Macronutrient intake of elderly people in the Padang area, West Sumatra, Indonesia

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We examined the macronutrient intake of residents in Padang area, West Sumatra, Indonesia. The daily energy intake (1130±420 kcal) of elderly people in a rural traditional group was significantly lower than that in an urbanised "modernised" group (1700±460 kcal) ($p<0.01$). Even in young urbanised people (younger than 60 years old), 44.2% were below 2000 kcal per day. In the case of elderly people, in rural and urbanised groups 90%, and 33% of the respondents were below 1500 kcal per day, respectively.

As for individual nutrients, the daily protein intake of elderly people in both the urbanised and rural groups was rather low. However, daily fat intake and carbohydrate intake of the younger people in the urbanised group were adequate, but those in the elderly group were not. In the case of the rural elderly group, macronutrient and energy intake were extremely low. To improve dietary habits and nutrient intakes of people in the Padang area, rural elderly people need a greater energy intake and an increased intake of all macronutrients.

Key Words: Nutrients, elderly people, epidemiological study, Padang, West Sumatra, Indonesia

Introduction

Several physiological functions and body composition decrease with age[1-3]. Nutritional status greatly affects the aging process beginning at sexual maturation[4-7]. The free radical theory is one of the important theories about the mechanism of aging[8]. Antioxidant defence systems decrease with age, but the decrease is found to differ by tissue[9,10]. Dietary (energy) restriction and dietary antioxidants may suppress the aging process[11-13]; although the operational relevance of this extrapolation for energy restriction to humans lacks evidence, and the reverse may be the case in physically active individuals on nutritious diets[19]. The precise mechanisms of any action of dietary antioxidants to slow ageing is not known.

Recently, remarkable changes in life style and food habits are occurring in the urban area of Padang in West Sumatra, Indonesia. In west Sumatra coconut oil is commonly used in cooking, because it is readily available[14]. Furthermore, there are some traditional fatty dishes in the Padang area. One famous dish is a "Soto Padang" containing a great deal of coconut oil, chicken, rice, and vegetables. Dietary fat consumption in West Sumatra is increased gradually, because of the additional consumption of dairy fat and meat, such as beef and chicken, in addition to coconut oil and coconut milk. Changes in cooking styles also may have led to an increase in dietary fat intake. Thus, it is worth studying the differences between a group with a modernised life style and a group with a traditional life style.

There is little doubt that an adequate nutrient intake should be achieved to prevent poor nutritional status, which in people leads to a decline in health. The Indonesian Food and Nutrition Board has recommended that energy intake per day for adults should be of the order of 2500 kcal (595kj) and 50 g per day of protein. In general. If energy and protein intakes are adequate and the diet is varied, nutrient and biologically important food component intakes at large will be adequate.

In the present study daily intake of energy and macronutrients has been quantified and the difference in intakes between young and old residents in the Padang area aged from 20 years to 93 years assumed. If the nutritional quality of intake declines with age, this may contribute to ageing, as well as result from it.

Subjects and methods

Subjects

Subjects were administrative staff of the Faculty of Medicine, Andaras University, and their family members, aged 20 to 85 years, living in the Padang area of West Sumatra as an advantaged urbanised group (urban group; n=119). Other elderly people (60 to 93 years old) were selected by a random sampling technique from all people in Kelurahan Olo Kecamantan Nanggalo as a group with rural dietary habits (rural group; n=50) (men = 16, women =34).

Nutrient intakes and food habits

Dietary data were collected by 24-hour recall. Nutrient conversion was undertaken using the Indonesian Food Composition Tables. The interviews were conducted by trained personnel using household measures to estimate portion size.

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Health status

Respondents had a general medical assessment with record of blood pressure, urinanalysis, underwent electrocardiography.

Statistics

Statistical analysis was performed with ANOVA followed by Scheffe's or Bonferroni/ Dunn's multiple comparison test. Differences between the two groups of the younger respondents, the aged respondents of the modernised group, and the aged respondents of the rural group were performed with Student's t-test.

Results

Health status of the respondents was good. As for electrocardiogram 4 respondents had left ventricular hypertrophy (LVH), and 2 respondents had supraventricular extrasystole. Urinanalysis showed that 2.5% (3/119) of respondents were blood positive and 0.8% (1/119) glucose positive, and had proteinuria or bilirubinuria in their urine. As shown in Table 1, some were hypertensive, defined as a persistent blood pressure of 160 mm Hg systolic or 100 mm Hg diastolic or greater, in both arms. Hypertension prevalence was much higher in elderly people (20% in the urbanised group and 24% in the rural group) than in the younger group (4.8%).

