

Effect of a meal on blood pressure in the elderly

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SUMMARY

As post-prandial hypotension may be a cause of falls in older people, blood pressure was measured for one hour following a test meal in 22 elderly patients. There was a small fall in both systolic and diastolic blood pressure but no change in heart rate. Although the changes were small and no symptoms occurred, post-prandial hypotension might be important in elderly patients who had other abnormalities in blood pressure regulation.

INTRODUCTION

Increasing age is associated with changes in blood pressure regulation particularly in relation to posture.¹ Postural hypotension is one of the many causes of falls in the elderly.² It has been suggested that a post-prandial reduction in blood pressure may occur in the elderly and cause symptomatic hypotension and falls.³ However, the published data has come from studies of severely disabled institutionalised patients³ or of those with idiopathic orthostatic hypotension.⁴ To study whether post-prandial hypotension occurs in a wider range of elderly people we measured the blood pressure after a test meal in a group of hospitalised elderly patients who did not have postural symptoms and who had a variety of degrees of disability.

PATIENTS AND METHODS

The study sample comprised a group of 22 patients in the geriatric medical unit, Belfast City Hospital. All subjects gave informed consent. There were 10 males, age 83.4 ± 5.9 (mean \pm SD), range 68–95, and 12 females, mean age 78.8 ± 8.2 , range 70–92. They comprised 13 patients undergoing short and medium stay rehabilitation and nine receiving continuing care. The majority of patients were ambulant, most with the assistance of a helper or a walking aid, and none was acutely ill. None had experienced syncope or any 'funny' turns either related or unrelated to meals. Six patients were being treated with anti-hypertensive medication and some were on sedation at night. Medication was omitted on the day of the study. All patients ate a normal breakfast on the morning of the test meal.

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At 12.00 midday on the test day, the patients ate a standard test meal within a 15-minute period. The test meal comprised 24% protein (21g), 42% fat (24g) and 34% carbohydrate (45g) — total 508 kCal. The patients remained seated throughout the study period and systolic and diastolic blood pressure and heart rate were recorded 15 minutes before the meal was begun and at five-minute intervals for one hour after the meal had been completed. On a later date, similar measurements of heart rate and blood pressure were made on nine of the same patients in the absence of a meal. Blood pressure was recorded automatically using a Roche Arteriosonde 1217. The data was examined by analysis of variance.

RESULTS

No patient complained of symptoms related to hypotension during the test. The mean readings for systolic and diastolic blood pressure fell after the meal while the heart rate remained unchanged (Fig 1). The maximum fall in mean systolic blood pressure was 8.3 mmHg and in mean diastolic blood pressure was 7.1 mmHg. The maximum change in mean heart rate was a reduction of 1.1 beats per minute.

Analysis of variance showed that all systolic blood pressures from 25 minutes after the meal to the end of the test, and all diastolic blood pressures from five minutes after the meal to the end of the test were significantly lower than the pre-prandial blood pressure. There was no significant change in mean heart rate. There were no differences between the responses of those on drugs or between patients with differing degrees of mobility. Blood pressure measurements taken at five-minute intervals for one hour in the absence of a meal in nine of the same subjects showed no significant change from the basal levels (Fig 2).

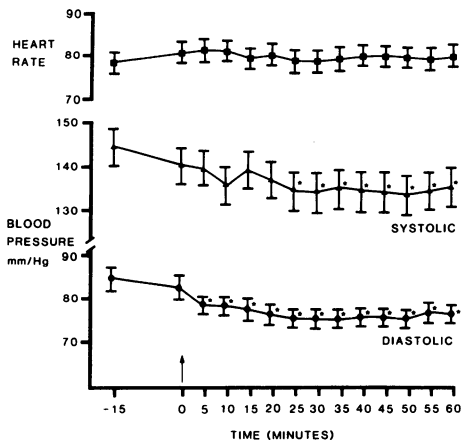


Fig 1. Mean (\pm SEM) heart rate, systolic and diastolic blood pressures during the test period. The arrow indicates when the meal was administered.

* Indicates points of statistically significant change ($p < 0.05$) in blood pressure compared with the basal level.

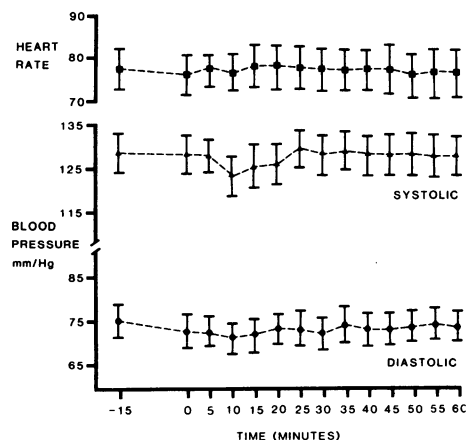


Fig 2. Mean (\pm SEM) heart rate, systolic and diastolic blood pressures in control subjects who did not take a meal.

DISCUSSION

This study shows that in a hospitalised group of elderly patients there is a statistically significant drop in both systolic and diastolic blood pressure, but no change in heart rate, after eating a meal. This confirms the results of previous studies.^{3,4} The clinical significance of this fall in blood pressure is doubtful. Although statistically significant, it was small, and none of the patients experienced any symptoms during the test period. It is possible that, if blood pressure is already low, a meal might result in a further decrease to a symptomatic level. On the other hand, postural hypotension in the elderly is more common in those with hypertension.¹ There is considerable intra-individual variability in blood pressure in the elderly, so that any change occurring after a meal must be interpreted cautiously.

The mechanism of the post-prandial fall in blood pressure is unknown. Detailed study of a patient with autonomic neuropathy and profound post-prandial hypotension suggested that a gastro-intestinal hormone might be involved.⁵ Although the hormone was not identified, treatment with somatostatin prevented the post-prandial fall in blood pressure. The fact that heart rate did not alter suggests that the post-prandial fall in blood pressure might be due to decreases in stroke volume or unpaired peripheral vasoconstriction.¹

Our results demonstrate that elderly patients with varying degrees of severity of disability have a small drop in blood pressure after a meal. Although this did not appear to be clinically important in these patients, it might be significant in elderly patients who have other abnormalities in blood pressure regulation.

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