ROLE OF INDIGENOUS WISDOM IN FOOD SELECTION: STUDY OF STUDENTS' NUTRITIONAL STATUS IN FOOD NUTRITION PROGRAMME: WIDYA MANDALA SURABAYA CATHOLIC UNIVERSITY

Anna Ingani Widjajaseputra, Theresia Endang Widoeri Widyastuti, Maria Matoetina Suprijono and Chatarina Yayuk Trisnawati

Widya Mandala Surabaya Catholic University, Indonesia1

Abstract

Purpose: The aim of this research is to obtain comprehensive information about students' nutritional status and its relation to internal and external factors.

Design/methodology/approach: This study used a purposive sampling method to study 94 students, aged around 20 years old, from the Food Nutrition programme of Widya Mandala Surabaya Catholic University. The nutritional status was determined by anthropometric methods, and the influenced factors were collected by questionnaire and recall diet.

Findings: This study showed that more than 60% of respondents have healthy nutritional status criteria, based on the levels of nutrient consumption, fulfillment of energy, protein, vitamin A and Fe (iron). The levels of fulfillment were 72%, 98 %, 388% and 92% respectively. The data showed that most nutritional fulfillment was supported by the eating habits of the respondents who enjoy light meals (70.9%). The food selection of respondents was based

[1] Faculty of Agricultural Technology, Widya Mandala Surabaya Catholic University, Surabaya 60265, INDONESIA, Corresponding author: Anna Ingani Widjajaseputra, Email: ingani9456@yahoo.com

on preference of local food and light meals (100% of the respondents) and was not as dependent on nutritional knowledge.

Originality/value: Students need adequate nutrients that can improve and maintain their physical endurance and mental and cognitive functioning. Therefore, it is important to study their nutritional status.

Keywords: Indigenous wisdom, Food selection, Eating habits, Nutritional status

INTRODUCTION

Nutritional status indicates that one's health is conditioned by consumed nutrients both quantitatively and qualitatively, as well as the ability of the body to use these nutrients to meet metabolic demands. A self-reported questionnaire was administered to 94 students, ranging in age from 19 to 20 years old. Nutritional need is to meet the needs of high physiological development, and to support the daily activities of students. The nutrients' satiety will determine the ability to learn, working productivity and health of students (Soetardjo, 2011b). Data from Basic Health Research of 2010 (Ministry of Health, 2010) showed that the nutritional status of adults (over 18 years old) is dominated by the problem of obesity (21.7%), with rates of obesity in women (26.9%) higher than in males (16.3%) of the well-educated and higher economic classes of the urban population in Indonesia. The prevalence of obesity in East Java is 20.6% (Indonesia Ministry of Health, 2010).

Adequate nutrient achievement can improve the morale and physiological abilities of students in meeting the demands of physical endurance and mental and cognitive functioning for studying during both lectures and practical work. One method to determine the nutritional status of students is anthropometric assessment—the Body Mass Index (BMI). This method is very simple and was selected as one of the practical courses to aid in understanding nutritional status, but it has been less successful because the data are less comprehensive. Various internal and external factors affected the nutritional status of students such as interest, knowledge, perception and funds for providing healthy foods. Relationships between factors require more in-depth research because they can affect the nutritional status of subjects. For example, Shiwaku *et al.* (2004) found that the relationship between abdominal fat

mass and BMI is specific for each ethnicity. Universal BMI standards are not appropriate for Asian societies such as the Japanese and Mongolians because of different lifestyles, temperaments and perception. In addition, the accuracy of BMI to diagnose obesity is limited, particularly for individuals who are in the intermediate range of BMI (Abel Romero-Corral *et al.*, 2008). Therefore, in this study, the measurement of BMI was supplemented with measuring the percentage of body fat and water, recall of food consumption, as well as extracting various internal and external factors as needed. Therefore, it is necessary to study nutritional status, which is related to the amount of adult nutritional intake, eating habits and nutritional knowledge of the respondents, in order to obtain more comprehensive evaluation methods that will improve the nutritional status evaluation as a material input of food nutrition courses.