Table 1. Blood pressure of residents in the Padang area.

	Urbanised Young (n=104)	Urbanised Aged (n=15)	Rural Aged (n=50)
Age men/women	37.5±11.2	64.7±7.08	71.0±8.36
Height	154±7.48	150±7.19	151±7.17
BMI (kg/m^2)	22.6± 4.26	19.8± 3.16	19.4± 3.62
Body weight	53.8±10.2	44.6±9.0	44.8±9.54
Systolic BP, mmHg	122±13.1	139±21.8	141±16.0
Diastolic BP, mmHg	74±11.3	76.3±12.0	85.7±8.98
Hypertension (%)	4.8 (5/104)	20 (3/15)	24 (12/50)

As can be seen in Table 2, the average daily energy intake and daily intake of main nutrients such as protein, carbohydrate and fat were significantly different between the urbanised group and the rural group. The daily energy intake (1130±420 kcal) in the elderly rural group was significantly lower than that in the elderly urbanised group (1700±460 kcal) ($p<0.01$). Many respondents (44.2%) were below 2000 kcal per day in the younger urbanised group. In the elderly rural and urban groups 90% and 33% of the respondents were below 1500 kcal per day, respectively. This, however, was not reflected in BMI (Body Mass Index); 46 to 47% of the respondents in both groups had a BMI of less than 19 kg/m^2.The BMIs of aged people in both rural and urbanised groups were smaller than those of younger people of the urbanised group ($p<0.01$) (Table 1). The macronutrient intakes of elderly people in the rural group were less than those of the urbanised groups, although percentage energy was limited. Young respondents (20 to 60 years old) of the urbanised group had relatively higher intakes of total dietary protein, fat and carbohydrate. The average daily protein intake of young respondents in the urbanised group was 55.4 g, of which 27.1 g was animal protein (48.9% of total protein). (Table 2).

As shown in Figure 1, the energy intake of respondents in the 30-40 year old group was the highest of all the sectors of the urbanised group. Energy intake in the elderly group (>60s) and the younger group (20s) was significantly lower than that in the highest group (30-40s) ($p<0.01$), and the 60-year age group was lower than the 50-year age group ($p<0.05$). Body mass index (BMI) showed similar differences to those for energy intakes ($p<0.05$).

Table 2. Daily intake of energy and main nutrients of residents in the Padang area.

	Urbanised group young (n=104)	Urbanised group aged (n=15)	Rural group aged (n=50)
Energy (kcal/day)	2120±517	1700±460	1130±420
Protein (g/day)	55.4±18.3 (10.5)	42.8±13.9 (10.1)	38.2±22.7 (13.5)
Animal protein (g/day)	27.1±19.6 (5.1)	22.9± 8.9 (5.4)	17.1±13.9 (6.1)
Carbohydrate (g/day)	351 ±102 (66.2)	288 ±69.5 (67.8)	187 ±79.3** (66.2)
Fat (g/day)	51.2±21.5 (21.7)	38.9±22.4 (20.6)	25.7±12.2** (20.5)

1. Values show mean±SD, Significant difference between urban and rural;
2. Percentage energy intake is shown in parentheses. * $p<0.05$, ** $p<0.01$.

Figure 1A. Daily energy intake and BMI of residents in Padang area. A: daily energy intake, B: BMI (kg/m^2). Data show mean±SD. Significant difference; * $p<0.05$, ** $p<0.01$.

