of caffeine is $C_8H_{10}N_4O_2$ [1].

Leaves, seeds and fruits of approximately 63 species of plants contain caffeine. The most common sources are coffee, cocoa beans, tea leaves and kola nuts [1]. Now caffeine is added in energy drinks, soft drinks, potato chips, chocolates, chewing gum and medication [2].

The per capita utilization level of caffeine for all consumers is approximately 120 mg/ day and an average intake of 1.73 mg per kg body weight/ day [3].

A range of acute cardiovascular effects are induced by caffeine, such as an up regulation of circulating catecholamine, which causes an elevation in diastolic and systolic blood pressure [4]. Caffeine is a CNS-stimulating drug that works as an adenosine receptor antagonist in the brain [5]. Caffeine levels in plasma causes a rise in the respiration rate (RR) [6]. There has been an increase in reports of caffeine intoxication since 1982, from 2002-2004, forty one cases of caffeine abuse were reported in the United States [7].

Caffeine is absorbed and passes quickly into the brain. It does not collect in the blood stream or get stored in the body. It leaves the body in the urine many hours after it has been consumed. There is no nutritional requirement for caffeine. It can be quitted in the diet. Brain and nervous system can be stimulated by caffeine. It does not decrease the alcohol effects, though numerous consumers still consider a cup of coffee will assist a person "Sober-up." It may be utilized for the short-term release of drowsiness or exhaustion [8].

MATERIALS AND METHODS

Over all 800 females including those with normal blood pressures and elevated blood pressure, aged 18-60 years, served as subject of this study. These subjects were divided into three groups to ascertain the change in their blood pressure with caffeine intake.

Group A including 330 females of aged up to 20 years having normal blood pressure. While group B consists of 300 females aged up to 40 years with normal blood pressure. And the last group C comprises of 170 females up to 60 years. All of them are suffering from elevated blood pressure and all of them are inhabited of taking caffeine (In the form of tea, coffee and soft drinks etc.).

Blood pressure of each person was measured before the oral administration of strong cup of coffee. Each subject was administered a cup of coffee containing 7mgs of caffeine only. BP was measured after 15, 30, 45 and 60 minutes of oral ingestion of caffeine.

RESULTS

All these data indicates that caffeine elevated both SBP and DBP in all groups. The average rise was 6mmHg systolic and 3mmHg diastolic in subjects with normal blood pressures irrespective of age *i.e.*, group A and B showed same increase in blood pressures.

Moreover, in some of the subjects an acute but temporary rise in BP was noticed. These were non-habitual of caffeine consumers. This result was in accordance Mayo Clinic hypertension specialist Shedon Shep-MD who says, "Among people who do not use caffeine on regular basis, caffeine causes a temporary but sharp increase in BP."

A gradual rise in BP was observed in caffeine addicted consumers. This might be due to the fact that such consumers establish tolerance for caffeine effects but since the tolerance is not complete, these still shows small rise in BP.

For subjects of group C, with elevated blood pressure, this rise was larger, 15mmHg systolic and 10 mmHg diastolic increases were noticed.

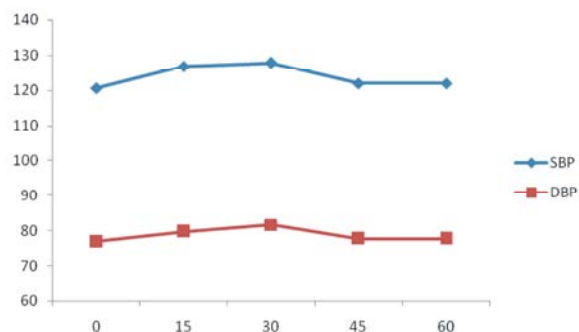


Fig. 1: Female with age up to 20 years (Group A)

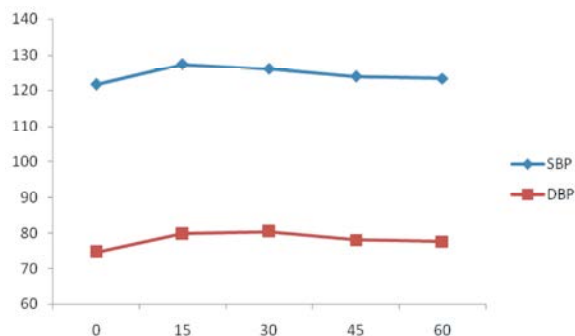


Fig. 2: Female with age upto 40 years (Group B)