There are many kinds of Indonesian cuisine, so Indonesian people can choose a menu to fulfill their nutritional needs. Rice is the staple food in major areas of Indonesia, but it is frequently supplemented by others foods, such as sweet potatoes, cassava and corn. In Indonesia, where much cassava is eaten, the sweet potato is being promoted because it is nutritionally better than cassava especially in terms of sugar content and no glycocyanogen content. Corn should have an important role in the Indonesian diet, as it supplies substantial amounts of protein and carotene besides the energy content. Mung bean sprouts are a potential source of vitamin E and dietary fibre; this commodity is used in the daily diet of Indonesian people as an ingredient in *pecel, urap, gado-gado* and *tahu campur*.

Pecel is an Indonesian dish which consists of steamed vegetables such as spinach, cabbage and mung bean sprouts and a sauce consisting of fried groundnuts (peanuts), coconut sugar, salt and other spices. *Urap* is a similar dish, using spicy shredded coconut without a groundnut sauce. *Gado-gado*'s sauce is minus cooked lemon leaves but with a groundnut sauce as with *pecel*. *Tahu campur* is a popular food from East Java, specifically Surabaya. It is a type of beef soup served with a green salad, mung bean sprouts, egg noodle, fried tofu, spiced fried cassava, garlic crackers and a sauce containing black shrimp paste.

The purpose of this research was to achieve more comprehensive nutritional evaluation methods that are related to the amount of adult nutritional intake, eating habits and nutritional knowledge of the respondents.

RESEARCH METHODOLOGY

This study used purposive sampling in that participants were selected intentionally, including students of the Food Nutrition Programme of even semester 2011/2012. A self-reported questionnaire was administered to 94 students, ranging in age from 19 to 20 years old.

DATA COLLECTING

The questionnaire was designed to obtain all the data associated with internal and external factors that determine nutritional status. A diet recall form to determine whole nutrient consumption during 3 days in each week was provided by each respondent. Measurement of anthropometric data (BMI, body fat and body water) was performed at the laboratory.

DATA PROCESSING

Descriptive analysis was carried out on nutrient consumption data—body fat, body water, BMI and nutritional status—by calculating the mean and standard deviation in order to predict the centre and spread of the data. Linear regression and correlation analysis were conducted to determine the relationship of BMI to body fat.

FOOD CONSUMPTION STUDY

The monitoring of consumed food was conducted over six weeks by using a specially designed Food Questionnaire (FQ). The portion sizes used in the FQ were based on household sizes such as slice, piece or cup. When natural portion size was uncertain, the portion size was declared as small, medium or large. The nutritive and energy values of consumed foods were calculated by using the table of food composition issued by the Indonesian Ministry of Health for the year 1996.

ANTHROPOMETRIC ASSESSMENT

Measurement of weight and height were taken in the morning with respondents wearing light clothes and without socks and shoes. Weight was determined via the Body Fat/Hydration Monitor Scale (model 273867-Kris, Registered Number: AKL-20502111684). Height

was measured via a manual stature meter which ranges to 200 cm. Evaluation of Nutritional Status by Anthropometric assessment / BMI measurements were facilitated by taking percentages of body fat and water, as well as various internal and external factor assessments, such as nutrient consumption, nutritional knowledge, eating habits, nutrient intake level and physical activity (Hardinsyah and Martianto, 1989; Jebb *et al.*, 2000).

RESULTS AND DISCUSSION

Data from this research and general phenomena in the Indonesian community showed that healthy nutritional status was not achieved only by consuming meat, but also by consuming a mixture of healthy foods such as *gado-gado*, *pecel* and *tahu campur*. Basic consideration of the Indonesian community in food selection was influenced by eating habits, available commodities and budget. Fortunately the mixture of selected foods affected by indigenous wisdom had increased protein content, iron content and vitamin A as a supplementation effect. Descriptions of several factors and the relationships between factors are described below.

RELATIONSHIP BETWEEN LEVEL OF CONSUMPTION AND NUTRITIONAL STATUS OF RESPONDENTS

The data in Table 1 show that the mean height, body weight and calculated BMI of 94 respondents ranged from 15.72 to 34.73; an average BMI of 22.02 ± 3.97 was classified as a healthy nutritional status. The value of BMI from 18.5 to 25.0 was considered as the normal body weight of healthy status. The condition was supported by an adequate level of nutrition consumption, especially the consumption of protein (98%), vitamin A (388%) and Fe, which reached an average of 92% of the nutritional adequacy (Recommended Dietary Allowances-RDA), although the adequate energy of the of the respondents on average was only 72% RDA (Table 2). This rate can be caused by physical activity; most of the respondents (students) can be classified as doing light activity, and many respondents ate snacks during these activities (Table 5). It should be noted that the amount of consumed food and energy content were not recorded completely. This showed the weakness of recall diet as the method for data collecting, especially in calculating the nutritional value of food consumption.