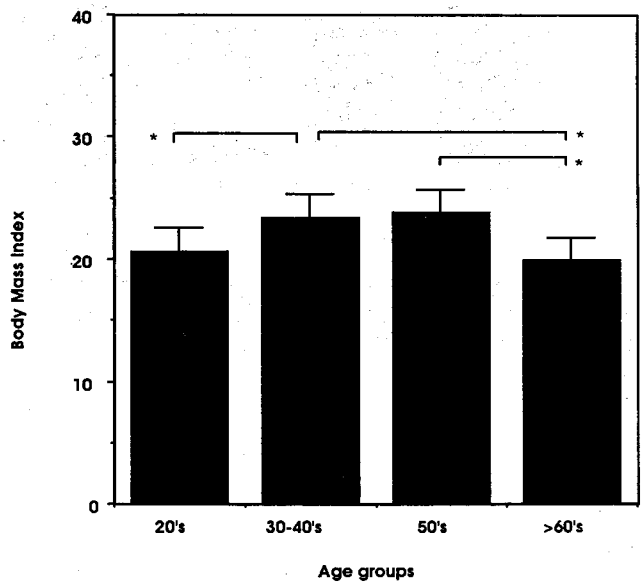
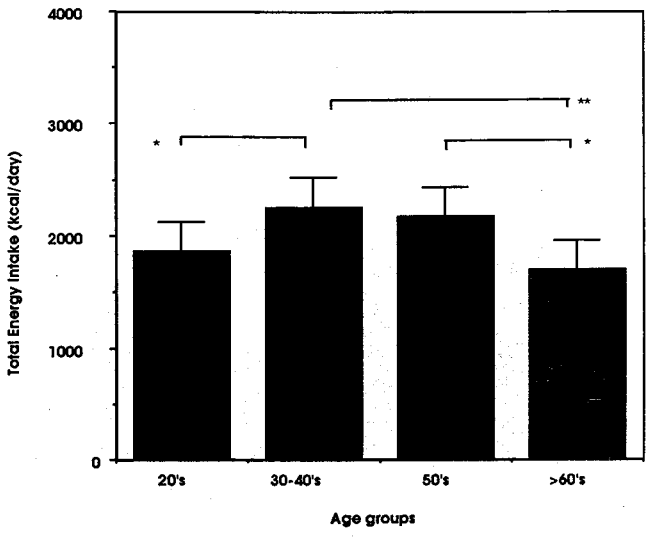
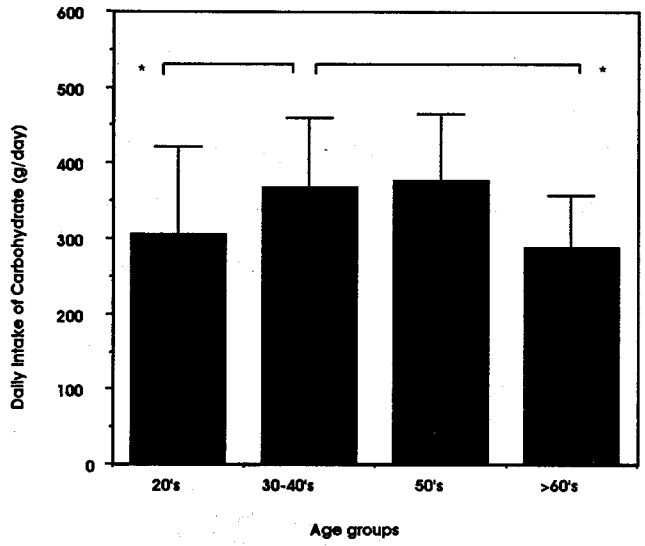


Figure 1B.



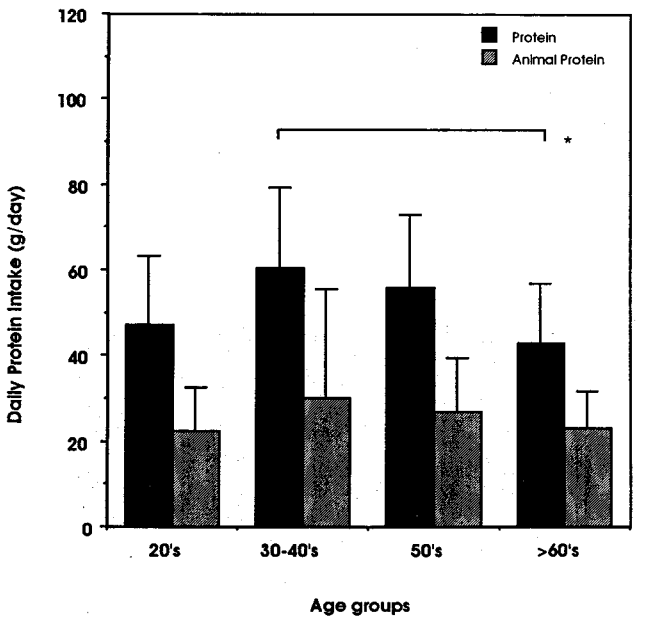
As can be seen in Figure 2, carbohydrate intake in the elderly group (>60s) and the younger group (20s) was significantly lower than that in the group of 30-40s ($p<0.05$). People in the Padang area consumed relatively high amounts of carbohydrate. In the elderly people, 36% of the rural group and 50% of the urbanised group consumed more than 200 g of carbohydrate per day. In the case of all the respondents in the urbanised group, 53.3% consumed more than 300 g per day, and 91.5 % of the respondents consumed 200g per day.

