Urinary sodium and potassium in a sample of healthy adults in Sydney, Australia

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Australia has had an official guideline for the last ten years, that people should aim to consume less than 100 mmol sodium per day (equivalent to 6.0 g NaCl). The only practical way of estimating sodium intake is from the 24-h urinary sodium excretion. Between 1970 and 1980 average sodium excretions in different Australian surveys ranged from 130 to 200 mmol/day (middle number 165 mmol/d). These surveys involved small numbers of subjects (n=11 to 259). To see how Australians are responding to the guidelines and taking advantage of a range of reduced salt food products now in the supermarkets, we measured urinary sodium and potassium in 117 healthy adult subjects, mostly in the university community. In group N (nutrition personnel) sodium excretion averaged 128 mmol/d in females and 137 mmol/d in males. In group W (eating a western, traditional Australian diet, no special knowledge of nutrition) urinary sodiums averaged 133 mmol/d (female) and 159 mmol/d (male). In group A (eating an Asian diet) sodiums averaged 140 mmol/d (female) and 195 mmol/d (male). Potassium excretions were 73, 81, 72, 76, 53, and 65 mmol/day respectively in the six subgroups. We conclude that these results possibly reflect a small downward trend in Australian sodium intake and that sodium intake is lower in mainline Australian diets than Asian diets. But only a minority of subjects' urinary sodiums were within the recommended 40 to 100 mmol/d. Women excreted consistently smaller amounts of sodium than men; the guidelines for sodium should perhaps be expressed separately by gender. In six subjects who provided seven days' urine collections the coefficient of variation for sodium excretion was between 20 and 35%.

Introduction

'Reduce salt intake' is one of the dietary guidelines of the Australian federal Department of Health first published in 1979[1]. The report of the National Health and Medical Research Council's (NH&MRC) working party on sodium in the Australian diet (1984)[2] recommended that adult sodium intakes should be under 100 mmol/day with greater restrictions for individuals at risk; sodium intake above 100 mmol/d could increase the risk of hypertension. At about the same time the NH&MRC's working party on recommended dietary intakes published new recommended dietary intakes for sodium of 40 to 100 mmol/d for all adults[3]. The 2nd edition (1992) of the Australian dietary guidelines[4] confirm the recommended upper limit of 100 mmol/d in adults and the guideline about lower salt intake has been moved up from eighth position to seventh.

However, a review of sodium intake data for Australian adults in the NH&MRC sodium working party (1984) report showed the average to be around 165 mmol/d[2]. Bullock[5] summarized these different studies in Australia, almost all based on 24-h urine sodium excretions between 1968 and 1980. The average sodium intake for adults in the different studies was between 130 and 200 mmol/d. Since then, there appear to have been no published studies of sodium excretion (reflecting intake) until recently, Beard et al. in Tasmania[6] reported a small but presumably random sample of 22 men and 32 women: the mean 24-h urine sodium were 160 mmol for men and 124 mmol for women. These figures suggest some decrease may be occurring in sodium intake, since Bullock's review, but it is still well above the range recommended by NH&MRC.

Alongside the confirmation and strengthening of official advice to restrict sodium intake a considerable number of reduced and low salt products have appeared in Australian supermarkets in the late 80s and early 90s. The Better Health Commission[7] set national targets for sodium intake of 130 mmol/d by 1995 and 100 mmol/d by the year 2000. The WHO study group[8] and the US National Research Council's Committee on Nutrition and Health[9], both also advise that healthy adults should eat less than 100 mmol Na or 6.0g NaCl per day. Thus, it was thought it was time to sample urinary sodium excretions in healthy residents in Sydney to see whether there has been any tendency to reduction in sodium intake from previous studies.

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Methods

Study design

The study was carried out from March to November 1992 in different groups of people in Sydney. A total of 127 volunteers, 63 men and 64 women over 19 years of age, answered our invitation to contribute 24-h urines. The participants had a wide range of nutritional knowledge and lifestlye. Each of the participants were given a consent form before joining the study.

Anyone with major medical illnesses and under certain treatments (anti-hypertensive agents, diuretics, other renal drugs and steroids) was not accepted. None of the female subjects were pregnant or lactating. Another important piece of information was the ethnic background of the subject. People from overseas, especially from Asia, may eat more salty foods compared with those who eat a more traditional western diet, hence duration of stay in Australia was asked of the participants. Promotion and education about dietary salt may also be more established in Australia than in some Asian countries.

