Associations of Knowledge, Attitude and Practices of Food Label on Cardiovascular Diseases (CVD) Risk amongst University Students in Selangor, Malaysia

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Summary Cardiovascular diseases (CVD) deaths were on the rise in developing countries. In Malaysia, the accelerating economic transition has been accompanied by high prevalence of CVD risk factors which accounts for 35% of total deaths in 2016. This increasing trend involving not only the elderly but also the young adults. Food label reading is reported to be the key to help individual adopt healthy food choice and dietary habits. Hence, the aim of this study is to determine the associations of knowledge, attitude and practices (KAP) of food label on CVD risk amongst university students. A cross sectional study was conducted on 389 university students aged 19 to 35 y old in Selangor. Information on socio-demographic profile, nutrition knowledge, attitude, and practice of food label were collected using self-administrated questionnaires. Anthropometric data of participants were measured using standardize methodology and blood pressure was measured using Omron blood pressure monitor. The data were tested using Chi-Square test. Average age of the respondents were 23 y. Majority of the respondents had no CVD risk (41%) while (59%) had increased CVD risks. There was a significant association between CVD risk factors (BMI, waist circumference, systolic blood pressure (SBP), and diastolic blood pressure (DBP) with knowledge and attitude of using food label \(p<0.05\). The practice of food label usage showed no significant association \(p>0.05\) with all CVD risk factors. Considering the importance of understanding and usage of food label in the management of chronic diseases, these findings provide useful information to incorporate nutrition education on food labelling in preventing CVD risks.

Key Words food label, nutrition knowledge, obesity, CVD, hypertension

Cardiovascular diseases (CVD) are the major cause of death worldwide with an approximate 17.9 million fatalities, which represents 31% deaths worldwide in 2016 as reported by World Health Organization (WHO) (1). Diet and lifestyle have changed rapidly over the years with CVD deaths on the rise especially in developing countries, due to rapid industrialisation, market globalisation, economic development and urbanisation. Malaysia, one of the world’s advancing countries with epidemiological and demographic changes (2, 3).

This rapid economic transformation in Malaysia, was supplemented with increased occurrence of risk factors for CVD, and is the main causation of death (3). CVD-related mortality affects not only the elderly but also the younger people (2). CVD development is linked to a number of predisposing factors. The advancement of a country brings about shifts in the food economy that in turn results in changing the population’s dietary patterns. For example, the sugar consumption, salt and fat from processed foods in high-income countries has stabilized, but it has increased in low and high-middle-income countries (4).

Food label refers to any brand, tag, pictorial, mark, or any explanatory material written, printed or attached on any food product (5). The use of the nutrition facts label has been associated with healthy eating behaviors for adults. A Malaysian study highlighted that nutrition label gives users the nutrition status of pre-packaged foods and is rather helpful in making healthier food choices for individuals (6).

The transition period from high school to university is challenging for many young adults. This period is typically classified for young adults by a transition from eating with their parents at home to one where they plan and prepare their own meals at their new accommodation (7). Adopting healthy dietary practices during this transitional period might affect consumption throughout adulthood, thus reducing the risk of chronic disease later in life (8). However, university students have often been reported to adopt unfavorable dietary habits including lower consumption of fruits, vegetables, whole grains and legumes, meats and fish; higher consumption of fast food, sugar and alcohol

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during their studies. According to previous studies, the frequency of use of nutrition information labels in young adults was much lower than in other adult groups which is one of the contributing factors to high prevalence of weight gained among young adults (9).

Malaysians, however, lack awareness on the usage of the nutrition label while buying food (5). Study found that people who constantly use nutrition labels consumed less sodium more regularly, resulting in a healthier intake of food (10). The impact of knowledge of nutrition and the nutrition label must be established in order to establish an impactful nutrition intervention program to alleviate the national level of morbidity of CVD. The nutritional equilibrium is therefore important for the prevention of disease and lowers the risk of major diseases, particularly type 2 diabetes mellitus and CVD. Knowledge of nutrition is multidimensional, including health literacy, nutrient source, calorie requirements and dietary recommendations (11). It helps users make healthier food choices and forms healthy dietary practices (12). The level of nutritional knowledge is indirectly linked to CVD incidence (13).