Based on this classification of the Indonesian Ministry of Health, 63.83% of respondents were classified as healthy, 5.32% as having chronic energy deficiency, 9.57% as unhealthily thin, 8.51% as overweight, and 12.77% of respondents were classified as obese. Deviation from the mean of BMI value of the sample showed the presence of some extreme values, such as respondents who were classified as negative on very thin (BMI <17.0) to a relatively underweight measurement (17.0 – 18.4) and were classified as obese (BMI> 27.0). Observational data on the sixth week showed a change in direction of the nutritional status of the respondents, by increasing and decreasing the BMI. Positive changes among respondents who were considered overweight (25.1 – 27.0) were demonstrated by the percentage compared to the data in the 1st week. Based on the results of a t-test with α = 0.10, the data generated for the nutritional status of respondents in Week 1 and 6 are not significant

Criteria	Mean ± standard deviation
Body weight (kg)	57.83 ± 14.09
Height (cm)	161.4 ± 8.13
Body Mass Index	22.02 ± 3.97

Table 1. Anthropometric data of respondents (n = 94)

Item of measurement	Energy (Cal)	Protein (g)	Vitamin A (RE)	Fe (mg)
Average consumption	1656	56,27	2051,54	18,32
Nutritional adequacy	2303,63	56,81	524	22,82
Nutrient consumption level (%)	72	98	388	92

Table 2. Nutrient consumption assessment

No	BMI	Nutritional status	Percentage of nutritional status (%)	
			First week	Sixth week
1	< 17,0	Chronic Energy Deficiency	5.32	6.38
2	17,0–18,4	Underweight	9.57	10.64
3	18,5–25,0	Healthy	63.83	61.70
4	25,1–27,0	Overweight	8.51	7.5
5	> 27,0	Obesity	12.77	13.83

Table 3. Nutritional status of respondents

different statistically, with t = 0.0176, which is smaller than the t critical region (t <- 1.645 or t > 1.645). Based on the data presented in Table 3, it was seen that more than 60% of respondents who have a healthy nutritional status criteria with BMI 18.5 to 25.0 supported the data in Table 2, and the rates of nutrient consumption for energy, protein, vitamin A and Fe were 72%, 98%, 388% and 92% respectively.

Achievement of the above nutrient consumption may be partly caused by the indigenous wisdom of Indonesian people in food selection, with the main meal consisting of rice commodities, and the supplementation effect of a rice and dried fish menu to increase the chemical score of protein through the combination of ingredients in the *tahu campur* recipe, such as beef soup served with a green salad, mung bean sprouts, egg noodle, fried tofu, spiced fried cassava, garlic crackers and a sauce containing black shrimp paste and other selected traditional foods in daily consumption. This means that the role of the parent to introduce eating habits to their children is an important method to gain good nutritional status.

RELATIONSHIP BETWEEN NUTRITION KNOWLEDGE AND NUTRITIONAL STATUS OF RESPONDENTS

The nutritional knowledge of respondents indicated that their food selection is based on food preference only (100%) and knowledge of required nutrients is based on a secondary school level (100%). Limited nutritional knowledge did not affect nutritional status, as it is related to the phenomenon that the nutritional status of respondents showed an average BMI 22.02 ± 3.97; thus the nutritional status of respondents is still relatively healthy (the healthy criteria of BMI is 18.5 to 25.0). This phenomenon was also obtained by Sakamaki *et al.* (2005), who studied the knowledge of nutrition, healthy eating habits and behaviour of students at a Chinese university. In that study, although 85.6% of the students know the concept of food with balanced nutrition, only a few students (7%) apply the concept to food selection.

RELATIONSHIPS BETWEEN BODY FAT/WATER AND EATING HABITS

The body fat of respondents indicated an average of 21.71% (Table 4), which was not categorized as obese (obesity is categorized by body fat of > 25% for males and > 35% for females [WHO, 1995 in Abel Romero-Corral 2008]). Figure 2 shows the relationship between body fat and BMI.