The participants were given the explanation form to read, followed by detailed verbal instructions on how to collect an exact 24-h urine collection. They were told that the collection was a survey of nutrients in urine. During the briefing the words, *salt* or *sodium* were not mentioned, so that subjects would not be influenced to change their salt intake. Subjects' body weight and height without shoes and heavy outer clothing were recorded.

A two-litre plastic bottle containing 30 g of boric acid as preservative was given to each subject, together with two spare 500 ml plastic containers, one funnel and one safety pin (to attach to underclothes as a reminder) all in a convenient, discrete black plastic bag. 'Do Not Discard' was written on all the containers to prevent an accidental discard when the subject left the containers anywhere. Boric acid was chosen as preservative as it is not dangerous, if it should be spilt and come in contact with the skin, and sodium and potassium are stable in urine.

From one to seven 24-h urine collections were provided by different subjects. When subjects brought in their 24-h urine collection, they were personally interviewed and carefully questioned about completeness of the urine collection, unusual dietary intake, any medicines or tablets taken at least two days before the collection and strenuous exercise taken during the collection period. After participants had finished all the collections, questions were asked about changes in their usual way of eating: whether they were attempting a low salt diet; whether they added salt when cooking or eating; preferences in buying food products and the history of their general dietary intake, particularly high salt foods.

The completed urine sample was brought directly to the laboratory, except for weekend collections. Estimation of the completeness of urine collection in this study was done primarily by carefully questioning the subject. Urinary creatinines were measured, but only employed as a back-up to confirm the answers in the questionnaire and at the interview. Because of variability of creatinine excretion between and within healthy individuals[10], recent workers consider that attentive questioning of the participant is more useful for checking the completeness of urine collection[11,12]. All the subjects in this study were volunteers and appeared keen to cooperate and were carefully instructed before starting their urine collections.

Urine analyses

On receipt, the volume of the 24-h urine specimen was measured, and the sample thoroughly mixed. A sample of approximately 400 ml was then removed and mixed again using a magnetic stirrer. Glucose, ketones, blood, pH, protein, nitrite and leucocytes were estimated qualitatively with an Ames multistix® (Miles, Australia Pty. Limited, Mulgrave, Victoria) and any result that might need medical attention was reported to the participants.

Creatinine was analysed as soon as possible with a MA-kit 10 <Roche> Creatinine (F. Hoffmann-La Roche & Co. Ltd, Dignostica, Basle, Switzerland) and Cobas Fara (Roche Diagnostic) auto analyser based on the Jaffe reaction. Sodium and potassium were analysed using a Model 430 Flame photometer (Corning-Eel with diluter, Evans Electro Selenium Limited, Halstead, Essex CO9 2DX, England). All measurements were conducted in duplicate.

Statistical methods

Data were stored in a personal computer and processed using the statistical package, StatView-R Student v1.0. Subjects were categorized according to their gender, then into three groups: 'N' students or staff members from the university's Human Nutrition Unit, 'W' group members eating predominantly a western, traditional Australian diet and 'A' group members eating an Asian type of diet. The three groups were further divided into two sub-groups according to whether they were aware of salt and their tendency to avoid high salt foods or not. Analysis of variance was calculated across the groups, then the unpaired t-test was used to estimate the significance between sub-groups on a low to moderate salt diet and those not concerned about salt. Coefficients of variation of sodium, potassium and creatinine within individuals were also calculated and compared for seven day collections.

Results

Population sample

Results were obtained from 117 subjects: 56 males and 61 females. The age range was 20 to 64 years. The average body mass index (BMI: weight [kilograms] ÷ height squared [metres]) was 21.5 and 23.9 for female and male subjects, respectively. Sixty nine percent of the participants' BMIs were in the ideal range (20 to 25), 18% were less than 20, and 13% were more than 25.

In their backgrounds subjects were either human nutrition students or staff (as group N) or from the university community, but without training in nutrition. They were either following a western (group W) or Asian dietary pattern (group A). It was presumed that nutrition personnel would have more knowledge of sodium sources in food and possibly more concern about their diet. In group W, (female n=20, male n=19), 19 subjects were born in Australia, eight subjects had lived in Australia more than 20 years and the others were more

Table 1. Means and ranges of 24-hour urine sodium, potassium and creatinine excretions and BMIs of female and male subjects for the six groups.