It is of concern that the age of CVD occurrence in Malaysia is fairly younger than the neighbouring countries and some western nations (3). There are currently no studies in Malaysia conducted to assess the affiliation between nutrition Knowledge, Attitude, and Practices (KAP) of the use and understanding of food labels and CVD risks. In addition, the intake of nutrients and the body mass index (BMI) are the determinants of the risks of NCDs. Therefore, this study seeks to assess association with nutritional knowledge, attitude, and practices (KAP) of food label use and understanding with CVD risk factors (BP, WC, and BMI) among university students.

MATERIALS AND METHODS

Participants. This cross-sectional study was conducted in two universities in Selangor involving a total of 389 university students. Participants’ recruitment were targeted on Malaysian students aged between 19 y old till 35 y old. The sample size calculation was based on prevalence-based formula (14).

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n = \left( \frac{Z^2 \cdot p(1-p)}{d^2} \right)
\]

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n = \left( \frac{1.96^2 \cdot 0.5(1-0.5)}{0.05^2} \right) \approx 324.23
\]

\[
n = 324
\]

Dropout rate (20%):

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\text{20/100} \times 324 = 64.8
\]

\[
n = 324 + 65 = 389
\]

n = 389 samples

Questionnaire. A validated questionnaire, Food Label Use Questionnaire (FLUQ) was used in this study to access the KAP of university students on food label usage and understanding (15). There was a total of four main sections.

Section A, consists of demographics data, including sex (male or female), anthropometry measurements such as height, weight, blood pressure readings, and waist circumference readings, and BMI categorization grouped participants as normal weight (BMI < 25), overweight (25 < BMI < 30) or obese (BMI > 30) and marital status, family income and level of education (16).

Section B contains eight multiple questions of food and nutrition to assess the level of nutrition knowledge. The scoring was based on 70 and it ranges from High (6.0–7.0), Medium (4.0–5.0) to Low (1.0–3.0).

Section C contains the question about attitude on food label uses among university students was asked by using the 4-part Likert-type response set included (4) most important, (3) important, (2) least important and (1) not important. It also encompasses two questions about the factors affecting the use of food labels during the decision to buy food. The participants can select more than one answer based “why refer the food label” and “why they do not refer to the food label” (15).

Section D encompassed the questions of food labeling practices, which was asked by using 4-part Likert response set included (4) frequently, (3) sometimes, (2) rarely and (1) never. Respondents answered question on the frequency of reading nutrition label, specifically on list of ingredients, serving size, health claim, as well as a list of calories and nutrients (15).

Assessment of other variables. BMI was calculated as weight/height² (kg/m²). An average systolic blood pressure (SBP) and diastolic blood pressure (DBP) were calculated from two measurements with the subjects in a sitting position. Waist circumference was measured using cross-hand technique with SECA 201 measuring tape.

Ethical consideration. This research was conducted with the approval of Management and Science University Ethics Committee (MSU-RMC-02/FR01/08/L1/066).

Statistical analysis. Data were analyzed using SPSS Software Version 23 (17). Descriptives analysis was carried out to assess distribution of nutrition knowledge, attitude and practice on the usage and understanding of food label among university students in Selangor and on selected CVD risk factors of university students in Selangor. Chi-Square test was applied to find the associations of KAP of food label and the risk of CVD. The significant level was set at \( p<0.05 \).

RESULTS

The socio-demographic of the subjects had been summarize and reported in Table 1. The majority of subject population were approximately young adults with the age range of 18–25 y old and the mean age of the subjects is approximately 23 y old. Among the subjects (n = 389) from this study, there were 192 (49.4%) male and 197 (50.6%) female subjects.

The overall nutrition knowledge, attitude, and practice of food label among university students. Generally, the subject population had low knowledge on food label, averagely (46.3%), followed by medium knowledge (29.0%), and high knowledge (24.7%) on food label.
Majority of the subject population recorded medium attitude (63.0%), followed by high attitude (33.4%), and low attitude (3.6%) of food label use. High practice was recorded among \( n = 11, 2.8\% \) of the subject population, 93.1% had medium practice, and \( n = 16, 4.1\% \) had low practice on food label are presented in Table 2.

