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Problems with folacin status with use of orange juice substitutes in a geriatric institution

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An increased range of orange drinks is now available with varying proportions of orange juice. These have begun to appear in institutions for the care of elderly people. With evidence of folacin deficiency in such elderly people, we evaluated the effect of either 100% orange juice or an orange drink (at least 5% juice) on folacin status in 19 institutionalized elderly people over a 13-week period. Serum folacin increased from 8.5 ± 0.8 to 13.2 ± 0.8 nmol/l ($P<0.001$) in 13 weeks, with 100 ml orange juice daily, but did not change from baseline (8.9 ± 0.8 nmol/l) to 13 weeks ($8.5\% \pm 0.7$ nmol/l) with orange drink. By 6 weeks the difference between orange juice (11.0 ± 1.0 nmol/l) and orange drink (8.6 ± 0.7 nmol/l) was significant. Thus, not only is the choice of orange drink important, but small regular orange juice supplements can produce a significant increase in biochemical folacin status.

Key words: orange juice substitutes, geriatric nutrition, folacin status, institutionalized elderly.

Introduction

The institutionalized aged are at risk of essential nutrient deficiency including folacin (Flint *et al.*, 1979; Nguyen *et al.*, 1985; Infante-Rivard *et al.*, 1986). With changes in food products, a traditional commodity can be presented in some ways which may not be nutritionally comparable. Oranges are a good source of folacin in the Australian diet but a good range of orange drinks are now available in Australia, with proportions of orange fruit ranging from 0–100%, the most commonly available being 'orange fruit juice drink' which must have at least 35% orange juice and 'orange drink', at least 5% orange juice (Briggs, 1982). We chose to evaluate the effects of 100% orange juice and an orange drink on biochemical folacin status in elderly people with no intercurrent illness, domiciled in an institution for the care of the aged.

The study was conducted over a 13-week period, following baseline observations 2–3 days apart, with no changes in background diet and where no nutrient supplements were provided.

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Subjects and methods

Nineteen long-stay patients at a major Melbourne institution for the care of the aged were randomly selected and allocated to one of two groups. Their characteristics are shown in Table 1.

Table 1. Characteristics of subjects studied

	Age (years)	M (n)	F (n)	BMI (kg m^{-2})
Orange juice drink	81.5±2.4	3	7	25.2±1.4
Orange drink group	82.1±2.3 NS	2	7	24.9±1.1 NS

BMI: Body Mass Index $\left(\frac{\text{weight (kg)}}{\text{height}^2\text{ (m)}}\right)$.
Means+s.e.m. are shown.
NS indicates that there was no significant difference ($P>0.05$) between the two groups.

One group was given 100 ml orange juice daily, and the other 100 ml orange drink for 13 weeks. The total folacin content of the orange juice was assayed by HPLC (Silva, 1986) and found to be 40 μg/100 ml; that of the orange drink was 2 μg/100 ml. Background diet was estimated from three-day food records. These were done once every four weeks during the thirteen-week study period, to determine any significant changes in the food intake pattern which may affect the total folacin intake. McCance and Widdowson Food Composition Tables were used to assess the dietary intake of total folacin which was 130 μg per day (Paul & Southgate, 1979).

Blood was taken after an overnight fast, twice as baseline, 2–3 days apart and then 1, 3, 6, 9 and 13 weeks after commencement of the drink. Serum folacin concentration was measured using a radioassay kit purchased from Amersham (UK).

Differences between orange juice and drink supplement groups were assessed by Student's *t*-test for a group comparison and from baseline by the paired *t*-test.

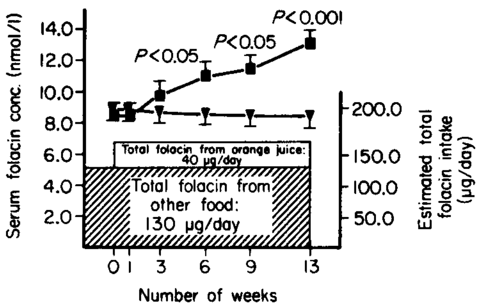

Fig. 1. The effect of orange juice and orange fruit drink supplements on the serum folacin concentrations of institutionalized elderly subjects. Values are means±SEM. Significance of difference between dietary approaches is shown. (-■-) orange juice, n=10; (-▼-) orange fruit drink, n=9.

Results

No significant rise in serum folacin values from baseline were observed with orange drink supplement. However with orange juice, by week 6, a significant rise in serum folacin was observed, even more evident by the week 13, and these rises were significantly different from the corresponding orange drink supplement values.

Discussion

Although the mean serum folacin fell within the reference range for the laboratory (5–35 nmol/l), it was possible to shift it upwards with modest regular consumption of orange juice (100 ml per day). This could have functional implications for elderly people, although the present study provides no evidence of folacin deficiency or its rectification. Leeder *et al.* (1981) in Newcastle, Australia, observed improvement in confusional states with those admissions who were given folacin supplements. A problem arises where a food or beverage substitution is presumed to have the same nutritional role as the traditional product. In the case of the two preparations used here, the orange juice provided about 20% of the Australian Recommended Dietary Intake of 200 μg total folacin and the orange drink about 1%. While citrus fruit is one of the important good sources of folacin in the Australian diet, elderly people obtain more from fair sources of folacin, namely wheat-based cereal products (Wahlqvist *et al.*, 1985). Especially in institutions and probably with Meals-on-Wheels, green vegetables may be a less good source, given food service methods which predispose to folacin loss. Liver, another good folacin source is rarely eaten these days in geriatric institutions. Some elderly people use nuts and these may protect against folacin deficiency.

The folacin status of elderly people in Australian geriatric institutions can be improved provided appropriate food systems and choices are in place. Such measures can also be expected to attend to other micronutrient deficiences, such as that of vitamin C, observed in long-stay institutions (Newton *et al.*, 1985).

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