Group	*n*	Sodium (mmol/d)	Potassium (mmol/d)	Na/K	Creatinine (mmol/d)	BMI
Female						
N	20	127.9 (69.6–168.8)	72.8 (30.1–160.1)	2.05 (0.9–3.65)	10.9	21.0
W	20	132.7 (76.2–219.4)	72.4 (38.4–114.2)	1.90 (1.0–3.0)	10.7	23.5
A	21	139.7 (83.4–229.4)	52.8* (30.1–93.4)	2.83** (1.8–4.7)	10.1	20.2
Average of groups means (unweighted)		133	66	2.26	10.5	21.6
Male						
N	8	136.9 (55.1–199.0)	80.7 (56.0–115.2)	1.83 (0.5–2.5)	14.2	24.4
W	19	159.4 (95.5–216.5)	76.4 (36.9–118.4)	2.27 (0.96–4.3)	14.9	24.0
A	29	194.5† (96.4–358.7)	64.5 (34.4–103.2)	3.17†† (1.1–5.3)	15.9	23.8
Average of 3 groups means (unweighted)		164	73.8	2.42	15.0	24.0

* Significantly lower compared with groups N and W ($P<0.05$).
** Significantly lower compared with group N ($P<0.05$).
† Significantly higher compared with groups N and W ($P<0.05$).
†† Significantly higher compared with group N ($P<0.05$).

recent immigrants. In group A, almost all the subjects (female $n=21$, male $n=29$) were students from overseas, only five females and six males were employed but they still followed an Asian lifestyle. Subjects in group A came from Indonesia ($n=25$), Malaysia ($n=13$), Bangladesh ($n=2$), China ($n=2$), Philippines ($n=2$), Taiwan ($n=2$), Cambodia ($n=1$), Japan ($n=1$), Laos ($n=1$) and Thailand ($n=1$).

Compliance with the original instructions was good; of the original 127 subjects only 13 subjects required repeat collections. Of these 13, eight were not prepared to give another collection, subsequently they were excluded from analysis. In addition two subjects had some abnormality on multistix analysis and were also excluded.

Sodium and potassium excretion

The average sodium and potassium excretions (Table 1) had a similar pattern between female and male participants across the three groups. The lowest result for 24-h sodium excretion was in group N, nutrition workers (female: 127.9 mmol; male: 136.9 mmol), next lowest was group W: western diet (female: 132.7 mmol; male: 159.4 mmol) and the highest was in group A: Asian diet (female: 139.7 mmol; male: 194.5 mmol). Potassium excretions were in the opposite order. The lowest average potassium excretion was in group A, then group W and the highest was in group N. The ratio of sodium to potassium (Na/K) excretions showed a similar pattern across the groups to the sodium excretions. Creatinine excretions averaged 10.55 and 14.98 mmol per 24-h for female and male subjects, respectively.

Analysis of variance was applied to look for the significance of the above data. Mean excretion of sodium of male subjects in group A was significantly higher than in groups N and W. As a result the sodium to potassium ratio was also higher than in the other groups. Similarly, mean potassium excretion of female subjects in group A was significantly ($P<0.05$) lower than group N and group W and the sodium to potassium ratio was also significantly higher than in group N.

Distribution of individual's excretions in each of these groups compared with the Australian Recommended Dietary Intakes (RDIs) for sodium and potassium is shown in Figs. 1, 2 and 3 for groups N, W, and A, respectively. These show that overall, subjects in group N were closer to the recommendation than the other groups, but fewer subjects were within the box for the sodium and potassium recommendation than group W. This is possibly caused by the smaller sample in group N. The third Figure shows that in group A more subjects, were far from the recommended values, particularly the males.

Sodium and potassium excretion and awareness of salt

In group N, female subjects who said they were trying to follow a moderately low salt diet had a lower sodium and potassium excretion than the other subjects (Table 2), but the sodium to potassium ratio was not different between the subgroups. In groups W and A, however females aware of dietary salt did not excrete less sodium, but Na/K ratios were lower for the low salt diet subjects in both groups W and group A. After correction for creatinines, all results had similar patterns as mentioned above except for females in group A. Sodium excretion in this group was then higher in females who did not follow a low salt diet. There was no significant difference in sodium and potassium excretion in unpaired t tests.

