

# KNOWLEDGE, ATTITUDE AND PRACTICE (KAP) REGARDING FOLATE INTAKE AMONG FEMALE STUDENTS IN INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA (IIUM) KUANTAN

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## ABSTRACT

**Background:** Knowledge regarding folate intake plays important role in public health especially for women in the reproductive age, since lacking of folate intake may cause neural tube defects in baby during pregnancy. However, the level of knowledge regarding folate of women in the reproductive age in many parts of the world are of concern. The aim of this study was to examine the knowledge, attitude and practice of folate intake among female undergraduate students in International Islamic University Malaysia (IIUM) Kuantan campus. Besides that, this study also aims to assess the relationship between the KAP regarding folate among female IIUM Kuantan undergraduate students.

**Materials and Methods:** This was a cross-sectional study whereby 111 female undergraduate students had completed an online survey questionnaire using Google Docs. The questionnaire consists of 71 questions which were divided into four parts (social-demographic characteristic, knowledge and attitude regarding folate and practice of folate intake). The data was analysed by descriptive frequency and Pearson correlation test to find the association between KAP of folate among female IIUM Kuantan undergraduate students.

**Result:** Overall, 91% of the respondents ever heard about folate. All respondents have a very good attitude regarding folate however only 8% were assessed with good practice of folate intake. Significant correlation was observed between knowledge and attitude regarding folate but not for other factors.

**Conclusion:** This study indicates that the respondents have a good knowledge and attitude towards folate intake, but not portrayed in their daily practice. This could be due to their marital status where all of them are single, still in study period and yet to pregnant, thus folate intake is not necessary at the current time.

**Keywords:** Folate intake, reproductive age, neural tube defects, Knowledge, Attitude and Practice (KAP), undergraduate female students

## 1.0 Introduction

Folate is one of the eight water-soluble vitamins B and can be easily obtained from food including green leafy vegetables, liver, wheat, broccoli, some fruits, fortified cereals and collards (Allen, 2008). Folate or folic acid (vitamin B9) is an essential nutrient that function as coenzymes which facilitate single-carbon transfer in the metabolism of nucleic acid, amino acids and also vitamin synthesis (Gao et al., 2016). It aids the production of genetic materials including DNA and RNA, particularly when cells and tissue are growing rapidly such as in infant, adolescent and during pregnancy (Hisam et al., 2014). In addition, it is essential for the formation of red and white blood cells in the bone marrow (Scott, 1999). Other than that, the role of folate in normal cell division makes it particularly important in embryogenesis. This is because periconceptual folate supplementation can reduce the risk of severe health defects such as cleft palate and neural tube defects (Kondo et al., 2009).

The function of folate and folic acid in prevent diseases such as neural tube defects, megaloblastic anemia and cardiovascular disease has been widely discussed in previous studies (Kondo et al., 2009). Due to its importance to human body, World Health Organization (WHO) (2009) have made a recommendation on folate intake. In 1992, the US Public Health Service has recommended all women of childbearing age (from age 13 to 45 years old) to consume 0.4 mg of folic acid each day (Chivu et al., 2007).

Despite the recommendation and mandatory fortification, the knowledge of folic acid intake is still low in some countries (Keshavarzi et al., 2016; Hisam et al., 2014). According to Lane et al., (2015), although the recommendation of folic acid intake was comprehensively publicized in United States, only 83.3% of women age 18 to 24 years old from 1,921 participants reported that they are taking vitamin supplement and only 47.6% of them take the vitamin which supplemented with folic acid. Pre-conceptual study conducted among Malaysian women showed that 88.3% of 400 Malaysian women had heard about folic acid before, but only 8% have a good knowledge on folic acid (Keshavarzi et al., 2016). Either the pregnancies are planned or unplanned, good knowledge on folate or folic acid intake is crucial to prevent disease related to folate or folic acid deficiency (Noraihan et al., 2005). The awareness data on this particular field are reported in many countries such as in Iran, Germany, United States of America and China (Bayrami et al., 2013; Klusmann et al., 2005; Lane et al., 2015; Li et al., 2011), but still lacking in Malaysia (Keshavarzi et al., 2016). Albeit an average number of spina bifida (0.43 in 1000 individuals in Hospital Kuala Lumpur) have been reported, the importance of spreading the information regarding folate intake especially among young mothers aged 20 to 30 years old should not be neglected (Ismail et al., 2009).