The association between level of nutrition knowledge, attitude, and practice and CVD risk factors are presented in Table 3–5. Results showed low nutrition knowledge of food label usage among the overweight (69.4%) and obese (85.7%) category, \( p < 0.01, \chi^2 = 67.343\). Low knowledge level was also observed among the other CVD risk factors \( p < 0.01\). Attitude levels were also associated with CVD risk factors \( p < 0.05\) with most of the respondents achieving medium or satisfactory attitude towards food label usage. Practice levels on food label usage were not associated with CVD risk factors in this study, \( p > 0.05\).

### DISCUSSION

This study was undertaken to assess the relationship between KAP of nutrition label use and CVD risks among university students in Selangor. It was found that nutritional knowledge can be seen playing an important role in encouraging better eating practices, resulting in the maintenance of suitable body weight (18). Prior nutritional knowledge can increase food label use by the growing interest to seek more information about health. A study in the UK discovered that prior knowledge of nutrition was linked to self-reported use of the food label (8). A study done by Grunert and colleagues stated that consumers with higher nutrition knowledge are more likely to use nutrition labels when shopping for food (19).

Low nutritional knowledge may prevent the use of food labels by individuals as they may be unable to understand the educational benefits. A study conducted among university students in Selangor reported poor obesity knowledge and it was significantly associated with level of education but on other socioeconomic indicators (20). Then misunderstanding and misjudgment of quantitative information on food labels could have a negative effect on dietary choices and thus poorer health outcomes. Furthermore, based on the questions that were asked, most of the students read the food label because they want to control energy intake from food.

This highlights the reasons why food labels are used by the students as they want to control their energy intake and only the smallest number of subjects actually understand each food label information. Thus, it shows that knowledge of nutrition leads to the use of food label. A study found that knowledge of nutrition has a powerful effect on the general use of the label, including list of ingredients and food label, promotes these advocations (8).

Most of the respondents in this study reported ‘that they sometimes’ used food labels when making food purchase decisions. One possible explanation may be

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**Table 1. Demographic Data of the Study Population \( (n=389) \).**

| Demographic Characteristics | n (%) | Mean Standard Deviation |
|-----------------------------|-------|-------------------------|
| Age                         | 22.91 ± 3.57 |
| Gender                      |       |
| Male                        | 192 (49.4) |
| Female                      | 197 (50.6) |
| Year of Study               |       |
| 1st Year                    | 118 (30.3) |
| 2nd Year                    | 142 (36.5) |
| 3rd Year                    | 79 (20.3)  |
| 4th Year                    | 50 (12.9)  |
| Faculty                     |       |
| Health science              | 67 (17.2) |
| Law                         | 92 (23.7) |
| Business                    | 126 (32.4) |
| Engineering                 | 42 (10.8) |
| Others                      | 62 (15.9) |
| Races                       |       |
| Malay                       | 205 (52.7) |
| Chinese                     | 100 (25.7) |
| Indian                      | 67 (17.2) |
| Others                      | 17 (4.4)  |
| Level of Study              |       |
| Diploma                     | 67 (17.2) |
| Degree                      | 282 (72.5) |
| Postgraduate                | 40 (10.3) |
| Family Income               |       |
| <RM 1,500                   | 80 (20.6) |
| RM 1,500–RM 2,500           | 139 (35.7) |
| RM 2,500–RM 4,000           | 121 (31.1) |
| ≥RM 4,000                   | 49 (12.6)  |
| Marital Status              |       |
| Single                      | 374 (96.1) |
| Married                     | 15 (3.9)  |
| Height (cm)                 | 155.86 ± 5.24 |
| Weight (kg)                 | 55.26 ± 4.68 |

**Table 2. Nutrition Knowledge, Attitude and Practices on the Usage of Food Label among University Students in Selangor \( (n=389) \).**

| Characteristics             | n (%) |
|-----------------------------|-------|
| Knowledge of Food Label      |       |
| High                        | 96 (24.7) |
| Medium                      | 113 (29.0) |
| Low                         | 180 (46.3) |
| Attitude of Food Label       |       |
| High                        | 130 (33.4) |
| Medium                      | 245 (63.0) |
| Low                         | 14 (3.6)  |
| Practice of Food Label       |       |
| High                        | 11 (2.8)  |
| Medium                      | 362 (93.1) |
| Low                         | 16 (4.1)  |