Results for male subjects had a different pattern. In

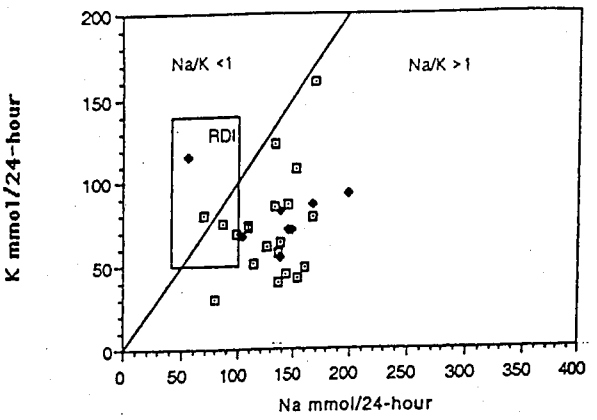


Fig. 1 Group N (nutrition workers)

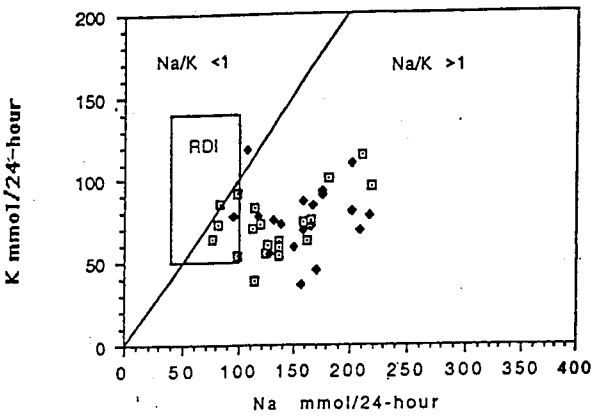
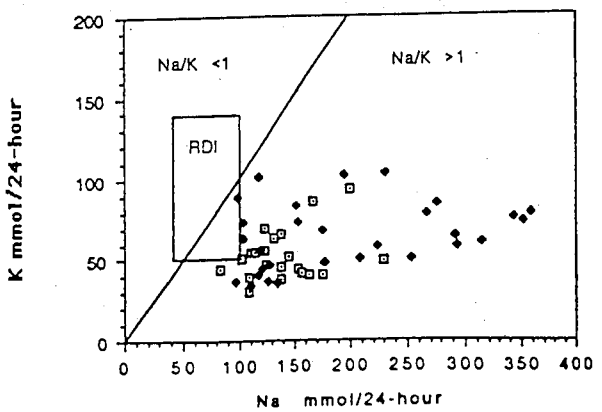


Fig. 2 Group W (western diet)



(---□---) female subjects
(---◆---) male subjects

Fig. 3 Group A (Asian diet)

Figs. 1, 2 and 3 Plots of 24-h urinary sodium (Na) and potassium (K) in individual subjects in the three groups. The boxes represent the limits of the Australian recommended dietary intakes for sodium (40–100 mmol/d) and potassium (50–140 mmol/d). The diagonal line indicates an Na/K ratio of 1.0.

group N, sodium and potassium excretions and the sodium to potassium ratio were higher in subjects not salt conscious compared with the other subgroup. In group W, sodium excretion was lower and potassium excretion was higher in males who said they were salt conscious, and their Na/K ratio was lower. In group A, sodium and potassium excretions were both higher in salt conscious males on the diet, yet the Na/K ratio was less than in males who did not say they tried to avoid high salt foods. Correction with creatinine did not change these results. As with the females, sodium and potassium excretions were not significantly different between subjects who were salt conscious or not in three groups. It should be noted that none of the subjects were following a prescribed therapeutic low salt diet.

Seven-day collections

Six motivated participants gave 24-h collections for seven days (Table 3) and the patterns of each individual's sodium and potassium excretions are shown in Fig. 4. Regardless of the days they started collection, the horizontal axis shows days of the week; day 1 for Monday and day 7 for Sunday, ie weekend days at the right-hand end of all curves. From these Tables and Figures, it can be seen that sodium has a higher coefficient of variation than potassium, except for one subject (No.25). On the fifth day in this subject, all measured excretions dropped, but the percent difference was less for sodium than for potassium excretion in the urine. Urinary creatinines averaged 11.1 mmol/24-h in the three female subjects (individual coefficients of variation: 10.2, 17.3 and 3.2 respectively) and 14.1 mmol/24-h in the three men (coefficients of variation 6.7, 15.8 and 16.4 respectively).

