Asia Pacific J Clin Nutr (1994), 3, 103–110

Assessing food and health relationships: a case study of blood pressure determination in adult Melbourne Chinese

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An effective public health approach to cardiovascular disease prevention should be one which gives the general public alternatives in choice when fat, salt and sugar are reduced in the diet. Fat, salt and sugar are nutrients which can be found in various foods. Public health educators convert these nutrients into foods so that the general public can engage in daily food choice. The usual nutrient-to-food conversion is indirect and can be misleading. For example, we are still unclear as to the potential benefit of polyunsaturated margarine over butter or olive oil. In a base-line data analysis of Chinese adults in Melbourne, we related food intake in addition to nutrients to major cardiovascular risk factors. In all models, food intake accounted for a higher variation of major cardiovascular risk factors than did nutrient intake. Melbourne Chinese, who consumed a wide variety of foods and ate more fish, vegetable, and fruits, had a better cardiovascular risk profile. The findings are of importance in public health significance. Longitudinal documentation of changing food intake, in addition to nutrients, and associated change in cardiovascular risk factors in this population are needed at this stage followed by further work to confirm its generalizability to Australians at large. This report focuses on findings of blood pressure determination in 547 adult Melbourne Chinese and reviews the way in which food and health relationships may be studied.

Introduction

Health status of an individual is a function of preventable risk factors and their determinants. Aside from genetic predisposition, dietary factors play an important role in the determination of an individual's health. Cancer and cardiovascular diseases, the two most widely researched chronic disease categories, are said to be preventable because the several established risk factors for these diseases are of dietary or environmental consequence. It is known that genetic factors account for as much as 50 % of the variation in serum cholesterol between individuals; an individual's serum cholesterol, however, differs in response to fat intake[1]. For essential hypertension, there is genetic involvement in the susceptibility to dietary factors such as sodium, potassium, calcium, fats, total energy intake and alcohol[2]. Moreover, age, gender and socio-economic status of an individual have been shown to be associated with all-cause mortality, particularly cardiovascular mortality[3–4], as well as dietary intake[5,6]. Deter-

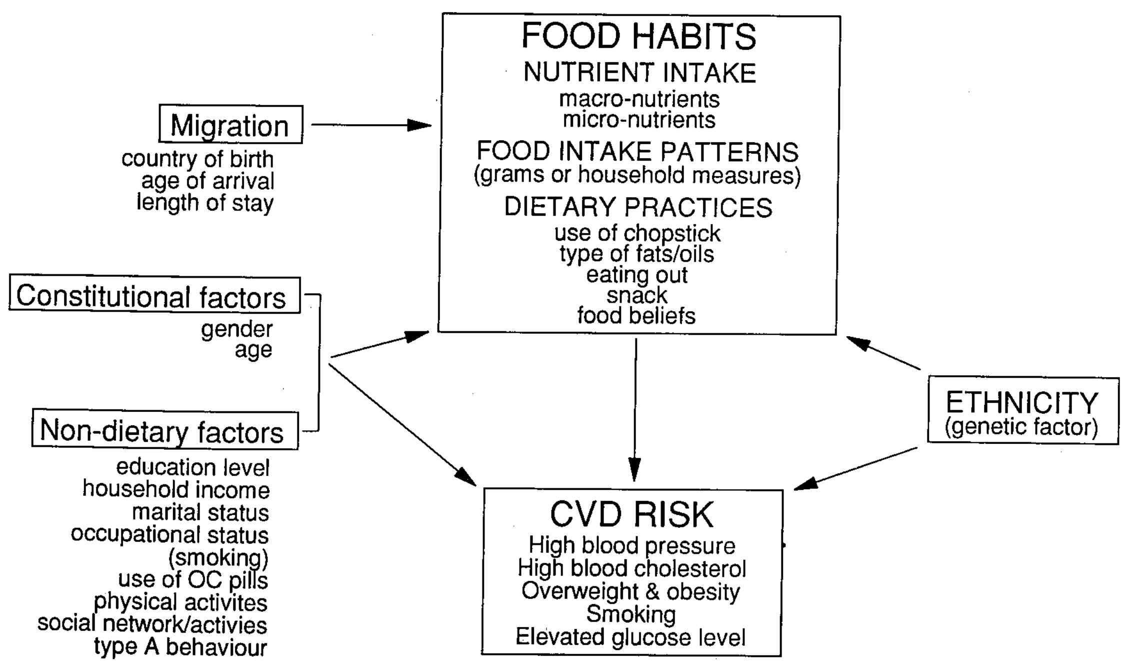

Figure 1. Proposed pathways in the determination of CVD risk.