The nutrition status of a woman plays a key role in her health and is likely to have huge impact to the born child. Lack of knowledge related to nutrition in women can lead to low productivity and increase risk of poor maternal health outcome. This poor maternal health outcome can increase the nation's health burden. Nutrition-related programs have been developed by university which aimed to produce students who have more knowledge on nutrition. However, very less studies have been conducted to assess knowledge of these students on micronutrients such as folate. Thus, this study attempted to figure out the knowledge of folate intake and possible factors related to level of knowledge in female undergraduate students in IIUM Kuantan campus.

## 2.0 Materials and Methods

### 2.1 Sample selection

This cross sectional study was conducted in International Islamic University Malaysia (IIUM), Kuantan Campus. The subject for this study are female undergraduate from five different faculties (or known as Kulliyah in IIUM) which are Kulliyah of Allied Health Sciences (KAHS), Kulliyah of Medicine (KOM), Kulliyah of Nursing (KON), Kulliyah of Pharmacy (KOP) and Kulliyah of Dentistry (KOD). Data were collected via distribution of adopted questionnaire to the respondents (Bayrami et al, 2013; Keshavarzi et al., 2016).

### 2.2 Sampling strategy and data collection

The convenience sampling method was used to select the respondents from all Kulliyah. The questionnaire was prepared through Google Docs (Form) platform and distributed through social media channel which is WhatsApp application. The questionnaire were distributed through linked of contacts and friend-to-friend. The questionnaire consist of 71 questions which were divided into four sections arranged as Section One, Section Two, Section Three and Section Four. Section One is regarding sociodemographic data, Section Two concentrates on knowledge of the respondents regarding folate and folate intake. This part includes 35 questions with yes, no, or don't know options for each questions. For Section Three, the questions are on attitude of folate intake where the answers either 'strongly agree' to 'strongly disagree' options. Then, Section Four is regarding practice of folate intake and the respond option was 'never' to 'consistently'. The questionnaire was in English language since the main language for teaching and learning in the IIUM is in English language. The questionnaires were adopted and derived from previous studies (Keshavarzi et al, 2016; Bayrami et al, 2013).

### 2.3 Scoring

Table 1 Scoring analysis of knowledge, attitude and practice regarding folate

Section	Score	
Knowledge	Correct answer =1	Incorrect answer = 0 Don't know = 0
Attitude	<u>Positive statement</u> Strongly Disagree =1 Disagree = 2 Neutral = 3 Agree = 4 Strongly agree = 5	<u>Negative statement</u> Strongly Agree =1 Agree = 2 Neutral = 3 Disagree = 4 Strongly disagree = 5
Practice	<u>Positive statement</u> 1= Never 2 = Rarely 3 = Regularly 4 = Consistently	

The socio-demographic data were presented in the frequencies and percentages, while for other questions, the answer were marked with scoring system. The scoring analysis of KAP regarding folate is summarized in Table 1.

## 2.4 Statistical Analysis

The data collected was analysed using Statistical Package Software for Social Science (SPSS) version 12.0.1. The score of knowledge, attitude and practice were tabulated in the descriptive table, while the association between knowledge, attitude and practice of folate intake were analysed through *Pearson* correlation test. The statistical significant value was set at  $p \leq 0.05$ .

