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A Nutrition Survey and Food Patterns in Predominantly Middle-income Housewives in Jakarta

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ABSTRACT *Background and purpose*. Lifestyle-related diseases have become the leading cause of death in Indonesia and are increasing along with overweight and obesity in all ages. Currently, about half of Jakarta women are obese. Little is known of their present dietary habits and food patterns, particularly among housewives. This study investigated energy and nutrient intakes compared with the current recommended dietary allowance, intakes of vegetable and table sugar, and frequently consumed foods. *Methods.* Seven communities in Jakarta were contacted and permission from 4 communities was obtained. Housewives were approached through each community health center. There were 196 housewives agreed to be subjects. Anthropometric measurements were conducted at the health centers. A nutrition survey by the 24 hour dietary recall method for 3 nonconsecutive days was conducted by visiting each subject's home. *Results.* Thirty-nine percent of the subjects had normal BMI, 21% were overweight, and 40% obesity. The daily nutrient intakes of energy, protein, carbohydrate, lipid, and fiber were 1962 kcal, 54g, 249g, 87g, and 10g, respectively. Energy intake was close to RDA of 1900kcal/day, lipid intake was on upper limit level, and fiber intake was only half of lower limit level. The vegetable intake was 96g/d, only 25% of recommendation. The table sugar intake was 29g/d, within recommendation of less than 10% energy. The top three frequently consumed foods were 29% fried animal protein, 17% fried tempeh, and 15% coconut milk rice. Commonly consumed sugary food and drinks were 19% cake and 19% added table sugar in tea or coffee. *Conclusion.* By the high prevalence of overweight and obesity whilst energy intake was close to energy RDA, it suggested that RDA is currently overestimated. The factors for lifestyle-related diseases were suggested by the housewives` overweight and obesity prevalence, high lipid intake and low fiber intake.
Keywords: nutrition intake, food patterns, vegetable intake, sugar intake, housewives

INTRODUCTION

In Indonesia, the tendency toward lifestyle-related diseases has been increasing year by year. According to basic health research conducted by the Ministry of Health, the three major causes of death in Indonesia are stroke, heart diseases, and diabetes mellitus (1-4). It was also found that the prevalence of obesity and overweight has been increasing for the last 10 years, basically in all age groups (1-3). In Indonesian adult population, male obesity increased from 13.9% to 19.7% and female obesity increased from 23.8% to 32.9% (3). The role of nutrition intake in lifestyle-related disease is important for determining the next steps in both prevention and cure. Excessive nutrient intakes can lead to development of lifestyle-related diseases.

Almost 20 years ago, a dietary intake and food pattern study in relation to heart disease was conducted in West Sumatra, investigating on the food culture of West Sumatra food culture, which Indonesians believe has the highest prevalence of coronary heart diseases because of its traditional fatty and oily foods with coconut milk, palm oil, and animal protein as the main ingredients (5). It concluded that intakes of animal foods, total protein, cholesterol, and total carbohydrate were coronary artery disease predictors (5). This study is a good example of Indonesian cuisine with no influence of western food, but it was limited to case of people suffering from coronary heart disease and included both men and women (5).

From the data of the national economic survey in Indonesia, which shows per capita consumption by households and was analyzed by the Ministry of Health (6), it was found that the average energy intake in Indonesia, especially in women age 19 – 55 years old, was 1607kcal/day (7). The total energy intake was about 77% energy of the 2000kcal Indonesian Recommended Dietary Allowance (RDA) (7,8). However, 40% of women, especially in Jakarta, were obese (3) and death caused by lifestyle-related diseases has been increasing (1-4).

Worldwide, most women stay at home or work as housewives. They tend to spend more time taking care of the family rather than their own health (9). Dietary

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habits of the family begin with the housewives, but the housewives often care more about the family food consumption than their own (9). Economic development has an effect on the normal household. It may also change their lifestyle, which eventually changes their dietary habits as well.