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minants of cardiovascular health status of an individual therefore are related to variations in constitutional factors such as gender and age, environmental factors such as dietary habits and other life-style factors, and underlying genetic factors (Fig. 1).

In this paper, nutritional determinants of blood pressure in 547 adult Chinese Australians are reviewed. The nutrient and food intake in relation to blood pressure is discussed separately. The subjects were randomly selected from the telephone directory and represented adult ethnic Chinese living in the Melbourne metropolitan area[7]. Survey methods for this study have been reported previously[8,9].

Relationships between blood pressure and urinary sodium and potassium excretion are also presented. Eighty-seven (48 men and 39 women) subjects aged 25 to 64 were randomly selected. They collected 24-hour urine specimens using a cylinder sampler which extracts 1/50 portion of void urine. Sodium and potassium excretion values are the products of urinary concentrations and volume estimated for 24 hours. Blood pressure (BP) is the mean of the two readings. Subjects taking tablets for BP were examined separately so that factors associated with BP and medication were removed. Analyses were performed within each gender.

Determinants of blood pressure

High blood pressure is an established risk factor for coronary heart disease and stroke[10–15]. Collective reports from studies carried out overseas suggest that hypertension is more prevalent in developed societies[16,17] than in developing countries[18–21]. Regional differences in the prevalence of hypertension within the country have also been identified in developing as well as developed countries[22–31].

There is a genetic predisposition to hypertension in humans[31]. Primary hypertension, however, does not result from genetic influences alone[33]. Genetic responsiveness to environmental influences, including nutritional status and psycho-social factors, may vary between individuals[34].

The intakes of sodium and alcohol have been widely reported for their adverse relationships with blood pressure. Positive association between blood pressure and salt intake was mostly found in ecological comparisons of diverse population means and secondary analyses of results from the cross-sectional studies[35–37]. Intra-population relationships have been observed by Khaw and Barrett-Connor[38,39]. A few studies have examined potassium per se and reported inverse relationships with blood pressure in industrialized populations[40]. However, associations at the individual level and within population correlations have been less consistent.

The positive relationship between blood pressure and alcohol consumption was found mainly in cross-sectional studies[41–48]. Ueshima and colleagues[49] showed that increased consumption of alcohol was associated with an increase in blood pressure and stroke mortality in Japanese populations.

The electrolytes sodium and potassium are widely studied for their effect on blood pressure. The possible interactions and inter-correlation of dietary electrolytes present difficulties in epidemiologic studies where single electrolytes are often examined to identify independent relationships with blood pressure. The 24-hour urinary sodium output is considered a more precise measure of sodium intake. 24-hour urinary sodium excretion was found to be positively associated with systolic blood pressure in the Intersalt Study populations[36].

Age and body fatness are probably the most important non-dietary factors in the examination of blood pressure relationships. Socio-cultural factors have been shown to affect blood pressure in migrants and populations undergoing rapid industrialization[26,50–52].

Nutrient intake and blood pressure

Univariate correlations: results

In men, systolic blood pressure was *positively* correlated to both P/S (P, polyunsaturated and S, saturated fatty acids) (r=0.15, *P*=0.0120) and M/S (M, monounsaturated) fatty acids (r=0.17, *P*=0.056) intake ratios. In women, systolic blood pressure was *positively* correlated to P/S fatty acid intake ratio (r=0.28, *P*=0.0001), M/S fatty acid intake ratio (r=0.24, *P*=0.0001), and the per cent energy intake of PUFAs (r=0.17, *P*=0.0058). There was a *negative* relationship between systolic blood pressure and saturated fatty acid (SFAs) intake (r=0.13, *P*=0.0264).

No correlation was found in men or women between dietary intake and diastolic blood pressure.