Discussion

Completeness of collection

Precision of urine collection in this study relied primarily on working with motivated, mostly tertiary education volunteers who were carefully briefed, given written instructions and questioned when they brought their urines in to the laboratory. We measured creatinines in all urines and they were available as a back-up, but the pattern of results was not changed by adjusting sodium and potassium excretions for creatinines. Six subjects passed under 8 mmol creatinine/day. All were female; three were thin (BMI<19), two of these vegetarians. Three subjects gave multiple urine collections and the results were similar; the others were carefully questioned and appear to have collected their urine as instructed. Creatinine excretion is related to muscle mass and increased by meat consumption. It is not constant from day to day. In our subjects who provided 7 days' collections the within-person coefficient of variation averaged 11.6%, within the range reported by others[13]. We did not give PABA to our subjects because this would have involved giving a foreign substance to healthy volunteers, and because there is no guarantee that subjects will take all the 3 capsules at the required times and because urinary PABA cannot show over-collection[11].

Sodium and potassium excretion in 24-hour urine across three groups

In the present study it was found that the mean sodium excretion in the urine of the groups in both men and women was, in descending order, groups: A, W and N. The groups' descending order of potassium excretion was

Table 2. Comparison of subjects who aimed to moderate salt intake ('mod salt') and those not concerned about salt ('not') 24-hour urine sodium, potassium and creatinine excretions, and BMIs in female and male subjects.

Group	No. of subjects		Sodium mmol/d		Potassium mmold/d		Na/K		Creatinine mmol/d		BMI	
	Not	Mod salt	Not	Mod salt	Not	Mod salt	Not	Mod salt	Not	Mod salt	Not	Mod salt
Female												
N	15	5	129.1	124.2	73.7	69.9	2.05	2.05	10.73	11.27	21.0	21.1
W	15	6	131.0	134.1	66.5	77.3	2.09	1.75	10.91	10.55	22.5	24.3
A	9	11	137.4	145.6	50.7	58.1	2.89	2.69	9.71	11.00	20.4	19.9
Average			132.5	134.6	61.1	63.7	2.34	2.16	10.45	10.94	21.3	21.7
Male												
N	5	3	141.8	128.9	84.5	74.3	1.87	1.75	15.82	11.44	24.8	23.81
W	15	4	160.8	154.2	72.2	91.8	2.40	1.80	14.41	16.69	24.4	22.73
A	25	4	193.2	202.8	63.4	71.1	3.22	2.90	15.84	16.14	23.3	26.53
Average			165.3	162.0	73.4	79.1	2.50	2.15	15.36	14.76	24.1	24.4

Table 3. 24-hour sodium and potassium excretions of seven 24-hour urine collections

Subject No.*	BMI	Sodium		Potassium	
		Mean Na	Coef. var	Mean K	Coef. var
Female					
1	23	113.3	35.0	51.5	19.2
28	19.8	69.6	27.5	80.0	21.
66	19.8	108.0	25.50	74.2	17.11
Mean	20.9	97	29.3	68.8	19.4
Male					
3	24.1	167.3	31.2	84.0	24.4
25	24.0	170.9	22.0	44.7	37.9
98	24.4	103.0	19.6	68.3	13.1
Mean	24.2	147.1	24.3	65.7	25.1

*Subjects 1, 28, 66, 98 were Nutrition workers (group N)

the other way round: N, W and A. These results might be expected. Group N consisted of people with more knowledge and concern about their diet. Group W were eating mainly (western) Australian diets and had been potentially exposed to promotion of lower salt intakes. Group A were mostly students who had recently come from an Asian country.

Overall, female subjects excreted substantially lower amounts of sodium ($P<0.05$) than male subjects but their potassium excretions were not significantly lower. This sodium result is in line with almost all studies that recruited both sexes[6,14-16]. It is probably related to total food intake. Males eat more food and with it more salt than females. The National Heart Foundation of Australia survey in 1989[17] also reported that females were less likely to add salt to their food compared with male subjects.

Significantly higher sodium excretions were found in males in group A (Asian diet) in comparison with the other groups and potassium intakes were significantly lower in group A females. By analysis of variance, the Na/K ratio showed greater differences than sodium and potassium excretions themselves. This may be because the ratio is not affected by the size of the subjects. However, groups N and W showed no significant differences in urinary sodium and potassium within the female and male groups.