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**Table 3. Characteristics of the Study Population.**

| Characteristics | n (%) |
|----------------|-------|
| Knowledge of Food Label |       |
| High | 96 (24.7) |
| Medium | 113 (29.0) |
| Low | 180 (46.3) |
| Attitude of Food Label |       |
| High | 130 (33.4) |
| Medium | 245 (63.0) |
| Low | 14 (3.6)  |
| Practice of Food Label |       |
| High | 11 (2.8)  |
| Medium | 362 (93.1) |
| Low | 16 (4.1)  |
that the subjects have constrained time to read food label during each purchase of food products and are most bothered about the assignment given and their education rather than spending time reading the nutritional information (9). In the advancement of technology for purchasing food products such as the use of food delivery apps, factors such as price, convenience, trustworthiness and variety of products were perceived to be more important in purchasing decision of the younger generations (21).

Table 3. Associations of Knowledge Levels and CVD Risks (n=389).

| Variables                        | Knowledge Levels |        |        |        |        |        |
|----------------------------------|------------------|--------|--------|--------|--------|--------|
|                                  | Low n (%)        | Medium n (%) | High n (%) | p-Value |                |       |
| BMI Category (kg/m^2)            |                  |        |        |        |        |        |
| Normal (%)                       | 72 (30.6)        | 78 (33.2) | 35 (36.2) | 0.01*   | 67.343 |        |
| Overweight (%)                   | 102 (69.4)       | 34 (23.1) | 11 (7.5)  |        |        |        |
| Obese (%)                        | 6 (85.7)         | 1 (14.3)  | 0 (0)     |        |        |        |
| Waist circumference              |                  |        |        |        |        |        |
| >80 cm (Risk female)             | 50 (71.4)        | 15 (21.4) | 5 (7.1)   | 0.01*   | 33.234 |        |
| <80 cm (No risk female)          | 40 (31.5)        | 38 (29.9) | 49 (38.6) |        |        |        |
| >90 cm (Risk male)               | 53 (67.9)        | 19 (24.4) | 6 (7.7)   | 0.01*   | 26.522 |        |
| <90 cm (No risk male)            | 37 (32.5)        | 41 (36.0) | 36 (31.6) |        |        |        |
| SBP (mmHg)                       |                  |        |        |        |        |        |
| Optimal                          | 8 (29.6)         | 12 (44.4) | 7 (25.9)  |        |        |        |
| Normal                           | 66 (37.9)        | 49 (28.2) | 59 (33.9) |        |        |        |
| High normal                      | 90 (54.5)        | 46 (27.9) | 29 (17.6) |        |        |        |
| At Risk (Hypertension)           | 16 (69.6)        | 6 (26.1)  | 1 (4.3)   |        |        |        |
| DBP (mmHg)                       |                  |        |        |        |        |        |
| Optimal                          | 9 (25)           | 14 (38.9) | 13 (36.1) |        |        |        |
| Normal                           | 67 (38.7)        | 54 (31.2) | 52 (30.1) |        |        |        |
| High normal                      | 72 (52.9)        | 37 (27.2) | 27 (19.9) |        |        |        |
| At Risk (Hypertension)           | 32 (72.7)        | 8 (18.2)  | 4 (9.1)   |        |        |        |

* p<0.05 shows significant association using Chi-Square Test.