The graph in Figure 2 does not distinguish between male and female respondents, which is due to their unequal numbers (male respondents are 24.73% of a 94-person population). The percentage of body water of respondents was an average of 53.97%, showing no symptoms of abnormal water retention, as this is still lower than the average water content of a standard body size of 60% (Wilson *et al.*, 1979; Chouinard *et al.*, 2007). The data make it clear that the food consumption pattern of respondents was correct during six weeks of observation.

Items of measurement	First week	Sixth week
Average of BMI	22.02 ± 3.97	22.01 ± 4.03
Average of *Body Fat* (%)	21.71 ± 6.40	21.70 ± 6.77
Average of *Body Water* (%)	53.97 ± 4.75	53.83 ± 4.59

Table 4. BMI, body fat and body water of respondents
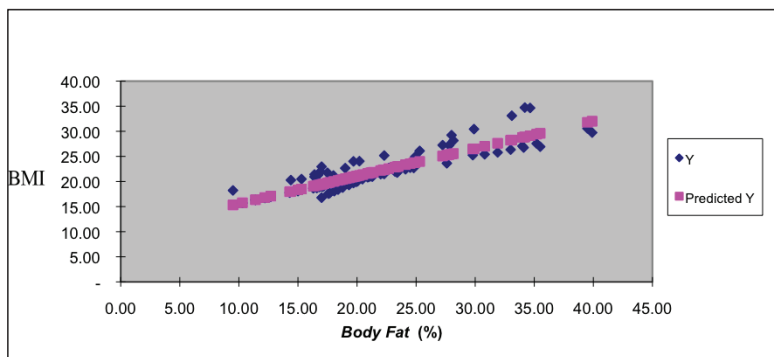
Figure 2. Regression of BMI (Y) and body fat (X) with R2= 0,78

No.	Questions	Frequency (%)		
		Always	Sometimes	Never
1.	Do you have breakfast in the morning before doing activities?	100	0	0
2.	Do you like to eat together (with family or friends)?	100	0	0
3.	Do you like to eat snacks while doing certain activities?	70.97	29.03	0
4.	Do you like to eat fast food?	0	100	0

Table 5. Related conditions to eating habits

Based on the questionnaire in Table 5, the data of respondents indicated that respondents have breakfast before doing certain activities (100%), and like to eat with family and or friends (100%). This was due to students living with their parents (72.53%) or relatives (1.10%), while 26.37% of respondents were in lodging. Respondents have a tendency to eat snacks during activities "always" (70.97%) and "sometimes" (29.03%). The eating habits of respondents showed that they consumed fast food occasionally (100%). Eating habits of the respondents were strongly influenced by the eating habits of the parents (100%), as well as eating habits of relatives and friends, <5% and <9%, respectively. This indicates that a child was introduced to foods during early life by parents, especially mothers. These eating habits determine the level of nutrient consumption, which then affects the BMI or nutritional status. This is supported by Sakamaki *et al.* (2005), who obtained similar results: that eating habits, such as daily vegetable intake, needs to be taken into account in measuring BMI.

CONCLUSION

Based on the results of the provided studies, it can be concluded that nutritional status evaluation methods based on the measurement of adult body mass index (BMI) will result in more comprehensive outcomes if they are complemented with internal and external factor data such as nutrition knowledge, nutrition consumption, eating habits, and body composition (fat and body water). Indigenous wisdom of Indonesian people in food selection has an important role in nutrient consumption fulfillment, such as the supplementation effect of a rice and dried fish menu to increase the chemical score of protein, the combination of ingredients in Indonesian cuisines such as *tahu campur*, which consists of beef soup served with a green salad, mung bean sprouts, egg noodle, fried tofu, spiced fried cassava, garlic crackers and a sauce containing black shrimp paste, and other selected traditional foods in daily consumption.

ACKNOWLEDGEMENTS

and Nutrition for the academic year 2011/2012, for the implementation of technical support in this study.

REFERENCES

Abel Romero-Corral, M.D., Somers, V.K., Sierra-Johnson, J., Thomas, R.J., Bailey, K.R., Collazo-Clavell, M.L., Allison, T.G., Korinek, J., Batsis, J.A. and Jimenez, F.L. (2008), "Accuracy of Body Mass Index to Diagnose Obesity in the US Adult Population", *International Journal of Obesity* (Lond), Vol. 32, pp. 959-966.