Records of the minority of subjects with excretions within the Australian RDI for sodium and potassium were examined for their answers about dietary habits. In group N, three females and one male were within the RDI box for sodium and potassium (Fig. 1). From these four, one female agreed that she was trying to eat low amounts of salt, while the others considered that it was part of their normal diet. One female claimed that she sometimes used salt at table, and the other female said that she always used salt in cooking. Three of them had low consumption of meat. In group W, five females and one male subjects were within the box of the RDI's (Fig. 2). Four subjects said that they were trying to eat a low salt diet and one female and one male considered that they achieved a low salt excretion without trying. Two females said that they sometimes used salt at table and the male said that he always used salt at table. Two females were vegetarian.

A question about meat consumption was one of the general questions about usual diet on the questionnaire. The meat eating habit might merely reflect concern about dietary intake and not be necessarily related to the sodium intake. People eating little or no meat are likely

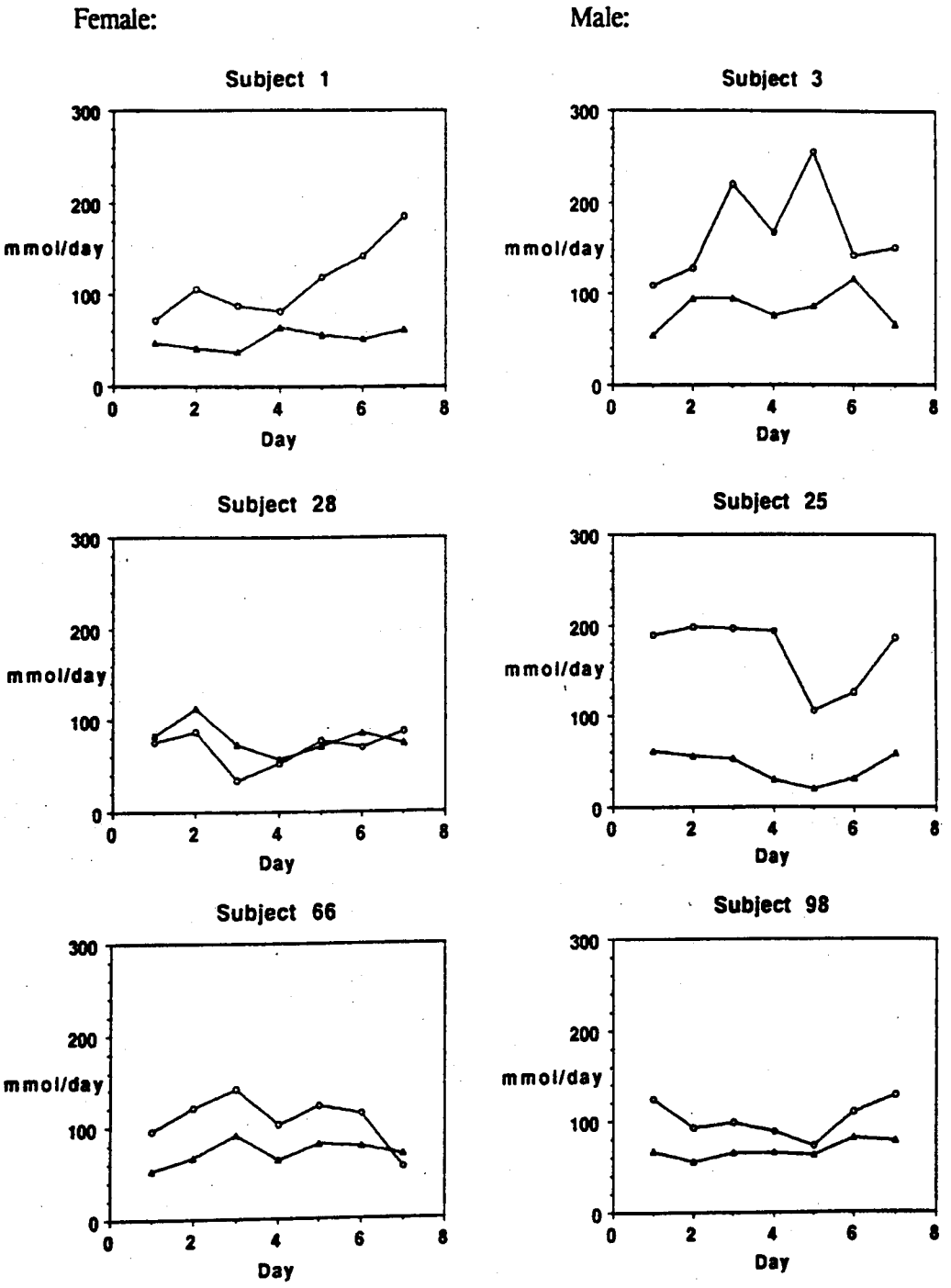


Fig. 4. 24 hour urinary sodium (---O---) and potassium (---▲---) extretion in six subjects who provided seven days collections. Day 2 = Tuesday, day 4 = Thursday, and day 6 = Saturday, for all subjects.