Table 4. Associations of Attitude Levels and CVD Risks (n=389).

| Variables                        | Attitude |        |        |        |        |        |
|----------------------------------|----------|--------|--------|--------|--------|--------|
|                                  | Low Attitude n (%) | Medium Attitude n (%) | High Attitude n (%) | p-Value |                |       |
| BMI Category (kg/m^2)            |          |        |        |        |        |        |
| Normal (%)                       | 4 (1.7)  | 129 (54.9) | 102 (43.4) | 0.01*   | 31.899 |        |
| Overweight (%)                   | 9 (6.1)  | 110 (74.8) | 28 (19)  |        |        |        |
| Obese (%)                        | 1 (14.3) | 6 (85.7)  | 0 (0)    |        |        |        |
| Waist Circumference              |          |        |        |        |        |        |
| >80 cm (Risk Female)             | 3 (4.3)  | 58 (82.9)  | 9 (12.9)  | 0.01*   | 19.957 |        |
| <80 cm (No Risk Female)          | 3 (2.4)  | 68 (53.5)  | 56 (44.1) |        |        |        |
| >90 cm (Risk Male)               | 7 (9)    | 52 (66.7)  | 19 (24.4) | 0.004*  | 11.252 |        |
| <90 cm (No Risk Male)            | 1 (0.9)  | 67 (58.8)  | 46 (40.4) |        |        |        |
| SBP (mmHg)                       |          |        |        |        |        |        |
| Optimal                          | 1 (3.7)  | 13 (48.1)  | 13 (48.1) |        |        |        |
| Normal                           | 7 (4)    | 96 (55.2)  | 71 (40.8) |        |        |        |
| High Normal                      | 4 (2.4)  | 117 (70.9) | 44 (26.7) |        |        |        |
| At Risk (Hypertension)           | 2 (8.7)  | 19 (82.6)  | 2 (8.7)   |        |        |        |
| DBP (mmHg)                       |          |        |        |        |        |        |
| Optimal                          | 2 (5.6)  | 19 (52.8)  | 15 (41.7) |        |        |        |
| Normal                           | 5 (2.9)  | 101 (58.4) | 67 (38.7) |        |        |        |
| High Normal                      | 5 (3.7)  | 87 (64)    | 44 (32.4) |        |        |        |
| At Risk (Hypertension)           | 2 (4.5)  | 38 (86.4)  | 4 (9.1)   |        |        |        |

* p<0.05 shows significant association using Chi-Square Test.
From this study, female respondents were more likely to have high practice using food label than male. A local study highlighted a high awareness level on food label among urban shoppers, which was associated with gender and income level of the respondents (22). A study done by Ambak et al. that males were less likely to report reading food labels compared to females (23).

Healthy males generally ignored the importance of food label information to health, interpreted food label reading as time consuming, did not comprehend food label information and complained on small printed labels (24). One reasoning is that for the whole family, traditional gender roles could encourage women to be meticulous about food selection. In contrast, women were more likely than men to be unhappy with body image and more motivated to change body weight by changing their diet (25). The highest percentage can be seen in low knowledge of food label. This means that, majority of the subjects have low knowledge on food label use while for both attitude and practice of food label, the subjects had overall moderate attitude and practice towards the use of food label.

The results indicated that the subject population lacked sufficient nutritional knowledge on food label use but moderate attitude and practice to food label usage but is not consistent with another research done in Malaysia which targeted university students population where the study claimed that majority of the young adults have high knowledge on nutrition labelling (6) which could be due to self-reporting bias when answering the questions. Another study showed that knowledge impacted self-reported nutrition label use by influencing attitudes. From this study, long-term executive function with great knowledge of nutrition upholds both the frequency use of labels and the understanding of food labels. This finding suggested that knowledge is useful when finding nutrition difference, comparing between two products so that they can make a healthy and better choice (25). A study in Tehran, Iran suggested that increasing nutrition knowledge and understandable and legible food labelling can increase the likelihood of food label usage (26). While another study in Botswana highlighted that lack of nutritional knowledge, interest, and failure to believe nutritional information on food products as the possible reason of not using food labels (27). The attitude of a person shapes the use of food label with a variety of factors. Inadequacy in knowledge but positive attitudes toward food labels causes consumers to misuse or being misled by information on food labels when practicing reading food label (28). Thus, it can be seen in this study that, majority of the subjects recorded moderate attitude and practice but did not record a high practice.

