ORIGINAL ARTICLE

Education, Knowledge, Attitude, and Balanced Diet Practices Among Adult Women in Banten, Indonesia

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ABSTRACT

Background
The prevalence of diabetes mellitus is increasing in Indonesia and the known contributing factors are age, physical activity, smoking, and diet. Education plays a role in increasing knowledge, and might influence one's attitudes and practices. Studies on the role of knowledge, attitude and balanced diet practices are scarce in Indonesia and still remain controversial. The aim of the study was to determine the relationship between education and knowledge and their effects on attitude and balanced diet practices.

Method
This was a cross sectional study that involved 56 women aged 18 years and above. Questionnaires and modified structured questionnaires were used to assess sociodemographic factors, knowledge, attitudes, and practice. Scores of education, knowledge, attitude, and practice were categorized as low and sufficient. Data were analyzed using SPSS ver.28.0.1.1. Simple and multivariate logistic regression were used to assess the relationship between sufficient scores and sociodemographic factors: age, education, working status, income, and disease history.

Results
Median age of women in our study was 43 years old with 33.9% of them had minimal education level of graduated Diploma. Around 28.6% and 17.1% of subjects had low knowledge and attitude, respectively, and 81.4% had poor balanced diet practices. Education was positively associated with knowledge levels (adjusted OR = 5.35 [95%CI: 1.05, 27.25], p=0.04). However, knowledge was not found associated with attitude ((OR = 2.16 [95%CI: 0.24, 19.38], p=0.49) and attitude was not found associated with balanced diet practices, even after the adjustment with covariates (adjusted OR = 2.27 [95%CI: 0.25, 20.84], p=0.469).

Conclusion
Our study showed that the level of education was positively associated with knowledge but we have not found association between knowledge and attitude and between attitudes and balanced diet practice. A program needs to be designed to increase attitude and balanced diet practices, that can be used to control the development of diabetes in this population.

Keywords : Adult women, balanced diet, behavior, education level, healthy lifestyle

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ABSTRAK

Pendidikan, Pengetahuan, Sikap, dan Pola Diet Seimbang Pada Wanita Dewasa di Banten, Indonesia

LATAR BELAKANG

Prevalensi diabetes melitus terus meningkat setiap tahunnya di Indonesia. Faktor yang berperan antara lain usia, penurunan aktivitas fisik, rokok, dan pola diet tidak seimbang. Edukasi diketahui dapat meningkatkan pengetahuan, yang selanjutnya dapat memengaruhi sikap dan praktik seseorang. Namun demikian, pada saat ini penelitian mengenai edukasi, pengetahuan, sikap dan praktik diet seimbang di Indonesia masih sedikit dan kontroversial. Tujuan penelitian ini adalah mengetahui hubungan pendidikan dengan pengetahuan dan pengaruhnya terhadap sikap dan perilaku.

METODE

Penelitian cross-sectional dilakukan dengan melibatkan 56 wanita berusia minimal 18 tahun. Kuesioner dan modifikasi kuesioner yang terstruktur digunakan untuk menilai faktor sosiodemografi, pengetahuan, sikap, dan perilaku. Skor tingkat pendidikan, pengetahuan, sikap, dan perilaku dikategorikan menjadi kurang atau rendah dan baik. Data dianalisis dengan perangkat lunak SPSS versi 28.0.1.1. Regresi logistik sederhana dan multivariat regresi logistik digunakan untuk menilai hubungan antara kelompok dengan skor tinggi dengan faktor sosiodemografi: usia, pendidikan, status pekerjaan, pendapatan, dan riwayat penyakit.

HASIL

Median usia wanita yang mengikuti penelitian ini adalah 43 tahun dengan 33,9% diantaranya memiliki tingkat pendidikan minimal Diploma. Terdapat 28,6% dan 17,1% wanita memiliki pengetahuan dan sikap yang rendah, dan 81,4% wanita memiliki praktik diet seimbang yang buruk. Pendidikan secara signifikan berhubungan dengan tingkat pengetahuan (adjusted OR= 5,35 [95% CI: 1,05, 27,25], p = 0,043). Pengetahuan tidak berhubungan dengan sikap (OR = 2.16 [95%CI: 0.24, 19.38], p = 0.491). Sikap tidak berhubungan dengan praktik diet seimbang, bahkan setelah memperhitungkan kovariat (adjusted OR = 2.27 [95%CI: 0.25, 20.84], p = 0.469).