Figure 2. Distribution of daily intake of carbohydrate of residents in the Padang area. Data show mean ± SD. Significant difference; * $p<0.05$.



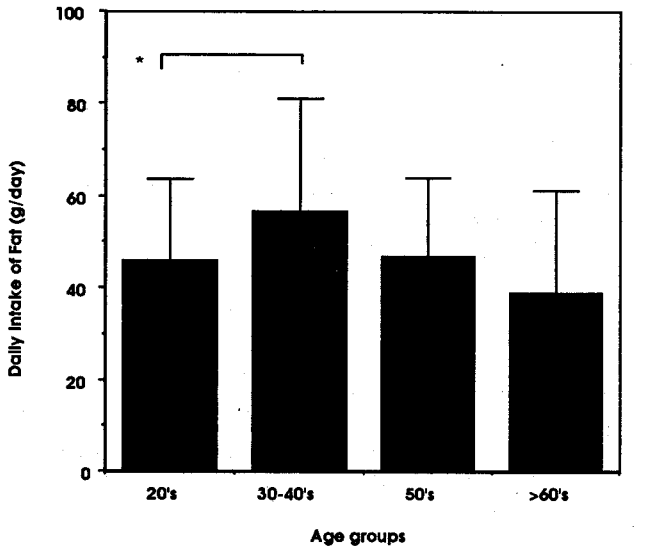
As can be seen in Figure 3, daily protein intake in the aged (>60s) and the younger group (20s) was significantly lower than that in the middle-age group (30-40s). The daily intake of animal proteins in elderly people of both the urbanised groups (22.9± 8.9 g/day) and the rural group (17.1±13.9 g/day) was low.

Figure 3. Daily protein intake of residents in the Padang area; total protein intake; animal protein intake. Data show mean ± SD. Significant difference; * $p<0.05$.



Respondents who consumed more than 50 g fat per day were 4% and 39.4% of the aged respondents in the rural elderly group and in the urbanised elderly group, respectively. In the case of all respondents in the urbanised group, 53.3% consumed more than 50g per day. As shown in Figure 4, daily intake of fat in the aged group (>60s) was significantly lower than that in the middle-age group (30-40s) ($p<0.05$). As for individual types of fat, respondents in the urbanised group had relatively high intakes of coconut oil and coconut milk, which accounted for 12% of total energy.

Figure 4. Daily fat intake of residents in the Padang area. Data show mean±SD. Significant difference; * $p<0.05$.



Discussion

We conducted an epidemiological study of the energy and macro-nutrient status of residents in the Padang area of West Sumatra. We chose an area where people lived either a traditional rural life-style or an urbanised life style. The Indonesian Food and Nutrition Board has recommended that energy intake and protein intake per day should be about2500 kcal and 50 g, respectively. The recommended value of energy intake for elderly people (>60 years old) is 2100 kcal/day for men, and 1710 kcal/day for women. Fat intake is recommended to be 20-25% of total energy. As shown in Table 2, the daily energy intake of the elderly people in the rural group was significantly lower (1130 kcal/day) than that in the urbanised group (1700 kcal/day). Even so both are lower than recommended values. People in the Padang area acquired most of their energy (66%) from carbohydrates. Daily protein intake in the urbanised young group was 55.4 g of which 27.1 g (48.9% of total protein) was animal protein. It is thought preferable that, animal protein constitute more than 50% of total protein. The protein intake of elderly people in the urbanised group (42.8 g/day) has almost reached the recommended value (49 g/day for men and 41 g/day for women), but this is not the case in the rural group (38.2 g/day). In the case of dietary fat, young respondents in the urbanised group took 51.2±21.5 g/day which is 21.7% of total energy. In the case of elderly people in both the urbanised group and the rural group, dietary fat was 20.5% of total energy. These values reached the recommended value. Interestingly, about 12-13% of total energy was from coconut oil and coconut milk. A high intake of coconut oil and coconut milk is rather

special in world nutrition, but common in tropical countries. Coconut oil is composed of 9% unsaturated fatty acid and 91% saturated fatty acid. The saturated fatty acid in coconut oil contains 47% lauric acid, (12:0) 18% myristic acid (14:0), 9% palmitic acid (16:0), 8% octanoic acid (8:0), 6% decanoic acid (10:0), and 3% stearic acid (16:0). Thus coconut oil contains high amounts of middle- length saturated fatty acids.