Multivariate models: results

Table 1 lists factors that are associated with systolic blood pressure of Melbourne Chinese. In men, systolic blood pressures are associated with dietary fibre, M/S fatty acid intake ratio and food variety, while M/S fatty acid intake ratio was associated with systolic blood pressure of women. Age accounted for 41 % of the variation of systolic blood pressure in women. For men, education level was positively related to systolic blood pressure, while for women systolic blood pressure increased with an increasing length of stay in Australia. Food variety is an independent predictor of systolic blood pressure of men. Systolic blood pressure of men decreased with an increasing food variety. The protective effect of food

Table 1. Nutrient determinants of systolic blood pressure (mmHg), by gender.

Factors	b	*P*
MEN		
Age (yrs)	0.78	0.0001****
ED	1.98	0.0315*
BMI (kg/m^2)	0.78	0.0095*
Food variety	–0.15	0.0095**
Energy (kJ/day)	0.00094	0.0459*
D fibre (g/day)	–0.32	0.0420**
M/S ratio	8.36	0.0258*
% variation explained by the model		36 %
WOMEN		
Age (yrs)	1.07	0.0001****
LOSIA (yrs)	0.37	0.0024**
Food variety	–0.18	0.0352*
Energy (kJ/day)	0.00046	0.3120 NS
M/S ratio	19.86	0.001****
% kJ alcohol	2.48	0.0708 NS
% variation explained by the model		48 %

b=regression coefficient (parameter estimate); *P*=significance level for F-test that 'b=0'; ED=education level ('2', 0–6 yrs; '3', 7–9 yrs; '4', 10–12 yrs; '5', 13 plus yrs schooling); LOSIA=the length of stay in Australia; BMI= body mass index; NS= *P*>0.05;* =*P*<0.01;**= *P*<0.01;*** = *P*<0.001;**** = *P*<0.0001.

Table 2. Nutrient determinants of diastolic blood pressure (mmHg), by gender.

Factors	b	P
MEN		
ED	1.76	0.0015**
WHR	64.17	0.0001****
Energy (kJ/day)	–0.00089	0.0236*
% kJ SFAs	–1.0-9	0.0105*
SFAs	0.37	0.0171*
% variation explained by the model		17 %
WOMEN		
Age (yrs)	0.24	0.0001****
LOSIA (years)	0.16	0.0160*
BMI (kg/m^2)	0.60	0.0017**
Energy (kJ/day)	–0.00095	0.0361*
Zinc (mg/day)	0.71	0.0202*
% variation explained by the model		19 %

b=regression coefficient (parameter estimate); P=significance level for F-test that 'b=0'; ED=education level ('2', 0–6 yrs; '3', 7–9 yrs; '4', 10–12 yrs; '5', 13 plus yrs schooling); LOSIA=the length of stay in Australia; WHR=waist-to-hip ratio; BMI=body mass index; NS= $P>0.05$;* =$P<0.05$;** =$P<0.01$;** *= $P<0.001$;**** =$P<0.0001$.

variety in women was dependent on total energy intake and the percentage energy intake from alcohol.

Diastolic blood pressure of men was positively related to SFA intake (controlling for the per cent energy intake of SFAs) and was negatively related to total energy intake (Table 2). Diastolic blood pressure of women was positively related to zinc intake and was negatively related to total energy intake.

Waist-to-hip ratio was predictive of diastolic blood pressure in men while for women body mass index (BMI) was a better predictor. Age was positively related to diastolic blood pressure for women. Diastolic blood pressure was higher among the educated males. For women, diastolic blood pressure increased with an increasing length of stay in Australia.

Discussion

Both systolic and diastolic blood pressure have been shown to be negatively associated with the intake of MUFAs[53]. Studies have also shown the protective effect of increased P/S ratio[54,55]. However, the study population of the above studies is known to have a much higher total fat intake, particularly SFAs and PUFAs, compared to the Melbourne Chinese.

People consuming a vegetarian diet have been reported to have a lower blood pressure compared to those consuming omnivorous diets[55]. A complete vegetarian diet has also been reported to contain more PUFAs and less total fat, SFAs and cholesterol[57]. Although the total fat intake was also low in Melbourne Chinese, the fatty acid intake of Melbourne Chinese was predominantly MUFAs, not PUFAs.