KESIMPULAN

Penelitian ini menunjukkan bahwa tingkat pendidikan berhubungan dengan pengetahuan namun tidak ditemukan adanya hubungan antara pengetahuan dengan sikap dan antara sikap dengan praktik diet seimbang, Sebuah program perlu dirancang untuk meningkatkan sikap dan praktik diet seimbang, sehingga dapat digunakan untuk mencegah penyakit diabetes pada populasi ini.

Kata kunci: Diet seimbang, gaya hidup sehat, perilaku, tingkat Pendidikan, wanita dewasa

INTRODUCTION

In Indonesia there has been an annual increase in the prevalence of non-communicable diseases such as diabetes, cardiovascular disease, obesity and cancer.[1] These non-communicable diseases are among the major causes of mortality.[2] Changes in lifestyles such as sedentary lifestyle and unhealthy food intake involving high amounts of energy and fats, and low fiber intake, are often related to high risk of non-communicable diseases.[3-5] Moreover, studies report changes in diet and lifestyle during COVID-19 pandemic. An increase of purchasing long-shelf-life foods like canned or processed food[6, 7], decrease in consumption of fresh food[6], tended to buy with online food delivery[6] and eating out of control[8] were reported as changes in pandemic situation.

The Indonesian Ministry of Health guide on balanced diet with its motto "Healthy eating plate" and "Nutrition pyramid (Tumpeng Gizi)" constitutes the main efforts to educate the Indonesian people on the need for balanced diet.[9] Education is the key to a better life, including a better health status and increased longevity.[10] In Indonesia, nutritional education is introduced since elementary school upwards, although it is not taught as a special module but is integrated with other modules.[11] Through education, people acquire information and knowledge about health, which helps then make the correct decision in health-related matters.[12]

Studies have shown higher percentages of low knowledge, attitude and behavior on balanced diet. A study on adolescent girls in South Sulawesi, Indonesia, found that 41% had poor knowledge,

55% had negative attitude and 46.5% had poor practice on balanced diet.[13] The percentages of low knowledge in predominate women over 18 years also were between 39.7% to 82.3%. [14-18] There was also a high percentage of subjects with negative attitude and poor behavior on balanced diet namely 54.0% to 85.3% [16-18] and 33.8% to 49.0% [15-17], respectively.

The increase in knowledge is believed to increase awareness and attitude that will influence practice and behavior of an individual.[19-21] Yang et al. showed that subjects with knowledge of their country's dietary guidelines have a more positive attitude and better healthy eating behavior of 14% and 9%, respectively, than do those without knowledge of the dietary guidelines.[18] The increase in knowledge also has a negative effect on unhealthy diet behavior such as consumption of fatty meats and sweets with r= -0.265 and r= -0.422, respectively.[22] Several studies also showed that higher knowledge is related to good nutritional status both in the subject themselves [14] and their children.[15] However, Agustin et al. did not find a relation of knowledge and attitude versus balanced diet behavior.[16]

Studies about knowledge, attitude and balanced diet practices were still controversial and few studies adjusted with subject characteristics such as age, level of education, working status, income, and disease history. Therefore, our study's objective was to assess this data and determine the association of education and knowledge levels with their effects on attitude and balanced diet practices by considering sociodemographic factors among adult women in rural area, Banten, Indonesia.

METHODS

This study is observational, analytical and uses a cross-sectional design. It was conducted in Ciputra hospital in Tangerang, Banten, in September 2019. The study had been approved by the Ethical committee of the Faculty of Medicine, Universitas Trisakti, Jakarta under registration number149/KER/FK/VIII/2019.