The mean BMI of subject population was within the normal range. It was lower than results obtained from a Korean study (23.6 kg/m²) (29). From this study, 39.6% of the subjects reported to be overweight or obese, which is lower than findings from another Malaysian study (51.2%) (30). The incidence of obesity amongst university students could be due to fewer meals a day, frequent snack consumption, avoidance of eating fatty foods and cholesterol and being male was associated with high waist-height ratio, and frequent snack consumption (31). Malaysia was ranked as the sixth fattest country in Asia-Pacific region, and first in South East Asia (32). Abdominal obesity is a leading indicator of

### Table 5. Associations of Practice Levels and CVD Risks (n=389).

| Variables                              | Low Practice  | Medium Practice | High Practice | $p$-Value | $\chi^2$ |
|----------------------------------------|---------------|-----------------|---------------|-----------|----------|
| BMI Category (kg/m²)                   |               |                 |               |           |          |
| Normal (%)                             | 11 (4.7)      | 217 (92.3)      | 7 (3)         | 0.919     | 0.936    |
| Overweight (%)                         | 5 (3.4)       | 138 (93.9)      | 4 (2.7)       |           |          |
| Obese (%)                              | 0 (0)         | 7 (100)         | 0 (0)         |           |          |
| Waist Circumference (cm)               |               |                 |               |           |          |
| >80 cm (Risk Female)                   | 1 (1.4)       | 68 (97.1)       | 1 (1.4)       | 0.224     | 2.996    |
| <80 cm (No Risk Female)                | 7 (5.5)       | 115 (90.6)      | 5 (3.9)       |           |          |
| >90 cm (Risk Male)                     | 3 (3.8)       | 73 (93.6)       | 2 (2.6)       | 0.983     | 0.035    |
| <90 cm (No Risk Male)                  | 5 (4.4)       | 106 (93.0)      | 3 (2.6)       |           |          |
| SBP (mmHg)                             |               |                 |               |           |          |
| Optimal                                | 1 (3.7)       | 26 (96.3)       | 0 (0)         | 0.684     | 3.946    |
| Normal                                 | 6 (3.4)       | 161 (92.5)      | 7 (4.0)       |           |          |
| High Normal                            | 2 (8.7)       | 20 (87)         | 1 (4.3)       |           |          |
| At Risk (Hypertension)                 | 7 (4.2)       | 155 (93.9)      | 3 (1.8)       |           |          |
| DBP (mmHg)                             |               |                 |               |           |          |
| Optimal                                | 2 (5.6)       | 34 (94.4)       | 0 (0)         | 0.321     | 6.995    |
| Normal                                 | 7 (4)         | 159 (91.9)      | 7 (4.0)       |           |          |
| High Normal                            | 5 (3.7)       | 130 (95.6)      | 1 (0.7)       |           |          |
| At Risk (Hypertension)                 | 2 (4.5)       | 39 (88.6)       | 3 (6.8)       |           |          |
chronic conditions like CVDs (33). From the results obtained in this study, it can clearly be seen that more than half of the subjects when combined genders (76.1%), have found to fall under risk group and have central obesity. It has been shown that WC strongly predicts all-cause of mortality among young and middle-aged adults compared to older people (34). Although the percentage of obese was low as well as the average waist circumference of subjects was lower in the risk group for both females and males compared to the non-risk group, the occurrence of central obesity was relatively higher compared to the prevalence of obesity. More male subjects were having central obesity when compared to females (34, 35). This is in contrast with a Malaysian study that reported females were more prevalent to have central obesity as compared to males (36). Similar findings highlighted that women have a higher proportion of body fat than men with comparably more adipose tissue in hips and thighs that women generally have increased body fat than men of the same BMI (37).

The mean SBP of subject population was 129.89 mmHg, close to the normal reading (130 mmHg). High blood pressure is associated with hypertension and indicative of other CVDs (31). The prevalence of hypertension risk for SBP and DBP reading were lower than NHMS III (30.3%) when comparing with the same age range (38). The prevalence from this study is higher than a study conducted in Kuwait (7%), and in Malaysia (10%) but lower than that reported in Nigeria (19.3%) (39). The differences may be due to the difference in method as digital sphygmomanometer was used and a study has concluded that it is of low sensitivity and specificity (40).