In a study of traditional Mediterranean diet and blood pressure, Strazzullo and colleagues[58] showed that a reduction of P/S ratio from the 0.44 to 0.23 caused increases in systolic blood pressure, but not diastolic blood pressure, in a rural southern Italian population. The investigators achieved the 50 % reduction of P/S ratio by means of increasing SFAs and a corresponding decrease in carbohydrates and MUFAs so that total energy intake remained constant. In other words, the investigators have shown a negative relationship between systolic blood pressure and P/S fatty acid intake ratio while the customary M/S intake ratio remains. In terms of dietary intake what has been effectively altered is the SFA intake. Thus, it is not clear whether it is the decreased P/S fatty acid intake ratio or the increased intake of SFAs that increases systolic blood pressure. However, it is evident that the manipulation of either P/S fatty acid intake ratio or saturated fat intake does not alter diastolic blood pressure of a population high in monounsaturated fatty acid intake.

M/S fatty acid intake ratio of Melbourne Chinese men was positively related to total energy intake, protein intake, total fat intake, the per cent energy intake of fat, the per cent energy intake of alcohol, and was negatively related to the per cent energy intake of carbohydrates. It is suggestive that a higher M/S fatty acid intake ratio is associated with a higher per cent energy intake of alcohol and total fat intake. On the other hand, M/S fatty acid intake ratio of women was independent of all macro-nutrient intakes and the contribution of macro-nutrient intake to energy.

The positive relationship of systolic blood pressure and M/S fatty acid intake ratio in Melbourne Chinese is not supported by current literature.

An increased intake of dietary fibre was negatively related to systolic blood pressure of men. The protective effect of dietary fibre for blood pressure is consistent with findings of vegetarian studies.[56,59,60].

There is a large body of evidence linking the relationship between BMI and blood pressure. Positive relationships between body weight and blood pressure have been reported in ecological studies[61,62] and large-scale epidemiological studies[45,63–69]. BMI was positively related to systolic blood pressure in men, but not women (Table 1).

The role of trace elements in the regulation of blood pressure is ill defined. Zinc, copper and iron participate in enzyme reactions related to blood pressure regulation and may be factors in the development of hypertension. However, they are unlikely to be the primary cause of hypertension[70].

Detailed examination of systolic blood pressure and the M/S fatty acid intake ratio firmly supports a relationship between intake of dietary fats and level of blood pressure. However, we can be less clear about the type or the amount of fats which relate to blood pressure levels. Despite a much lower SFA intake compared to Australians, Melbourne Chinese men who had higher intakes of SFAs were likely to have a higher diastolic blood pressure.

Food intake and blood pressure

Univariate correlations: results

Table 3 shows food intake components that are related to systolic blood pressure of Melbourne Chinese. Systolic blood pressure was positively correlated to the intake of rice and fish in men, and the intake of nuts, vegemite/jam/honey, and soup in women. Systolic blood pressure negatively correlated to the intake of biscuits in men and the intake of fatty snack foods in women.

Quite different from the examination of nutrient intake and diastolic blood pressure, where no univariate correlations were found, the food intake and diastolic blood pressure

Table 3. Pearson correlation coefficients for relationships between food intake and blood pressure (mmHg), by sex.

Food intake components	Men b	Men P	Women b	Women P
SBP				
Rice	0.13	*		
Fish	0.14	*		
Biscuits	–0.15	**		
Nuts			0.17	**
Vegemite/jam/honey			0.13	*
Soup			0.13	*
Fatty snack foods			–0.15	*
DBP				
Fish	0.16	**		
Sea weeds	0.16	**		
Light snacks	0.16	**		
Biscuits	–0.14	*		
Spirits			0.12	*

NS=P>0.05;*=P<0.05;**P<0.01;***P<0.001;****P<0.0001.

existed as shown in Table 3. We found that diastolic blood pressure positively correlated to the intake of fish, seaweeds, and light snacks in men, and the intake of spirits in women. A high intake of biscuits was negatively related to diastolic blood pressure in men.

Multivariate models: results

Foods accounted for 12 % of variation of systolic blood pressure in men. For women, age is the most important predictor of systolic blood pressure. Less than 4 % of the variation of systolic blood pressure in women was accounted for by foods (Table 4). Neither BMI nor waist-to-hip ratio were predictive of systolic blood pressure in women. The length of stay and food acculturation, on the other hand, were predictive of systolic blood pressure in women. This is consistent with the nutrient intake model (Table 1).