Subjects were all adult women aged 18 years and above who participated in a health promotion seminar held by the Community Service Program of Universitas Trisakti in partnership with Ciputra Hospital and who agreed to participate in the survey by signing the informed consent form. Initially there were 57 subjects that participated in the survey, but during the study one subject was omitted due to an incomplete questionnaire form so the final total number of subjects in the study was 56.

Characteristics of subjects and results of knowledge, attitude and practices assessment on balanced diet were obtained using a modified structured questionnaire from Patimah et.al [13]. There were in total 36 questions, namely 12 questions on knowledge, 12 questions on attitude and 12 questions on balanced diet practices. Questionnaire validity was assessed by six reviewers, three of whom had bachelor of nutrition degrees and the other three had non-nutrition degrees.

Assessment of knowledge was given a score of 2 if the answer was correct, a score of 1 if it was wrong, and 0 if the subject did not know. For attitude and practices we used the Likert scale. Knowledge was categorized as sufficient if it was ≥ 80 and as low or poor if it was <80. A question with positive attitude such as question C1 "breakfast makes learning easier" if the answer is strongly agree has a score of 4, agree is 3, do not agree is 2 and strongly disagree has a score of 1. On the contrary, a question with negative attitude such as question C7 "adequate exercise is once a week" if the answer is strongly disagree has a score of 4, disagree is 3, do not disagree is 2 and strongly agree has a score of 1. Attitude was categorized as sufficient if it was 70 and as low or poor if it was <70.

Assessment of practices consists of finding the frequency of a subjects' practices on a balanced diet in the last week. A question on good practices with an answer of never has a score of 0, 1-2 x weekly has a score of 1, 3-4 x weekly a score of 2, 5-6 x weekly a score of 3, and ≥ 7 x weekly is given a score of 4. On the contrary, a question with poor practices with an answer of never has a score of 4, 1-2 x weekly a score of 3, 3-4 x weekly a score of 2, 5-6 x weekly a score of 1, and ≥7 x weekly is given a score of 0. Practices was categorized as sufficient if it was ≥ 70 and as low or poor if it was <70.

The SPSS software 28.0.1.1. version was used for data analysis. Binary logistic regression was used to explore association

of sociodemographic factors (age, education, working status, income, and disease history) with knowledge, attitude, and practice. The covariate variables that had p <0.25 further be analyzed for multivariate logistic regression to explore association between education and knowledge, between knowledge and attitude, and between attitude and practice. If there are more than one multivariate regression model were evaluated, we presented the best fitted model. The result of logistic regression analysis was reported as odd ratio with 95% confidence interval with the level of significance was set at p <0.05.

RESULTS

Subject Characteristics

The age of the subjects participating in the study was between 21 – 71 years with median age of 43 years. The majority of subjects had not finished diploma 1/diploma 2/ diploma 3 (66.1%), with occupational status of not working or housewife (76.8%), married (89.3%), income < 3,000K rupiah or < USD 200/- (84.3%) and had no medical history (67.9%) (**Table 1**).

Table 1. Subject characteristics (n=56)

Characteristic	Median (p25-p75)	n (%)
Age (years)	43 (33 – 47)	
Age category in years (n, %)		
< 40		20 (35.7)
≥ 40		36 (64.3)
Education [a] (n, %)		
Low-intermediate		37 (66.1)
High-intermediate		19 (33.9)
Ethnicity (n, %)		
Javanese		35 (62.5)
Non-Javanese		21 (37.5)
Working status (n, %)		
No		43 (76.8)
Yes		13 (23.2)
Marital status (n, %)		
No		6 (10.7)
Yes		50 (89.3)
Income >3,000 K (n, %)		
No		36 (64.3)
Yes		20 (35.7)
Disease (n, %)		
No		38 (67.9)
Yes		18 (32.1)

Abbreviation: Category of low education: Level of education not graduated Diploma 1/2/3 degree; High education: Minimal education level of graduated Diploma 1/2/3 degree.

Knowledge, attitude and balanced diet practices

There were 16 subjects (28.6%) and nine subjects (17.1%) who had low knowledge and attitude respectively, and 47 subjects (81.4%) had poor balanced diet practices.