Since little is known about the food patterns of Jakarta housewives and nutrition surveys on them, yet almost half of Jakarta women are obese, the purpose of the study was to find the current nutrition intake of housewives in Jakarta compared with the current Indonesian RDA, including vegetable and table sugar intakes, their current nutritional status, and food patterns. The nutrient intakes, food intakes, and nutritional status of the women investigated in this study are considered predictors for lifestyle related diseases.

METHODS

In Indonesia, there are community health centers available in every district and community. Two cities in Jakarta, of which has 65 districts, with about 1820 communities in total. Each community has one community health center. Every month, the health centers offer basic health examinations for residents from infants to elderly people. We contacted 7 communities, but only 4 communities agreed to accept us for the study. After that, we applied for permission from each district social welfare service. The social welfare service brought the application to the mayor`s office. After the mayor`s office granted permission, we could start the study at the community health centers.

Before the study, we trained the investigators, who hold Bachelor of Nutrition degree from the Universitas Indonesia. Next, we contacted 4 health centers and from each health center we obtained a list of housewives who regularly visit the health center. Then we invited them to come visit us at the health center. At the visit to the community health center, we took their anthropometric measurements and recorded the personal data and addresses of the housewives.

Estimation of nutrient intake. Nutrition surveys using the 3-day 24-hour recall method were implemented three times: 2 weekdays and 1 weekend day. All the nutrition surveys were conducted on one by one home visits to each subject. The nutrition survey were conducted by nutritionists who have at least one year experience in monitoring and supervising studies, especially community studies. Energy, protein, lipids, carbohydrate, fiber, vegetable, and sugar intake were obtained from each survey. The nutrition surveys were calculated using Indonesian food composition data (10) in Microsoft Excel Software 2013

Estimation of table sugar intake. the intake of table sugar was estimated using sugar composition table which was establish previously (11) The calculation of table sugar intake was performed using Microsoft Excel Software 2013.

Statistical Analysis. All procedures of data analysis were performed using Microsoft Excel Software 2013.

RESULTS

In total there were 196 subjects who participated in our study. The characteristics of the subjects included an average age of 51, weight of 60kg, height 152cm and BMI of 26.5kg/m^2 (Table 1). All subjects were housewives. Thirty-nine percent of subjects had normal BMI, 61% were overweight or obese, and no underweight subjects found in this study (Fig 1). The nutrient intakes and food intakes were presented as grams per day (g/d). The energy intake was 1962 kcal/d, protein intake was 54g/d, carbohydrate intake was 249g/d, and the total lipid intake was 87g/d, while fiber intake was 10g/d with vegetable intake of 96 g/d, and sugar intake from table sugar of 29g/d (Table 2)

Table 1. Characteristics of the subjects (n=196)

Variables	Average	±	SD
Age (years)	51	±	9
Weight (kg)	60	±	10
Height (cm)	152	±	6
BMI (kg/m^2)	26.5	±	4.2

Data are shown in mean ± SD

Table 2. Energy and nutrient intakes of the subjects and Indonesian RDA 2013[8] (n=196)

	Daily intake	RDA[8]	Daily intake/RDA(%)
Energy (kcal)	1962 ±342	1900	103.3%
Protein (g)	54 ±15	57	94.4%
Lipids (g)	87 ±24	53	163.4%
Carbohydrate (g)	249 ±52	285	87.2%
Fiber (g)	10 ±4	28	35.7%
Vegetable (g)	96 ±38	-	-
Sugar from table sugar only (g)	29 ±14	-	-

Data are shown in mean ± SD

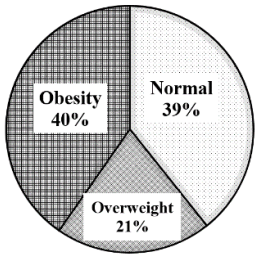

Fig 1. Prevalence of Normal, Overweight, and Obesity (n=196)