As can be seen in Figures 1-3, the middle-age group (40s-50s) had the highest energy and macronutrient intake of all the age groups. The younger group (20s) had a relatively low intake of macronutrients. This may be associated with income. Alcohol is a macronutrient which provides energy. However, most people in Padang, West Sumatra, do not drink alcohol at all, for religious reasons. The non alcohol derived energy intakes for nutrients in various countries are shown in Table 3.

Table 3. Percent energy from food macronutrients in several countries.

Country	Total energy (kcal)	Protein (%)	Fat (%)	Carbohydrate (%)
USA.	3,500	12.3	45.4	42.3
Germany	3,540	11.5	48.1	40.4
France	3,490	13.9	46.0	40.0
Switzerland	3,440	12.3	43.6	44.1
Japan	2,640	13.3	28.4	58.2
Indonesia (this paper)	2,120	10.4	21.7	66.2

West Sumatra has the highest coronary mortality in Indonesia[14]. Coronary mortality in the whole Indonesia is the third highest cause of mortality after respiratory infection and diarrhoea. Thus, the prevention of coronary disease is of great importance. Hypertension is one of the risk factors for coronary heart disease, and the prevalence of hypertension in elderly people in the Padang area was 20-24% (Table 1). Ischaemic heart disease (IHD) is strongly related to life style. Examples of potentially harmful life style elements of aetiological importance for IHD include a high amount of saturated fat in the diet, tobacco smoking, and low physical activity. Iacono *et al*[15] reported that a high intake of saturated fatty acids and a low intake of polyunsaturated fatty acids were related to high blood pressure, but total fat intake did not relate to blood pressure levels. It is estimated that many Americans consume 15% to 20% of their energy intake as saturated fatty acids[16]. The major food sources and contributors of saturated fatty acids in United States' diets are meats, poultry, fish, milk, cheese, butter, and eggs (70% to 75%)[16]. Trevisan *et al*[17] reported a cross-sectional association between the consumption of various fats and the risk factors for coronary heart disease in a sample of 4903 Italian men and women from 20 to 59 years of age. According to their analysis, consumption of butter may detrimentally affect coronary risk factors, while polyunsaturated and monounsaturated fats may be associated with a lower coronary risk profile. Diet plays an important role in the aetiology of coronary heart disease[18,19].

A high intake of soluble dietary fibre decreases low density lipoprotein cholesterol, but has little or no effect on high density lipoprotein cholesterol[20,21]. Rimm *et al*[22] reported that fibre is an important dietary component for the prevention of coronary heart disease, possibly through mechanisms other than through lipoproteins. People in the Padang area consume a great deal of coconut oil and coconut milk which has a high saturated fat content, even in the urbanised group. Moreover, a high percentage (about 60%) of Indonesian people smoke cigarettes. Thus, high coronary mortality may be due to a high intake of saturated fats and/or cigarette smoking, and also may be other factors of life-style. At the same time, the cardio-protective fretons which may accompany high intakes of plant food and fish require appreciation.

Beverage intake (tea and coffee) may also be important. Whether or not coffee consumption increases the risk of coronary heart disease has been examined in many studies[23]. Coffee is a pungent beverage including polyphenolic substances and diterpenes, the latter of which unfavourably affect lipoproteins[24]. People in the Padang area use many spices which contain a number of polyphenolic substances. It may be of value to consider changing consumption of spices as a potential protective factor against coronary heart disease.

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印度西蘇門答臘 Padang 地區老年人宏觀營養素的攝取

摘要

我們調查了印度西蘇門答臘 Padang 地區老年人宏觀營養素的攝取。發現農村老人每日能量攝取（ 1130±420 仟卡）明顯低於城市老人（ 1700±460 仟卡）($p < 0.01$)。即使居住城市的年輕居民（少於 60 歲）42% 能量攝取在 2000 仟卡以下。在老年人中，農村和城市居民能量攝取低於 1500 仟卡者分別為 90% 和 33%。

就個別營養素而言，城市和農村居民每日蛋白質攝取量均低，雖然城市年輕居民的脂肪和碳水化合物攝取也許是足夠的，但老年人並非如此。在農村老年人中，每種宏觀營養素和能量的攝取都十分低。最後作者認為要改善 Padang 地區居民膳食習慣和營養素攝取，農村老人需大大增加能量和宏觀營養素的進食量。

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