to eat more vegetables and fruits which usually have lower sodium content than meat dishes. But in a West Australian study Armstrong et al.[18] reported no significant difference in sodium excretion between vegetarian (mainly Seventh-Day Adventists) and non vegetarians.

In group A, only one male was just within the RDI range. He was not deliberately eating a low salt diet; he sometimes put salt in his cooking and ate a small amount of meat.

Sodium and potassium excretion in 24-hour urine and moderately low salt diet

There were no significant differences in sodium and potassium excretions or the Na/K ratio between subjects who said they had moderately low salt diets and subjects who did not, regardless of gender. Despite the small number in the sample, all the subjects were volunteers, mainly from in and around the University of Sydney. Therefore there is a possibility of narrow variation of salt intake within the subjects.

Although not significantly different, the data from groups N and W indicated (Table 2) that male participants were more successful than female subjects on moderately low salt diets, in reducing their sodium intake. Sodium and potassium are associated with energy-dense food[19,20]. Male subjects have higher total calorie intake, so it may be easier for them to reduce sodium intake by cutting down on, for example, some processed foods. The body mass index of salt conscious male subjects was lower than the other male subjects.

24 hour sodium and potassium urinary excretions in seven-day collections

Three females and three males provided seven days of urine collections. All the females and one of the males were from the Human Nutrition Unit. Excretion of sodium in females was lower than in the male subjects but the potassium excretion was not much different between the men and women. The coefficient of variation was higher for sodium than for potassium excretions, except in one male (subject 25). The higher coefficient of variation is presumably because the range of sodium concentrations in foods is wider than that of potassium.

Conclusion

Our study was with volunteers in a defined area of Sydney in 1992. The advantage of this was that co-operation and compliance of the mostly tertiary educated subjects in urine collection appeared to be excellent. On the other hand, we cannot generalize from our sample about results that might be found in a random sample, representing the sodium excretion of the population of Australia. However such a survey would be much more difficult to achieve and has never been mounted in Australia.

To compare our results with previous small surveys in Australia, reviewed by Bullock[5] and incorporated in the NH&MRC's sodium report[2], our group W is the most representative of the majority of Australians. Their mean sodium excretion in men and women combined was 146 mmol/d, which is a little lower than the previous median value of 165 (between the range of 130 and 200) mmol/d in the 1984 review. Values in our survey for group W (n=39) of 159 mmol/d in men and 133 mmol/day in women and 146 mmol for the sexes combined are very similar to those in Beard's study in Tasmania[6] (n=54) of 160 mmol in men, 124 mmol in women, or 142 mmol/d in men and women combined.

These two 1990's results suggest that there has possibly been a small downward trend in Australian sodium intake and it is also noteworthy that there were very few subjects in group W excreting more than 200 mmol/d. For the year 1995 we hope that a larger and more random survey can be organized to see if Australians are near to the target of average 130 mmol/d by that year.

Examination of the groups in our study leads to four further conclusions. Firstly, sodium excretions were consistently lower in women. Recommendations and targets should be written separately for men and women (as for energy, protein etc.). Secondly, people in our sample eating Asian diets had obviously higher sodium intakes. Except in Singapore[21], there appears to be less emphasis on reducing salt in public health nutrition in the region. Thirdly, professionals and trainees in nutrition and dietetics had slightly lower sodium excretions than in group W, but only a minority were within the target of 100 mmol/d. It is hard, even for professionals, to control their sodium intake with mostly processed foods. Fourthly, potassium excretions (in molar units) averaged less than half the sodium excretions, expressed by Na/K ratio mostly above 2.0. This is a lower ratio than considered ideal.

Our results support the need for further promotion of lower salt intake, by eating more fresh food, avoiding addition of salt in the home and encouraging production and consumption of salt-reduced processed foods. At present it is very difficult for people to understand the numbers on food labels that provide sodium content. Further study is also required to up-date the sources of sodium and potassium in Australian foods, since fewer analyses have been done in recent times.