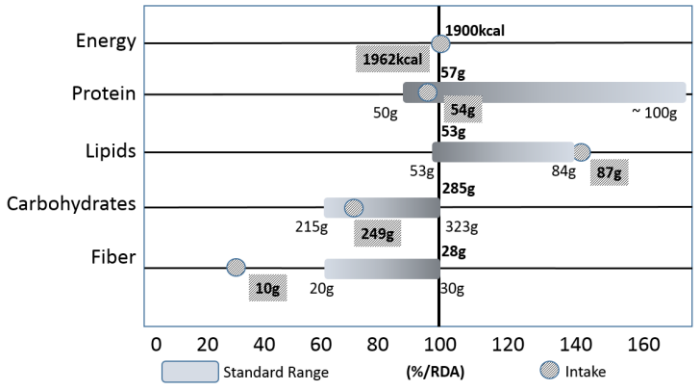

Fig 2 Comparison of energy and nutrient intakes with RDA

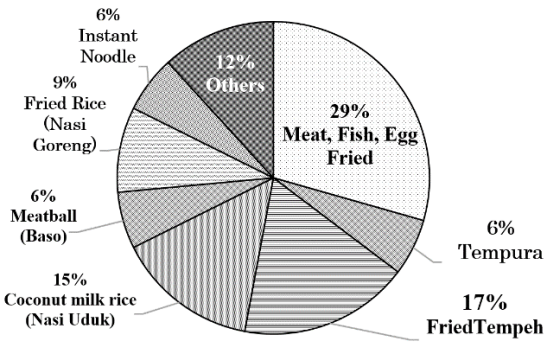

Fig 3. Food pattern frequencies

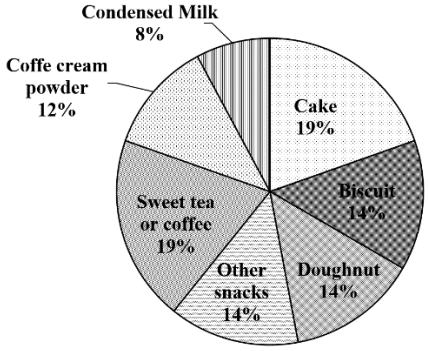

Fig 4. Sugary food and drink patterns

Energy and nutrient intakes were compared with Indonesian RDA (8) in Fig 2. The RDAs for nutrient intakes are shown in ranges (12). Protein intake was 54g (standard range 10 – 15% of energy, about 0.9–1.5g/kgBW/day, 50 – 81g/d), total lipid intake was 87g (standard range 25 – 35% of energy, 53 – 84g/d), carbohydrate intake was 249g (standard range 40 – 60% of energy, 215 – 323g/d), and fiber intake was 10g (standard 20g/d or more, 10 – 14g/1000kcal).

The food patterns of the housewives are shown in frequencies. The most frequent foods is 29% fried animal protein which includes meat, fish, and egg, 17% fried tempeh, 15% coconut milk rice, 9% fried rice, 6% of meatball, 6% tempura, 6% instant noodles, and others. There are almost no vegetable dishes among the foods most frequently consumed by the housewives.

Sugary food and drink patterns is shown at Fig 4. The most common sweet foods consumed is 19% cake, 14% biscuit, 14% doughnut, and 14% other snacks. For drinks, 19% drink tea and coffee with added table sugar, 12% coffee cream powder, and 8% condensed milk.

DISCUSSION

This study was conducted in 196 female subjects who were housewives in Jakarta to determine their obesity rates through BMI and dietary factors from intakes of energy, as well as to establish major nutrients including fiber and vegetable and table sugar. The Jakarta area was selected since the average overweight and obesity there was found to be high from the government basic health research (1-3).

Overall there were no underweight women found

in our study, while the normal, overweight, and obesity prevalence was 39%, 21%, and 40%, respectively. The results support the government report on basic health research, which showed the obesity prevalence in Jakarta women was 40% (3). In this study, the subject housewives were from average, middle class families. These results support the contention that the subjects in this study can be recognized as representative of women in Jakarta.