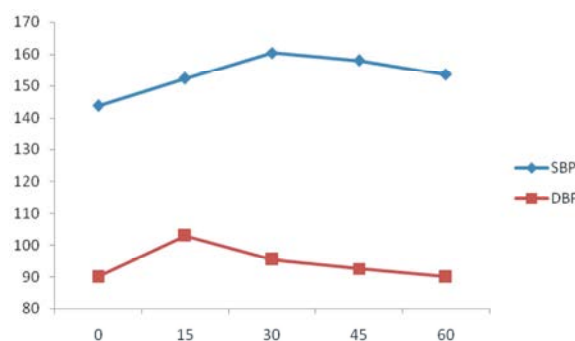


Fig. 3: Female with age upto 60 (Group C)

DISCUSSION

This study was designed to evaluate the varied dose of caffeine on blood pressure in different age groups. Although the result do not show any significant change in B.P with the intake of caffeine but in elder one.

A cup of coffee can contain 100-150 mg of caffeine and this may raise plasma caffeine levels to its peak level [9].

Caffeine produced significant promotions in ambulatory blood pressures, as reported in earlier studies. Furthermore, caffeine amplified the effects of stress on diastolic blood pressure and heart rate. Caffeine intake also increased urinary excretion of free epinephrine during the workday and evening time periods. Caffeine enters all tissue compartments [10] and through its actions at the adenosine receptor, it has extensive effects on the central

GROUP A (UPTO 20 YEARS)			GROUP B (UPTO 40 YEARS)			GROUP C(UPTO 60 YEARS)		
TIME (mins)	SBP	DBP	TIME (mins)	SBP	DBP	TIME (mins)	SBP	DBP
0	120.6	76.9	0	121.6	74.6	0	143.8	90
15	126.8	79.7	15	127.4	79.8	15	152.3	103
30	127.8	81.6	30	126	80.4	30	160.5	95.4
45	121.9	77.7	45	123.8	78.1	45	158.1	92.6
60	121.9	77.7	60	123.3	77.6	60	153.5	90

nervous system and all peripheral tissues [11]. There is inadequate evidence that older adults are more susceptible to the serious blood pressure-raising effects of caffeine [12, 13]. Because caffeine is distributed mainly through lean mass and older adults have lower lean mass to adipose ratios than younger adults, a dose of caffeine expressed as mg/kg of body weight has the prospective to result in higher plasma and tissue concentrations in older adults [14]. Caffeine raised blood pressure during stress by elevating the resting baseline from which the response was measured and not by potentiating the acute blood pressure stress response [15].

The effect of caffeine on blood pressure in usual caffeine consumers and avoiders has been investigated in more than 50 acute and 19 repeated-dose clinical trials with healthy or hypertensive subjects [16,17]. The results of the acute studies indicate that caffeine induces an increase in systolic (5-15 mmHg) and/or diastolic (5-10 mmHg) blood pressure, most constantly at doses >250 mg/person, in adults of both sexes, irrespective of age, race, blood pressure status, or habitual caffeine intake [18]. Taken together, the results suggest that the moderate doses of caffeine ingested every day by habitual coffee drinkers raise blood pressure and increase the activation of general stress reactivity systems. Such effects could have implications for blood pressure management and cardiovascular disease risk.

The results of this study are in a relation with Green *et al.* [17], James [18] and Myers [19].

It seems that the caffeine would explain this small trend towards an increase in systolic pressure due to its reported effects of increasing heart activity.

Observation suggests that increment in blood pressure, recorded in study group after caffeine ingestion. This increase is significant in higher age group subjects *i.e.* group C.

We concluded that despite coffee critically increases systolic and diastolic blood pressure.

CONCLUSION

This preliminary study confirms the rise in B.P after 1 hour intake of caffeine. The higher blood pressure is noticed in group C (Includes subjects with age of up to 60 years) than other groups. The modest significant rise in systolic and diastolic blood pressure can be characteristic to the known effect of caffeine.

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