Acknowledgements. We would like to thank Mr Zia Ahmad and Mr Bill Lowe for advice and help with the laboratory work and Mrs Isa Hopwood for helping prepare the manuscript.

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Sejak sepuluh tahun yang lalu, Australia mencanangkan pedoman kebutuhan gizi dalam diit termasuk kebutuhan elemen sodium dengan target konsumsi kurang dari 100 mmol sodium per hari (sama dengan 6.0 g garam dapur). Cara termudah untuk memperkirakan konsumsi garam adalah dengan mengukur ekskresi sodium dalam urin selama 24 jam. Beberapa surfei di Australi dari tahun 1970 sampai 1980, ekskresi sodium per hari rata-rata dalam urin adalaj antara 130 sampai 200 mmol (rata-rata 165 mmol). Surfei-surfei ini mencakup sejumlah kecil subjek (n=11 sampai 259).

Kami mengukur kadar sodium dan potasium dalam urine dari 117 orang dewasa sehat, hampir semua dari lingkungan universitas, untuk melihat tanggapan masyarakat Australia terhadap pedoman kebutuhan sodium dan pengaruh dari banyaknya produk makanan dengan rendah kadar garam yang tersedia di pasar swalayan saat ini.

Rata-rata ekskresi sodium per hari pada grup N (staf atau pelajar dari bagian unit gizi) adalaj perempuan: 128 mmol dan laki-laki: 137 mmol. Pada grup W (dengan kebiasaan diit makanan Australia, tanpa pengetahuan tentang gizi) ekskresi sodium per hari dalam urin kira-kira 133 mmol untuk perempuan dan 159 mmol untuk laki-laki. Pada group A (dengan kebiasaan diit makanan Asia) ekskresi sodium per hari rata-rata 140 mmol untuk perempuan dan 195 mmol untuk laki-laki. Sedangkan ekskresi potassium per hari dalam urin pada keenam group diatas (berurut): 73, 81, 72, 53 dan 65 mmol. Kesimpulan, hasil penelitian ini menunjukan kemungkinan penurunan konsumsi sodium pada masyarakat Australia dan konsumsi sodium lebih rendah pada orang dengan kebiasaan diit makanan Australia dibandingkan dengan kebiasaan diit makanan Asia. Tetapi, secara keseluruhan hanya beberapa subjek yang mencapai range pedoman diit sodium yang dicanangkan, yaitu 40 sampai 100 mmol per hari. Subjek perempuan tampaknya mengekresi sodium lebih rendah dari pada laki-laki, maka pedoman tentang elemen ini sebaiknya dipisahkan antara perempuan dan laki-laki. Pada enam subjek yang memberikan pengumpulan urin tujuh hari yang berbeda, koefisien variasi dar ekskresi sodium adalah 20 sampai 35%.

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澳大利亞雪梨市健康成人尿樣中的鈉鉀含量
摘要

近十年來，澳大利亞有一個正式的膳食指導，要求每人每日進食少于１００毫克分子量的鈉（相當于６・０克氯化鈉）。評估鈉進食的唯一實用方法是測定２４小時尿鈉排出量。在１９７０－１９８０年間，不同的調查顯示每日鈉排出量爲１３０－２００毫克分子量（中數爲每日１６５毫克分子量）。這些調查的人數由１１－２５９人不等。

爲了觀察澳洲人對膳食指導的反應和目前超級市場一系列減鈉食物的情況，我們測定了１１７位絶大部分在大學内的健康成人尿樣中的鈉鉀排出量。在N組（營養專業人士）平均女性每日鈉排出量爲１２８毫克分子量，男性爲１３７毫克分子量。在W組（進食西方傳統澳洲人膳食，無特殊營養知識），平均女性每日鈉排出量爲１３３毫克分子量，男性爲１５９毫克分子量。在A組（進食亞洲人膳食）平均女性每日鈉排量爲１４０毫克分子量，男性爲１９５毫克分子量。每日尿鉀平均排出量，三組女、男分別爲７３，８１；７２，７６；５３和６５毫克分子量。這些結果可能反映澳洲人鈉進食稍有下降，并低于亞洲人膳食。但僅少數人每日尿鈉排量在建議的４０－１００毫克分子量的範圍内。女性尿鈉排量經常低于男性，因此膳食指導中鈉進食也許應有性別的差异。我們收集了６個對象７天的尿液分析的鈉排量，其變异系數在２０－２５％之間。