The results of energy and nutrient intakes from this study and the Recommended Dietary Allowance 2013 (RDA is called AKG 2013 in Indonesian) were compared (8). The results of energy intake in the housewives were close to the Indonesian RDA, which makes it difficult to explain the high prevalence of overweight and obesity. The Indonesian RDA was estimated using the model formulation of Dietary Reference Intake developed by the Institute of Medicine, United States (12,13)

The model calculation is called EER, Estimated Energy Requirement, an average dietary energy intake to predict energy required to maintain balance in a healthy adult defined by age, gender, weight, height, and physical activity level (PAL) in order to sustain weight in the range desired for good health (13). This model calculation was used with the Indonesian RDA 2013 with adjustment (12).

The Indonesia RDA of energy calculation was estimated using units for weight and height for normal median weight and height of Indonesians based on national basic health research (8,12). For physical activity value, it was estimated using "Light Activities" value, based on basic health research which shows that more than 90% of Indonesians' activity level was from very light to light activities (1-3,8.12) so the value for physical activities was estimated 1.12 for women above 19 years old (12,13) The model calculation of EER for women 19 years and older is indicated below:

EER = [354 – (6.91xAge in year)] + PA x [(9.36xWeight in kg) + (726xHeight in meter)]

(PA = 1.12)

In determining women's RDA for energy, for women age 50 – 64 years old, the Indonesian data for weight and height used were 55kg and 159cm (8,12). At the final regularity which was listed as Indonesian RDA, energy RDA for women age 50 – 64 years old is 1900kcal/day (8,12). In our study, it was found that the housewives with an average age of 51 had an energy intake of 1962kcal/day. It is similar to the current Indonesian RDA for 50 – 64 years old (8). In contrast, overweight and obesity rates were found to be high in our study. This may suggest that the current Indonesian RDA is overestimated.

A better situation has developed in Japan, as the female obesity rates have been decreasing for the last ten years (14). For Japanese Dietary Recommended Intake (DRI), the EER for Japanese is obtained by multiplying basal metabolic rate (BMR) and PAL (15,16). Representative values for BMR per kg of body weight were determined based on previous researches for Japanese people, called the reference value for BMR (15,16). The reference BMR is based on the reference BMR reported in 2005 DRI and BMR values that have been reported since 1980 (15-23). The PAL unit used for light activities is 1.5 based on PAL research in Japanese (15,16).

For Japanese women aged 50 – 69 years old with light activity the DRI for energy is 1650 kcal/d (15). The current average energy intake is 1706kcal/d and the average weight and height for women age 50 – 59 years old is 55kg and 156.6cm (14), meaning that this is a proper recommendation for controlling health problems, especially obesity. As comparison, when these these values for average weight and height for 50years old and light physical activity were inserted in the formulation used for Indonesian RDA, the result will be 1855kcal, about 205kcal higher than the current Japanese DRI for energy with light activities (12-14).

The Indonesia RDA is available only at one level, as it is formulated for light activity and is used for all age groups (8,12). However for most other countries, the RDA for energy is listed using 3 – 4 levels of activity (15,16, 23,24). In comparison with women 50 years old with light activities, Japanese energy DRI is 1650kcal/d, Singaporean is 1720kcal/d, and Malaysian energy RDA is 1660kcal/day (16,23,24). The current Indonesian RDA for energy is 200kcal higher compared with energy RDAs for these countries for light activities level (8,16,23,24). Further research and reviews need to be done in order to improve the current RDA of Indonesians, especially on deciding an equation which is properly applicable for Indonesian people.

The lipid intake of the housewives reached 36% of their total energy intake, which is 87g/d. It is at the upper limit of the standard range for lipid intake (12). About 25% of EER was determined as the RDA for lipids in the Indonesian RDA, which means that for women age 50 – 64 years the EER is 1900kcal/d and 25% of this is 53g/d for the lipid RDA (8,12). When the actual lipid intake and the RDA lipid intake are compared, there is 34g difference, which means that the housewives' lipid intake is 306kcal higher than the RDA lipid intake (8). An explanation for this lipid intake is suggested in the following discussion

From the subjects' frequent food intake, it was found in this study that almost all the frequent foods were fried foods. The most common food consumed by the housewives were 29% animal protein fried, such as meat, fish, and egg cooked by deep frying methods, the second was 17% fried tempeh, and the third was 15% coconut milk rice, known as Nasi Uduk. Frying is one of the common, easy methods to prolong food expiration, a tasty, attractive, and very simple cooking method (25). The fact that it is a simple cooking method may also be a factor in why the housewives consumed more fried foods.