## 3.0 Result

### 3.1 Socio-demographic characteristics of the respondents

The total number of respondents involved in this study is 111 students, where 59 (53.2%) are from KAHS, 16 (14.4%) KOP, 14 (12.6%) KOM and 11(9.9%) each from KON and KOD. The mean age of the respondents is 22.44 years range from 20 to 25 years and all respondents are not married (single).

### 3.2 Knowledge, attitude and practice regarding folate

Table 2 Sources of information regarding folate among respondents

Items	Number (n = 111 )	Percentage (%)
In lecture	89	80.2
Internet	61	55.0
Book	46	41.4
Journal	27	24.3
Doctors	22	19.8
Family	20	18.0
Newspaper	19	17.1
Radio/Television	14	12.6
Magazine	16	14.4
Posters	5	4.5
Others	4	3.6

There are 101 (91%) respondents who had heard about folate and remaining 10 (9.0%) respondents never heard about folate. Majority of the respondents obtained information about folate from lecture which is 89 (80.2%) respondents and internet sources with 61 (55.0%). The other sources of the information are book (41.4%), journals (24.3%), doctors (19.8%), family (12.6%), newspaper (17.1%), radio/television (12.6%), posters (4.5%) and others (3.6%) (Table 2).

Table 3 Respondent's scores of knowledge on folate (n = 111)

Result (score)	No of respondents (%)
0-7	9 (8.1 %)
8-14	29 (26.1 %)
15-21	55 (49.6 %)
22-28	18 (16.2 %)
29-35*	0 (0.0 %)

\*maximum score = 35

Table 4 Knowledge regarding folate among 111 female IIUM Kuantan undergraduate students

Statement	Yes No. (%)	No No. (%)	Don't know No. (%)
<b>This health problems are associated with not having enough folate in the diet.</b>			
a) Arthritis	14 (12.6)	<b>60 (54.1)</b>	37 (33.3)
b) Neural tube defects (e.g. spina bifida and anencephaly)	<b>85 (76.6)</b>	8 (7.2)	18 (16.2)
c) Malformation in pregnancy (cleft palate)	<b>83 (74.8)</b>	11 (9.9)	17 (15.3)
d) Megaloblastic anemia	<b>77 (69.4)</b>	14 (12.6)	20 (18.0)
e) Mental retardation	<b>39 (35.1)</b>	32 (28.8)	40 (36.1)
f) Goiter			
<b>This certain food have folic acid added in them.</b>			
a) Orange juice	<b>41 (37.0)</b>	23 (20.7)	47 (42.3)
b) Breakfast cereals	<b>61 (55.0)</b>	13 (11.7)	37 (33.3)
c) Milk	60 (54.1)	<b>20 (18.0)</b>	31 (27.9)
d) Biscuits	22 (19.8)	<b>43 (38.7)</b>	46 (41.5)
e) Bread	<b>40 (36.1)</b>	28 (25.2)	43 (38.7)
f) Multivitamin	<b>90 (81.1)</b>	2 (1.8)	19 (17.1)
<b>This food is a good source of folate</b>			
a) Fruits	66 (59.5)	<b>14(12.6)</b>	31 (27.9)
b) Green vegetables	<b>85 (76.6)</b>	2 (1.8)	24 (21.6)
c) Fish/seafood	43 (38.7)	<b>31 (28.0)</b>	37 (33.3)
d) Liver	<b>49 (44.2)</b>	25 (22.5)	37 (33.3)
e) Breakfast cereal	<b>48 (43.3)</b>	24 (21.6)	39 (35.1)
f) Meat	<b>54 (48.7)</b>	23 (20.7)	34 (30.6)
<b>Recommended time for women who plan to get pregnant to start taking folic acid or adequate folate intake</b>			
a) a month before conception	<b>56 (50.5)</b>	7 (6.3)	48 (43.2)
b) two months before conception	<b>42 (37.8)</b>	12 (10.8)	57 (51.4)
c) three months before conception	<b>54 (48.7)</b>	8 (7.2)	49 (44.1)
d) anytime	45 (40.5)	<b>25 (22.5)</b>	41 (37)
<b>The recommended amount of folate intake recommended by RNI Malaysia (2005) for;</b>			