On knowledge, the majority (>70%) of subjects did not correctly answer the question whether animal protein could be replaced by plant protein, and 12% of subjects answered "did not know." A similar result on answers followed the question on examples of animal and plant proteins. There were 75% of subjects who gave wrong answers and 8.9% of subjects answered "did not know." (**Table 2**). The percentage of subjects who had poor knowledge on hydration by choosing the wrong answer was quite high (42.5%) and 21.4% of subjects answered "did not know".

A negative attitude is shown by 42.9% of subjects that agreed on the statement of "sufficient exercise is once a week" (**Table 3**). The attitude of subjects in maintaining hydration was quite good namely 94.6% of subjects showed agreement on drinking 8 glasses or 2 liters of pure water daily. There were 42.9% of subjects whose attitude was that fried foods is much tastier than boiled foods.

There were 32.1% of subjects having negative attitude on regularity of food consumption. This was supported by subjects' practices where < 20% of subjects had food pattern of 3 x daily and regular breakfast meals (**Table 4**). Around 37.5% of subjects ate animal protein with every large meal 1-2 x per week. There were 42.9% of subjects eating fish 1-2 x weekly and 8.9% subjects who had not eaten fish in the last seven days.

Fruit consumption of subjects was also low as shown by the fact that only 14.3% ate fruits daily. Furthermore, veggie consumption was found in only 28.6% of subjects eating veggies daily. Consumption of 8 glasses daily of pure water was found only in 39.3% of subjects

Table 2. Balanced diet knowledge among women (n=56)

Question	Response options		
	True (%)	*False (%)*	*Not know (%)*
Breakfast can increase concentration	100	0	0
Regular food consumption is only required by patients with stomach ailments	17.9	82.1	0
Animal protein can be replaced by plant protein	71.4	16.1	12.5
Fish can be substituted by tempeh, tofu or legumes	75.0	16.1	8.9
Affordable fruits have low vitamin content	8.9	87.5	3.6
Veggies and fruits are sources of vitamins and minerals	100	0	0
Walking is much healthier than riding a cycle/car	100	0	0
Urine light yellowish in color is a sign of dehydration	42.9	35.7	21.4
Washing hands with soap before and after eating can prevent infectious disease	92.8	3.6	3.6
Frequent soft drink consumption is good for our body	3.6	92.8	3.6
Balanced diet is a guide for our daily food consumption and healthy eating lifestyle	92.9	1.8	5.3
Consume a variety of foods	82.2	8.9	8.9

while 10.7% consumed caloric drinks daily. The majority (73.2%) of subjects exercised less than 150 minutes per week.

Educational level was also related to subjects' occupation and income namely OR = 7.43 [95%CI: 1.88, 29.34], p=0.004 and OR = 4.28 [95%CI: 1.31, 13.93], p=0.016, respectively. **Table 5**. shows that working status, income, and disease history were fulfilling the requirements for multiple logistic regression analysis for knowledge with level of education. Meanwhile, age was fulfilling the requirements for multiple logistic regression analysis for balanced diet practices.

Our study found a significant relation between educational and knowledge levels (OR = 5.17 [95%CI: 1.04, 25.85], p=0.045), and the association was still significant after adjustment for covariates (adjusted OR = 5.35 [95%CI: 1.05, 27.25], p = 0.043). The higher knowledge more likely having good balanced diet attitude compared to subjects with low knowledge (OR = 1.31 [95%CI: 0.28, 6.02]); however, the relationship was statistically not significant (p=0.730). Furthermore, it was found that the group of subjects with good attitude more likely having good balanced diet practice compared to subjects with low attitude (OR = 2.16

Table 3. Balanced diet attitude among women (n=56)

Question	Response options	
	Agree & strongly agree (%)	*Disagree & strongly disagree (%)*
Breakfast makes it easier to study	94.6	5.4
Skipping meals may cause overweight/obesity	67.9	32.1
Eat protein foods 2-3 portions daily	87.5	12.5
Eating fish may cause worms	7.1	92.9
Healthy foods are expensive	0	100
Fruits and veggies are very important to maintain health	96.4	3.6
Exercise is sufficient once a week	42.9	57.1
Drink pure water at least eight glasses or two liters daily	94.6	5.4
Washing hands can prevent diarrhea	83.9	16.1
Limit sugar consumption to four tablespoons daily	76.8	23.2
Taste of fried food is better than boiled food	42.9	57.1
A balanced diet is required to ensure all nutrients are consumed by our body	94.6	5.4