In Indonesia, the most common oil used in frying is palm oil since the price is cheap and it is easy to find anywhere, but it contains 45 – 50% saturated fatty acids (SFA) in one serving (10,26). As for originally low calorie and low fat foods, they will become energy-dense foods with oil absorption from the frying process (27,28). Another common lipid source used in Indonesian cuisine is coconut milk, which contains 20% SFA of total calories in one serving (10,29). Coconut milk is used to make soup and creamy savory sauces in Indonesian cuisine. Since both ingredients are major parts of Indonesian cuisine, the SFA might make a significant contribution to total lipid intake in our study, which can lead to higher risk of cardiovascular diseases (30).

The housewives SFA intake is estimated from their frequent food intake, of which roughly 45% is fried foods. In 1962kcal of the housewives' energy intake, 883kcal comes from fried foods. Thus, about 36% of the energy contribution from fried foods comes from

lipids, 317kcal. Finally, approximately 50% of 317kcal is SFA from palm oil, which is about 159kcal, so the SFA intake of housewives is roughly 17.6g per day just from palm oil. This amount might become higher if it is combined with other lipid sources.

Although a SFA recommendation is currently unavailable in the Indonesian RDA, other countries like the USA have SFA intake recommendations which are less than 10% of energy per day, about 21g/d (31). This recommendation is based an American nutrition survey in 2010, which found that the SFA intake of the whole American population on average contributed 325calories or more than 16% of energy per day, about 36g/d (32). It was found that the SFA intake of 51 – 70 year old American females ranges between 10 – 12% of energy, which is about 22.5g/d from SFA intake alone (31).

Unlike American dietary guidelines, the recommendation for SFA the Japanese DRI is 4.5% - 7% of the total lipid intake. The lipid intake of Japanese women age 50 – 59 years old is 55g/d, means that intake of SFA is 4g/d at maximum, much lower than the SFA intake from our study (14,16). From these comparisons, American women have a higher SFA intake than Japanese women and Indonesian women‘s SFA intake is closer to that of American women. This excess lipid intake might be a factor in the very high death rate from heart disease in Indonesia (4)

When causes of death are compared among these countries, death caused by lifestyle-related diseases are currently higher in America and Indonesia than in Japan (1-4, 33,34) Trends in mortality caused by lifestyle-related diseases among the same age group is mostly caused by circulatory system disease in America and Indonesia. For Indonesian women, with the high prevalence of overweight and obesity and high lipid intake, close to the situation in American women, the tendency to hyperlipidemia and the risk of circulatory system diseases seem to be high, with heart disease becoming one of the leading causes of death in Indonesia.

From all these facts, the real problem is over-intake. If the housewives can develop better food habits of to reduce lipid intake, 300kcal excess can be eliminated from their total energy intake and they can eventually reach a proper energy intake to lower the risk of lifestyle-related diseases. Reducing fried foods or reducing the SFA might be good ways to improve health.

High lipid intake and low fiber intake have been linked with increases of cardiovascular disease risk (37). Fiber intake of housewives found the present study showed only 10g/d, half of lower limit level. The benefit of fiber to control cholesterol levels and to decrease the risk of coronary heart disease has been reviewed in many studies, which is found 14g/1000kcal can achieved that benefit (12,13,39). Fiber can be a good way to modify diet with the goal of improving lipid profiles and blood pressure to reduce cardiovascular risk (40). In other words, more fiber will have the effect of better coronary circulation and less risk of cardiovascular disease (41).