Table 5 shows that diastolic blood pressure was positively related to the intake of fish, seaweeds, and breakfast cereals in men and the intake of molluscs and spirits in women. Diastolic blood pressure decreased with a higher intake of biscuits, tropical fruit, cruciferous vegetables and tea in men, and with a higher intake of confectionery in women. For men, the effect of food intake on diastolic blood pressure was adjusted for the confounding effect of age, education level, waist-to-hip ratio, and smoking status, while for women, an adjustment was made for age, the length of stay in Australia and BMI.

Similar to systolic blood pressure, foods accounted for 12 % of variation of diastolic blood pressure in men and less than 4 % in women (Table 5). Waist-to-hip ratio increases with age for men and women. It is a strong predictor for diastolic blood pressure in men. Adiposity alone accounted for more than 12 % of the variation of diastolic blood pressure. Diastolic blood pressure were lower among the male smokers, possibly due to its association with a higher tea consumption and the fact that smokers were less educated and had a lower waist-to-hip ratio compared to non-smokers.

Table 4. Food intake as a determinant of systolic blood pressure (mmHg), by sex.

Factors	b	P	Partial R^2
MEN			
Age (yrs)	0.82	0.0001****	29.92
ED	3.36	0.0003***	1.43
BMI (kg/m^2)	0.90	0.0015**	1.72
Food variety	–0.16	0.0134*	0.96
Rice	1.70	0.0449*	0.88
Offal	1.43	0.0297*	1.56
Fish	2.19	0.0068**	1.13
Spirits	1.65	0.0367*	1.02
Berries/grapes	2.01	0.0304*	1.02
Biscuits	–1.95	0.0061**	2.83
Choc drinks/coffee	–2.16	0.0122*	0.95
Soup	–2.11	0.0133*	0.98
Melon[a]	–1.53	0.0224*	0.47
% variation explained by the model			45 %
WOMEN			
Age (yrs)	1.16	0.0001****	41.94
LOSIA (yrs)	0.28	0.0262*	1.14
Food acculturation	2.36	0.0232*	1.02
Nuts	2.348	0.0249*	1.50
Fish[b]	2.211	0.0206*	0.53
Biscuits	–2.613	0.0042**	1.14
Cream	–2.456	0.0231*	0.52
% variation explained by the model			48 %

b = regression coefficient (parameter estimate); P=significance level for F-test that 'b = 0'; ED = education level ('2', 0–6 yrs; '3', 7–9 yrs; '4', 10–12 yrs; '5', 13 plus yrs schooling); BMI=body mass index; LOSIA = the length of stay in Australia; a=predictive power is significant controlling for the intake of berries/grapes; b=predictive power is significant controlling for the intake of cream; NS = P>0.05;*= P<0.05;**= P<0.01;*** = P<0.001;**** = P<0.0001.

Discussion

Despite the indication that food variety may protect against an elevated systolic blood pressure, we found that systolic blood pressure levels increased with a higher intake of rice, offal, fish, spirits and berries/grapes, and decreased with a higher intake of biscuits, chocolate drinks/coffee, soup and sweet melon in men, adjusting for age, education level, body mass index and food variety. For women, an elevated systolic blood pressure was associated with a lower intake of biscuits and cream, adjusting for age, the length of stay in Australia, and the degree of food acculturation.

Studies have shown that fish intake reduces CHD mortality[71–73] and that a moderate intake of fatty fish (two or three portions per week) may reduce total mortality in men who have recovered from myocardial infarction[74]. Furthermore, it has been shown that omega-3 fatty acids, found in fish and marine animals, cause a reduction in VLDL, reduction in thrombotic tendency, increase in fibrinolytic activity, and perhaps, reduction in blood pressure[75]. The protective effect of fish intake on CHD, however, is not supported by a study of Norwegian men[76], a study of Japanese men living in Hawaii[77], and descriptive studies of ecological compari-

Table 5. Food intake as a determinant of diastolic blood pressure (mmHg), by sex.