Table 4. Balanced diet practices of women (n=56)

Question	Answer choice	
	Daily (%)	***Several times a week (%)***
I have breakfast every day	16.1	82.1
I eat meals 3 x daily	19.6	73.3
I eat meat, fish or eggs with every big meal	8.9	91.1
I eat fish at least once daily	5.4	85.7
I eat fruits daily	14.3	83.9
I eat veggies daily	28.6	69.6
I exercise at least 30 minutes daily	3.6	82.1
I drink pure water eight glasses daily	39.3	58.9
I wash my hands with soap before and after eating	57.1	41.1
	Never (%)	Several times a week (%)
I drink sweet tea, coffee and sweetened condensed milk	19.6	69.7
I eat fried foods > 2 x daily	12.5	82.1
The variety of food I eat is similar at lunch and dinner	14.3	80.3

[95%CI: 0.24, 19.38], p=0.491, and the relation was still not significant after adjustment for covariates

Table 5. The relation of subject characteristics, knowledge, attitude, and balanced diet practices (n = 56)

Variable	Knowledge		Attitude		Practice	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
Age category in years						
<40	1		1		1	
≥ 40	1.32 (0.38; 4.54)	0.660	1.13 (0.25; 5.12)	0.871	0.33 (0.06;1.73)	0.190
Level of education						
Low	1		1		1	
High	5.17 (1.04; 25.85)	0.045	1.71 (0.40; 7.28)	0.470	0.88 (0.22; 3.46)	0.849
Working status						
No	1		1		1	
Yes	0.16 (0.02; 1.32)	0.087	0.37 (0.04; 3.23)	0.364	1.46 (0.27; 7.78)	0.661
Income >3,000 K						
No	1		1		1	
Yes	5.17 (1.04; 25.85)	0.045	0.59 (0.14; 2.50)	0.470	1.14 (0.29; 4.52)	0.849
Disease						
No	1		1		1	
Yes	2.05 (0.61; 6.86)	0.244	1.07 (0.23; 4.86)	0.933	0.49 (0.13; 1.88)	0.297

Abbreviation : OR= odds ratio, CI = confidence interval. Category of low education: Level of education not graduated Diploma 1/2/3 degree; High education: Minimal education level of graduated Diploma 1/2/3 degree Statistical analysis with binominal logistic regresion; p<0,25 fullfill requirements for multiple logistic regression analysis

(adjusted OR = 2.27 [95%CI: 0.25, 20.84], p = 0.469.

DISCUSSION

Our study results showed that the subjects with low education level were five times more likely to have higher risk of poor knowledge compared to the high education group. A significant association between the level of education and nutrition knowledge in workers

aged at least 18 years was also shown by Tas A.[23] This association is more obvious when education is given intensively. [20] Level of education also was significantly related to subjects' occupation and income. The high education group was seven times more likely to have an occupation and four times more likely to have an income of ≥ 3,000 K monthly compared to the low education group ($p<0.05$).

In spite of the sufficiently high number of subjects who had good knowledge levels in this study (71.4%), this was not sufficient to cause them to have good attitudes and balanced diet practices. This may have been due to the fact that the acquired knowledge did not convince the subjects that balanced diet practices may reduce the risk of NCDs, such that they did not yet show such behavior. The other reason for the existence of the gap may have been the fact that it requires sufficient effort in terms of time and intentions to be able to follow a correct healthy lifestyle behavior by practicing a balanced diet, regular physical exercise, and maintaining an ideal body weight. [24] However, Weerasekara P.C. et al. and Yang Y. et al showed significant association between knowledge and attitude[14, 18] and Ervina F.E et al. showed association between attitude and balanced Nutrition Behavior.[25] The difference may have been due to the subject's age and the questionnaire.