When the subjects` food pattern was observed, it became clear that the animal source dishes and high carbohydrate dishes were frequently included in their daily diet. Source of fiber like vegetable dishes and fruit were rather infrequently included. The Staple food for Indonesian is rice as in most Asian Pacific countries, but it doesn’t contain high fiber since the skin of the rice is removed during processing the husk. Fiber contained in raw Indica rice, the common rice consumed in Indonesia, is only 0.4g/100g (10,42). Raw shorter grain rice, commonly consumed in East Asian countries, contains 0.5gram fiber of 100g (42). Brown rice contains more fiber, about 3g/100g. However, for most Indonesians, brown rice is infrequently consumed since the flavor is not as delicious as regular white rice. In European countries and the US, people consume cereal which contains oats and a fiber content of 9.4g/100g or bread which contains wheat and has a fiber content of 10.8g/100g (42). These staple foods can be the source of fiber for these countries (31,32). So for Indonesians, the major source of fiber is vegetables and fruit. Indonesians currently rely on vegetables to include more fiber in their daily food habit. If Indonesians have a low vegetable intake, this will result in a low fiber intake.

The FAO/WHO recommendation is 400g/d for vegetable and fruit intake (43). However from our survey, the intake was only 96g/d for women, which is about 25% of the recommendation (8,43). In comparison, for Japanese women vegetable intake was 237g/d (14). This means that Indonesian women consume only 40% of the Japanese intake. Despite the fact that vegetable production in Indonesia is quite high, there are many factors that might contribute to the low vegetable intake, from current social habits regarding food to the economic distribution within the country. The cooking time needed to process vegetables might also be a factor, since the housewives choose simpler cooking methods like frying. Given current Indonesian women‘s food patterns, higher vegetable intake in women is highly recommended, especially to increase the fiber intake. Other strategies should be considered to include more fiber in Indonesian daily dishes such as recommending other sources of fiber aside from vegetables.

Other possible factors related to overweight and obesity were observed, including the sugar intake of the housewives. The frequencies of consumption of sugary food and beverages by the housewives were recorded. The most frequent sweet food consumed by the housewives was cake and a common sweet drink was coffee or tea with regular table sugar. The frequencies of sweet foods and drinks were low, indicating that the housewives do not regularly consume commercially available sweet food and beverages.

Sugary beverages are thought to be a problem in weight management since it is easy to ingest more in liquid form. However, it has been suggested that solid foods like cakes are more satiating than sugary beverages, which may also potentially increase the sugar consumption (44,45). In the case of the housewives` sugar intake, sugar intake coming from homemade sugary foods might provide a greater feeling of satiety than drinking sugary beverages, so cakes are more frequent compared with sugary beverages. Cakes are usually energy dense and its frequent excessive intake is associated with weight gain and excess adiposity (44). In future strategies of integrating healthier dietary habits, the housewives should be encouraged to replace sweet foods with healthier food choices that provide a greater feeling of satiety.

The total sugar intake from table sugar was 29 g/d. The housewives‘ sugar intake in this study can be

considered to be within the WHO recommendation, which is below 10% energy, 50g/d, with a preferable suggestion of less than 5% energy, 25g (7,12). There are many studies suggesting that intake of sugar from sugar-sweetened snacks and beverages may promote weight gain and eventually cause obesity (8,15,36). However, in this study we found that the sugar intake was normal and had no clear relation to the subjects' overweight and obesity prevalence. It is suggested that with intake over 90g/d it may be possible to predict overweight problems in the future (34). This may be the case, but it depends on the situation within the country itself. Despite the fact that the total sugar intake meets WHO recommendations, the awareness of varieties of sugar content and their effects on health should attract the attention of stakeholders and the society itself.

In conclusion, the current RDA is suspected to be an overestimation. Improvement is necessary, especially in the applicable equation to be used for Indonesian people. Lipid intake was found high especially from fried foods. Fiber intake was low, which may be caused by low vegetable intake. Sugar intake was considered normal. The housewives' current food habits carry lifestyle-related disease risks. Future study can be focused on the strategies to be employed in developing healthier food habits in women especially in housewives.

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