Factors	b	P	Partial R^2
MEN			
Age (yrs)	0.13	0.0109*	1.23
ED	2.01	0.0005***	2.45
Smoking†	−2.86	0.0270*	1.18
WHR	54.13	0.0001****	12.85
Fish	2.16	0.0001****	2.39
Seaweeds	1.34	0.0124*	1.23
Breakfast cereals	1.09	0.0321*	1.55
Biscuits	−1.71	0.0003***	2.65
Tropical fruit	−1.22	0.0140*	1.68
Cruciferous vegetables[a]	−0.75	0.0420*	0.92
Tea	−1.11	0.0434*	1.13
% variation explained by the model			29 %
WOMEN			
Age (yrs)	0.22	0.0001****	11.93
LOSIA (yrs)	0.18	0.0070**	2.08
BMI (kg/m^2)	0.54	0.0047**	3.04
Molluscs	1.05	0.0341*	1.37
Spirits[b]	1.10	0.0223*	0.91
Confectionery	−1.18	0.0411*	1.24
% variation explained by the model			21 %

b =r egression coefficient (parameter estimate); P = significance level for F-test that 'b = 0'; ED=education level ('2', 0–6 yrs; '3', 7–9 yrs; '4', 10–12 yrs; '5', 13 plus yrs schooling); † = cigarette smoking ('0', non-smokers; '1', smokers); WHR= waist-to-hip ratio; BMI = body mass index; LOSIA= the length of stay in Australia; a = predictive power is significant adjusting for tea consumption; b = predictive power is significant adjusting for the intake of confectionery; NS = P>0.05;* =P<0.05;**= P<0.01;*** = P<0.001;**** = P<0.0001.

son[78–80]. It appears that a higher fish intake may be protective of CHD in populations whose average fish intake was relatively low such as Dutch or North American. The same effect may be difficult to observe in populations already high in their fish intake.

We observed here a positive relationship between fish intake to systolic blood pressure in Melbourne Chinese. Adherence to a high fish intake in women is a marker for less food variety achieved and less acculturation. This has become apparent because the effect of fish intake on systolic blood pressure is not significant, unless the intake of cream is adjusted for. It is less clear the socio-cultural mechanism in which fish is positively related to systolic blood pressure in men.

So far no epidemiological studies have reported that fish intake per se is positively related to blood pressure. The positive relationship between fish intake and systolic blood pressure remains to be explored further, especially among the high fish intake populations.

It is possible that a higher fish intake protected against CHD mortality, but not stroke mortality, in a high fish intake population. Moreover, it is likely that the way fish is prepared and consumed is responsible for the positive relationship. There are a set of foods 'favoured' by those consuming a higher amount of fish and that fish is often consumed in accordance with the traditional *fan-t'sai* eating principles[81].

A higher intake of biscuits was negatively related to systolic blood pressure for men and women. The intake of biscuits among the Melbourne Chinese was higher among the educated and was independent of food variety, food acculturation index, the length of stay in Australia and age[81]. The independent effect of age, education level, food variety, food acculturation index and the length of stay in Australia on systolic blood pressure is consistent with the multivariate analysis for nutrient intake model (Table 1). The beneficial effects of biscuit intake on systolic blood pressure, therefore, cannot be superfluous.

Food variety is probably protective of systolic blood pressure in Melbourne Chinese. Although the predictive power of food variety per se is not significant for women, it can be said that the protective effect of food variety may be operational via effects of length of stay in Australia and food acculturation (Tables 1, 2 and 4) on systolic blood pressure. On the other hand, the adverse effect of education on systolic blood pressure in men is probably amplified by the adverse effect of food acculturation as education has been shown to enhance food variety as well as food acculturation.

A higher intake of spirits predicted an elevated systolic blood pressure in men (Table 4) and diastolic pressure in women (Table 5). This is consistent with findings of numerous cross-sectional studies.

In summary, foods that predict blood pressure levels of Melbourne Chinese can be characterized into three groups. They are seafoods (fish, seaweeds and molluscs), fruit (tropical fruit and melon) and foods between meals (biscuits, confectionery, chocolate drinks, coffee and tea). Seafoods were likely to be consumed with rice or in a traditional meal setting. With this in mind, it can be summarized that blood pressure in Melbourne Chinese decreased with a higher intake of seafoods and alcoholic beverage (spirits) and increased with an increasing intake of fruits and foods between meals (biscuits, confectionery, chocolate drinks, coffee, and tea).