Thus, taking into account of the CVD risk factors, it can be concluded that 41% of the subjects have no CVD risk while more than half of the subject population (59.4%) have CVD risk combined. The subjects who had at least one of the CVD risk were lower than the prevalence done by a study in Jordan (49%). The presence of risk factors were associated with increase in BMI, WC, and blood pressure (41). As shown in a Korean study, high risk of CVD was correlated with difficulties of mobility in both men and women as well as with troubles of self-care and normal daily activity (42). This is evident by the fact that increased body fat along with diminished muscles signifies reduced fitness status linked to higher CVD prevalence (43).

The study’s main finding is that a significant association was found between nutrition knowledge and all CVD risk factors (BMI, waist circumference, SBP, DBP). Hong et al supported the findings of this study that those with chronic disease reported less use and knowledge of nutrition labels compared to their healthy equivalents (44). Similar findings were found in a study in which nutrition education was conducted among subject populations, results showed that increasing nutritional knowledge essentially lower body weight, BMI and body fat percentage (45).

Individuals with a low level of nutritional knowledge still prefer high caloric foods or unhealthy eating behaviors without considering the use of food labelling. The contribution of snacks to the daily intake of energy among young adults has been increased from 20 to 23 percent. They showed a strong tendency towards packaged snacks, high in fat, salt, sugar and calories, leading to NCDs in adulthood (46). A study reported that when given food labels, subjects were able to select the healthier food options (47). Labels on packaged snacks serve as a reliable source of information related to nutrition in this regard. These labels provide basic visual guidelines that enable users to make healthier purchasing choices. This includes practices on the regularity of reading labels, attention given to the contents of a label and analysis of details on labels in order to make a healthy selection of food (48).

From this study, it showed that subjects with low knowledge on food label use have medium attitude and practice of food label which can be related to a study that reported despite, most students with good’ nutritional knowledge failed to implement food label use when making food/drink snacks decisions during purchasing (49).

There was a significant association between attitude of using food label and CVD risk factors but there is no significant association between practice of using food label and CVD risk factors. Expiry date was the factor that the subject reported to refer to as the ‘most important’. The practice of using food labeling was evaluated by asking students to grade a label’s content based on the attention they usually pay when buying a snack. List of ingredients was recorded to be the most frequent component being referred to when using food label.

From this study, subjects with normal BMI reported to have high attitude towards food label use while those with central obesity has a moderate attitude. Those with hypertension risk has a lower percentage on the practice of food label use as compared to participants who has normal blood pressure. A similar study has concluded that, participants with high practice scores had substantially lower BMIs and WCs, which clearly show that better knowledge and practices are linked to better anthropometric and biochemical variables which would reduce the likelihood of CVD (43). Although, the subject population have low knowledge on food label but they have moderate attitude and practice towards using food label. Nutrition knowledge may provide more or less support for the use of food labels depending on whether the use of food labels is defined in terms of how often the label is used as opposed to how well the food label information is understood and used for decision making. Not only that, the use of food labels could be a moderator of the link between knowledge of nutrition and dietary behaviors (50). Knowledgeable consumers were more likely than those with lower levels of knowledge to understand nutrition labels. Nutrition knowledge promotes healthy food choices through information processing associated with food label (8). Lack of understanding on the food label could lead to wrong interpretation of food label information, resulting in poorer food choices. Studies showed that use of nutri-
tion labels was associated with lower intake nutrient such as fat (51). In addition, a study evaluating the use of nutrition label and metabolic syndromes among Koreans identified that obesity, central obesity and high SBP were closely linked to low usage of nutrition label (p<0.05) which matches with the findings from this study (29). In other words, with increased use of the nutrition label, the rate of obesity could be lowered.

As a conclusion, it was found that low knowledge, but medium attitude and practice of food label usage was shown among university students in Selangor. The overall CVD risk factors which include BMI, WC, SBP, and DBP were high amongst university students. The overall knowledge and attitude from this study were found to be related to incidence of CVD. This can be seen that with good knowledge, subjects showed a lower CVD risk. In order to increase the use of food labels, government should enforce regulations and keep improving on the layout of food labels based on public feedback. It is recommended that a simpler form of the food label with traffic light system could be accessible to consumers. Nevertheless, it is necessary to arrange public health programs with the objective of encouraging the significance of reading food labels and passing on the accurate way to refer to food labels, for better understanding.

Disclosure of state of COI

No conflicts of interest to be declared.

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