If we analyze further each section of balanced diet, then the practices of limiting sugar and fat intakes as well as instituting food diversification had been practiced by the majority of subjects. These practices are also supported by good knowledge and positive attitudes and need to be maintained and/or reinforced considering that fast foods and/ or ultra-processed foods are easily available at the village level.[26] Fast foods are identified as foods of low nutritional value because of their high sugar and fat content,[27] as well as increasing levels of advanced glycation end products due to being ultra-processed foods that increase the risk of obesity and other non-communicable diseases. [3, 28]

The situation was different in the case of routine fruit and vegetable consumption as well as hand washing as part of a healthy lifestyle. Application of their good knowledge and positive attitudes was not visible in their daily practices. This is in line with data from the Ministry of Health in 2018 that showed that the majority (95.5%) of the Indonesian population aged > 5 years had lower fruit and vegetable consumption than the recommended five portions per day.[29]

The subjects still had poor knowledge on protein intake and hydration. The majority of subjects were of the opinion that animal protein could be replaced by plant protein. Negative attitude and poor practice on protein intake also was exhibited by the majority of subjects. It is known that animal protein has higher digestibility and bioavailability,[30] more complete essential amino acid content,[31] and higher content of micronutrients such as vitamin B12, vitamin D, omega-3 (n-3) fatty acids, iron, zinc, calcium, and iodine [32] compared to plant protein. Education on how to fulfill the daily recommended protein allowance and to practice prudent protein food choices is required in the current health literacy communication of key messages for better nutrition.

The intensive promotion of hydration in social media as well as electronic media to consume eight glasses of water daily has influenced the positive attitude of the subjects. However, knowledge on assessing hydration is still low as shown by the fact that 40% gave wrong answers and more than 20% did not know. Hydration can be assessed practically by the community through the observance of the color of urine, because it is known that there is a strong correlation of 0.40 – 0.93 between urine color and osmolarity. [33] Increasing knowledge on the practical assessment of hydration must be taught to improve subjects' health practices.

In the section on physical activity, knowledge was sufficiently good, but there was a high negative attitude on exercising. Forty percent of subjects stated that exercising once per week was sufficient to maintain health. This was shown by the fact that around 60% of subjects exercised less than the recommended 150 minutes per week. The prevalence of this group of subjects was higher than shown by data from the Ministry of Health of the Republic of Indonesia. The high to intermediate education probably was a factor of the low physical activity in this group of subjects as reported by several studies.[34, 35] Assessment of barriers also must be done to improve poor

attitude and practices in exercise and sports. More education should be given on how to incorporate daily home-based exercise practices for all family members especially during the on-going pandemic situation.

The limitation of our study was using a cross-sectional design that could not explain the cause - effect relationship. Another factor which was not evaluated in this study was like and dislike of foods, [16] perception on food quality, [14, 15] food availability and access to healthy foods or good-quality drinking water that could influence a person's practice in applying the correct diet. In order to improve the practice of this population, it may be necessary to conduct study using qualitative design or a linear programming to search for the obstacles in the practice of balanced diet. and positive attitudes in balanced nutrition practice.

However, in this study all the participants in the seminar fulfilling the study criteria became subjects of the study and only one was excluded due to filling out an incomplete form. The researchers had attempted to contact the subject, but the contact phone was inactive. The researchers attempted to minimize questionnaire interpretations by validating the questionnaire which was done by three persons having nutrition and three persons with non-nutrition educational backgrounds. Data collection was conducted by two enumerators with bachelor of nutrition degrees who had been trained on filling out the questionnaire before data collection. All these activities had the objective of validating data collection in the survey.

CONCLUSIONS

Even though that this study shows that the increase in knowledge and attitude were not demonstrated to improve balanced diet practices, our finding showed that the subjects with low education level were more likely to have a five times higher risk of poor knowledge. A program needs to designed to increase attitude and balanced diet practices, that be used to control the development of diabetes in this population.

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CONFLICT OF INTEREST

Competing interests: No relevant disclosures.

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