a) Children age 7 to 9 years old is 300 µg	<b>15 (13.5)</b>	6 (5.4)	90 (81.1)
b) Men age 19 to 65 years old is 400 µg	<b>18 (16.2)</b>	8 (7.2)	85 (76.6)
c) Pregnant mothers is 600 µg	<b>44 (39.6)</b>	7 (6.3)	60 (54.1)
d) Women age 19 to 65 years old is 400µg	<b>29 (26.1)</b>	3 (2.7)	79 (71.2)
<b>Function of folate in human body are:</b>			
a) Synthesis of nucleic acid	<b>61 (55.0)</b>	8 (7.2)	42 (37.8)
b) Formation of red blood cell	<b>72 (64.9)</b>	12 (10.8)	27 (24.3)
c) Synthesis of new cells	<b>60 (54.1)</b>	15 (13.5)	36 (32.4)
d) Synthesis of amino acid and protein	<b>57 (51.4)</b>	8 (7.2)	46 (41.4)
<b>Folate in food can lose through</b>			
a) Oxidation	<b>50 (45.1)</b>	8 (7.2)	53 (47.7)
b) Food storing	<b>28 (25.2)</b>	25 (22.5)	58 (52.3)
c) Cooking	<b>58 (52.3)</b>	6 (5.4)	47 (42.3)
d) Food preparation	<b>58 (52.3)</b>	13 (11.7)	40 (36.0)
e) Heat	<b>70 (63.1)</b>	2 (1.8)	39 (35.1)

\*correct answers are in bold

The questions regarding knowledge on folate and folate intake showed almost half (49.6%) of respondent obtained average score (15-21) out of maximum 35 marks (Table 3). From Table 4, only three questions correctly answered by more than 70% of respondents on regards of disease related to folate-deficiency (neural tube defects and cleft palate) and good source of folate in food (green vegetables). Consistently, more than 50% of respondent correctly answer all questions regarding function of folate in human body. The least correct answers were observed for questions regarding “*The recommended amount of folate intake recommended by RNI Malaysia (2005)*” where majority of them chose “*Don't know*” option.

Table 5 Attitude regarding folate intake among 111 female undergraduate students

Statement	<b>Strongly Disagree</b> No. (%)	<b>Disagree</b> No. (%)	<b>Neutral</b> No. (%)	<b>Agree</b> No. (%)	<b>Strongly Agree</b> No. (%)
Folate intake is important to one's health.	0 (0.0)	0 (0.0)	5 (4.5)	38 (34.2)	<b>68 (61.3)</b>
Everyone is at risk of folate deficiency.	1 (0.9)	25 (22.5)	30 (27.0)	40 (36.0)	<b>15 (13.5)</b>
Folate deficiency is a public health problem.	2 (1.8)	21 (18.9)	46 (41.4)	30 (27.0)	<b>12 (10.8)</b>
Limited knowledge of folate can be harmful to one's health.	1 (0.9)	1 (0.9)	24 (21.6)	55 (49.5)	<b>30 (27.0)</b>
Healthcare provider need to have knowledge of folate for human health.	0 (0.0)	0 (0.0)	7 (6.3)	39 (35.1)	<b>65 (58.6)</b>
Education of community can increase folate intake among the society	1 (0.9)	0 (0.0)	15 (13.5)	45(40.5)	<b>50 (45.0)</b>



Education of folate intake is a waste of time.	<b>69 (62.2)</b>	33 (29.7)	9 (8.1)	0 (0.0)	0 (0.0)
The knowledge of folate is beneficial to all age group	1 (0.9)	3 (2.7)	10 (9.0)	39 (35.1)	<b>58 (52.3)</b>
It is okay not to have enough folate in daily diet	<b>37 (33.3)</b>	36 (32.4)	21 (18.9)	14 (12.6)	3 (2.7)

\*Expected attitude are in bold

The attitude regarding folate intake were assessed through Likert-scale based answer with 'strongly disagree' to 'strongly agree' options. Based on Table 5, majority of the respondents showed the expected answers (either agree or strongly agree for positive statements or disagree or strongly disagree for negative statement).