Blood pressure and 24-hour urinary sodium and potassium excretion

Of the 87 subjects, seven men (14.6 %) and 12 women (30.8 %) were being treated for hypertension (THT). There were no untreated hypertensives (SBP>= 160 mmHg and DBP>= 95 mmHg). Three borderline hypertensives (140 mmHg<SBP< 160 mmHg or 90 mmHg< DBP< 95 mmHg) were not being treated; all had DBP less than 90 mmHg and were included in the non-hypertensive (NHT) group. The THT were older and had higher BP. No differences were found between the THT and the NHT group for urinary sodium (Na) and potassium (K) excretion and urinary creatinine (C). Mean and standard error of the mean for age, SBP, DBP, urinary sodium, potassium, and creatinine excretion are shown in Table 6. There was no difference in these parameters between the urine collectors and the non-urine collectors.

Among the THT, there were positive relationships between systolic BP and urinary sodium excretion and urinary Na/C ratio in both men and women: urinary Na excretion r=0.90 in men and 0.83 in women; urinary Na/C ratio, r=0.89 in men and 0.78 in women. Diastolic BP was positively related to urinary Na/C ratio (r=0.86) and urinary K/C ratio (r=0.88) in men yet no statistically significant relationship was found in women; presumably the urinary K loss is related to therapy such as diuretics and K supplements. Among the NHT group, there was a negative relationship

Table 6. Mean values (SEM in parentheses) for age, SBP, DBP, urinary sodium, potassium, and creatinine excretion, by 'hypertensiveness' (treated hypertensive vs non-hypertensive), by gender.

	MALES				FEMALES			
	THT(n=7)		NHT(n=41)		THT(n=12)		NHT(n=27)	
Age (yrs)	52	(2.47)	40	(1.53)	49	(2.54)	39	(1.54)
SBP (mmHg)	141.14	(5.18)	116.20	(2.90)	134.17	(8.26)	110.22	(3.68)
DBP (mmHg)	89.14	(4.19)	73.61	(1.91)	73.17	(3.39)	68.59	(2.07)
Na excretion (mmol/d)	173.7	(26.52)	180.0	(14.51)	170.8	(24.61)	145.8	(13.71)
K excretion (mmol/d)	52.00	(5.58)	63.66	(4.20)	66.08	(5.34)	49.07	(3.41)
U creatinine (mmol/d)	9.06	(1.32)	9.80	(0.53)	7.14	(0.73)	6.84	(0.41)

Na=urinary sodium; K=urinary potassium

between systolic BP and urinary creatinine (r=0.49) and a negative relationship between diastolic BP and urinary potassium excretion (r=0.41) in women; no relationships were found in men.

The positive relationship between urinary sodium excretion and systolic BP among the THT, yet not among the NHT group, may suggest that either hypertension or its treatment is responsible for the relationship. Though less potent and negative, the relationship between urinary potassium excretion and diastolic BP among the NHT group restates the relative importance of dietary potassium in BP control in women, although not in men. The sex difference is intriguing and may suggest that women achieve lower BP through potassium responsiveness.

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Assessing food and health relationships: a case study of blood pressure determination in adult Melbourne Chinese

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Asia Pacific Journal of Clinical Nutrition 1994; 3: 103–110

評估食物與健康的關係：
墨爾本中國成人血壓測定的研究

摘要

一個有效的預防心血管病的公共衛生方法應該是，在減少飲食中脂肪、鹽和糖的同時，給予選擇食物的機會。脂肪、鹽和糖是一類可在各種食物中找到的營養素。公共衛生教育工作者把這些營養素轉換成食物，以便於每日食物的選擇。通常營養素轉換成食物是間接的，並可能誤導。例如，我們對高度不飽和的人造黃油較黃油和橄欖油有益仍未明瞭。在墨爾本成人的基線數據分析中，我們把食物和營養素與主要心血管病危險因子進行相關分析，結果發現，食物與主要心血管病危險因素的相關較營養素爲大。墨爾本華人食物種類廣泛，並多食魚類、蔬菜和水果，因而心血管病的危險較低。這些發現在公共衛生的意義上是重要的，因爲除營養素外，食物的轉變會引起該人群心血管病危險因子的轉變。該文闡述了547 位墨爾本華人血壓測定的發現，並評論了食物與健康關係可能的研究途徑。