Chouinard, L.E., Schoeller, D.A., Watras, A.C., Clark, R.R., Close, R,N. and Buchholz, A.C. (2007), "Bioelectrical Impedance vs. Four-Compartment Model to Assess Body Fat Change in Overweight Adults", *Obesity,* Vol. 15, pp. 85-92

Ministry of Health of the Republic of Indonesia. (1996), *List of Food Composition.* Directorate of Community Nutrition, Ministry of Health.

Ministry of Health. (2010), *Basic Health Research Year 2010.* Jakarta: Agency for Health Research and Development, Ministry of Health.

Hardinsyah, R. and Martianto D. (1989), *Assessment of the Adequacy of Energy and Protein and Quality Assessment of Food Consumption.* Jakarta: Wirasari.

Jebb, S.A., Cole, T.J. Doman, D. Murgatroyd, P.R. and Prentice, A.M. (2000), "Evaluation of The Novel Tanita Body-Fat Analyser to Measure Body Composition by Comparison with a Four-Compartment Model", *British Journal of Nutrition,* Vol. 83, pp. 115-122

Sakamaki, R., Toyama, K. Amamoto, R., Chuan-Jun, L. and Shinfuku, N. (2005), "Nutritional Knowledge, Food Habits and Health Attitude of Chinese University Students: A Cross Sectional Study", *Nutrition Journal,* Vol. 4:4 doi:10.1186/1475-2891-4-4.

Shiwaku, K., Anuurad, E., Enkhmaa, B., Nogi, A., Kitajima, K., Shimono, K., Yamane, Y. and Oyunsuren, T. (2004), "Overweight Japanese with Body Mass Indexes of 23.0-24.9 Have Higher Risks for Obesity-Associated Disorders: A Comparison of Japanese and Mongolians", *International Journal of Obesity,* Vol. 28, pp. 152-158.

Soetardjo, M. (2011), "Nutritional Status Assessment", in *Balanced Nutrition in the Life Cycle,* Almatsier, S., Soetardjo, S. and Soekatri, M. (Eds). Jakarta: PT Gramedia Pustaka Utama.

Soetardjo, S. (2011), "Adult Nutrition", in *Balanced Nutrition in the Life Cycle*, Almatsier, S., Soetardjo, S. and Soekatri, M. (Eds). Jakarta: PT Gramedia Pustaka Utama.

Wilson, E.D., Fisher, K.H. and Garcia, P.A. (1979), *Principles of Nutrition*. New York: John Wiley and Sons.

ABOUT THE AUTHORS

Anna Ingani Widjajaseputra is Head of the Food Chemistry–Biochemistry and Nutrition Laboratory, Faculty of Agricultural Technology, Widya Mandala Surabaya Catholic University. Her fields of study are Food Chemistry and Food Nutrition, including sugar-starch balance during the storage of sweet potatoes in varied temperatures, moisture distribution of several starchy foods, the role of tempering time and temperature on a spring roll's wrapper characteristics, and the utilization of soybean tempe flour as a suppement for children under five years old. Her scientific papers have been presented and published in international seminars and journals, and she gives lectures about food chemistry and food nutrition. She is a member of the Indonesian Association of Food Technologists.

Theresia Endang Widoeri Widyastuti is Head of Food Quality Control and Sensory Evaluation Laboratory, Faculty of Agricultural Technology, Widya Mandala Surabaya Catholic University. She focuses on Food Chemistry and Human Nutrition research. Development of functional food and drink based on papaya is her research focus. She has several years' lecturing experience in functional foods and has presented/published her research in national journals and international seminars. She is a member of the Indonesian Association of Food Technologists. Consulting and training in Food Quality Control, sensory evaluation and nutrition for food industry practicists and society are also her areas of expertise.

Maria Matoetina Suprijono is a lecturer in the Departement of Food Technology, Agricultural Technology Faculty, Widya Mandala Catholic Surabaya University. Her background is in Community Nutrition and Food Science. She focuses her research and teaching in Food Nutrition, Food Biochemistry, Nutrition Evaluation, Nutrient Formulation and Fortification. She is a member of the Indonesian Association of Food Technologists.

Chatarina Yayuk Trisnawati has been a lecturer in the Department of Food Technology, Widya Mandala Catholic Surabaya University since 2003. She is a member of the Indonesian Association of Food Technologists. She has several years' teaching experience in beverage processing technology and bakery and cake technology, as well as in research, training and publication in areas of beverage technology and bakery and cake technology.