Table 6 Practice toward folate intake among female undergraduate students

Statement	Never No. (%)	Rarely No. (%)	Regularly No. ( (%)	Consistently No. (%)
<b>I do the follows to obtain recommended folate amount for human body:</b>				
a) I read the nutrition facts at the food product	5 (4.5)	45 (40.5)	51 (45.9)	<b>10 (9.0)</b>
b) I eat food which contain folate	7 (6.3)	54 (48.6)	45 (40.5)	<b>5 (4.5)</b>
c) I eat folic acid supplements	80 (72.1)	26 (23.4)	2 (1.8)	<b>3 (2.7)</b>
d) I eat a variety of vegetables everyday	6 (5.4)	34 (30.6)	38 (34.2)	<b>33 (29.7)</b>
<b>I do the following method to increase the knowledge of folate intake:</b>				
a) Advise other regarding folate	42 (37.8)	51 (45.9)	18 (16.2)	<b>0 (0.0)</b>
b) Have a discussion with people that have wider knowledge about nutrition	18 (16.2)	46 (41.4)	41 (37.0)	<b>6 (5.4)</b>
c) Read or study about the micronutrient that human need	20 (18.0)	38 (34.2)	42 (37.8)	<b>11 (10.0)</b>
d) Obtain information about folate from certified websites	20 (18.0)	48 (43.2)	35 (31.5)	<b>8 (7.2)</b>
<b>I do the following method to practice folate intake in daily life:</b>				
a) I eat vegetable at least once in a day	8 (7.2)	24 (21.6)	41 (37.0)	<b>38 (34.2)</b>
b) I eat whole grains once in a day	7 (6.3)	69 (62.2)	27 (24.3)	<b>8 (7.2)</b>
c) I eat fruits at least once in a day	8 (7.2)	64 (57.7)	30 (27.0)	<b>9 (8.1)</b>
d) I take multivitamin once in a day	50 (45.0)	52 (46.8)	4 (3.6)	<b>5 (4.5)</b>

\*Good practice are in bold

The practice towards folate intake was also assessed with Likert-scale based answers with 'never', 'rarely', 'regularly' and 'consistently' options. From the Table 6, it showed that most of respondent rarely practice activities that relate to folate intake. It also was observed 72.1% of respondent never take folic acid supplement in order to obtain the recommended folate amount for human body. The most frequent practice by the respondent on regards to folate intake is taking vegetables on daily diet.

### 3.3 The relationship between knowledge, attitude and practice regarding folate

Table 7 The relationship between knowledge, attitude and practice regarding folate intake (n=111)

Item	<i>r</i>	<i>p</i> -value
<b>Knowledge –Attitude</b>	0.259	<b>0.006*</b>
<b>Attitude - Practice</b>	0.060	0.535
<b>Practice-Knowledge</b>	0.115	0.228

\*significant at  $p \leq 0.05$

Table 7 describes the strength and direction of the relationship among knowledge, attitude and practice regarding folate. Pearson correlation test was used to evaluate the possible association between knowledge-attitude, knowledge-practice, and attitude-practice score among the respondents. As shown in Table 7, there is a significant correlation between knowledge and attitude regarding folate intake ( $p = 0.006$ ). The *r*-value is 0.259, which indicated a little positive correlation whereby when knowledge score is higher, the attitude score is higher. Then, no significant correlation were found between knowledge and practice and attitude and practice, the *p*-value is 0.228 and 0.535, respectively.

## 4.0 Discussion

Malaysia is currently observing a neural tube defect (NTD) prevalence of 10 per 10000 births annually (Keshavarzi et al., 2016), while report by Ismail et al., (2009) years before showed NTD cases 1: 2326 per livebirths. The survey data of the latter showed that majority of the respondents (91%) had heard about folate. This percentage is higher than finding by Keshavarzi et al., (2016) who found that, 88.3 % of the respondents in Department of Obstetrics and Gynecology of Hospital Kuala Lumpur have heard about folate. In comparison to other region, both of these percentages are higher than the finding of a study in tertiary hospital in Pakistan. Rehan et al., (2015) found that only 42.2% of their respondents who are patients and attendants in Out Patient Department of Mother and Child Health Centre, Pakistan ever heard about folate.

There are multiple factors that influence the knowledge regarding folate intake such as educational background, age of the women and socio economic status. In this recent study, the main factor that influence the knowledge regarding folate is the source of information. This study found that main source of information was obtained from the lecture. This could be expected since nutritional knowledge is part of the lecture of certain subject learnt by the respondents. This result is inconsistent with previous studies which found the main contributors for folate knowledge was from gynecologists/ physician or midwives (Keshavarzi et al., 2016;



Rehan et al., 2015; Hisam et al., 2014). This might be due to the setting of the investigation area where our study focused on university students while other studies involve hospital-based settings. This present study also found that internet (55.0%) is one of the sources of information. This result is similar with previous study done by Kondo et al., (2005) which showed that health-care provider obtained knowledge by mass media (51%) and medical journal/ seminars (45%). The result is also supported by March of Dimes Foundation (2008) survey where an increasing patterns for internet as source of information about folic acid was observed from 1995 to 2008. The possible reason for this observation is nowadays young people are highly attached to the internet and technology. Internet use among the young people is the highest compared to older generation. This is because information from the internet is easily assessed, through various platform or gadget either for entertainment, seeking information or for social networking.

This study also depicted that knowledge of folate among female IIUM Kuantan undergraduate students was at moderate level. Moderate knowledge of folate also has been observed among healthcare providers in Khov, Iran where respondents from Bachelor of Science in family health showed a good knowledge regarding pre-conception care (Bayrami et al., 2013). In details, 76.6% of our respondents have the knowledge on association of neural tube defects and folate deficiency. This knowledge may obtained in the class as part of course syllabus for health-science students. The awareness on importance of folic acid intake to prevent serious birth defects cases should be treated seriously, since there are strong evidence of neural tube defects (NTD) decreased with the increase intake of folic acid before and during pregnancy (Vergel et al., 1990; Shaw et al., 1995).

On the other matter, the respondents showed a moderate knowledge on source of folic acid added in the daily foods. For example only 37% of the respondents know that orange juice is added with folic acid. This result of this study is consistent with previous study conducted by Rodrigues & Dipietro, (2012) who also reported that only 49 (40.2%) pharmacist correctly answered that orange juice is a source of folic acid. Based on these finding, there could be possible reason why the knowledge regarding the food source of folate is low. Firstly, the food source of folate is not highly emphasis either in lecture or mass media, where the example of food is not specifically stated. Secondly, reading the nutrition labelling might not properly practice by the community. Thus, they may miss the information of the added nutrition in their meals.

Apart from that, this study shows that majority of the respondents have positive attitude towards folate. More than half of the respondents strongly disagree that education of folate is a waste of time. This may be because majority of the respondents have high education background hence the education will make them more aware of their health and health related diseases. Half of the respondents also strongly agree on the importance of folate intake for people health. Furthermore, half of them also agreed that healthcare provider needs to have knowledge of folate for human health. The undergraduate students of in health sciences learn about nutrition and how nutrition affect their body. They are also aware of non-communicable health disease that can harm their lives, and they also learn about bad eating habit, smoking and lack of physical activity can lead to obesity, risk for cardiovascular disease and risk of hypertension. Therefore, the undergraduate students are prone to have positive attitude toward folate. This is supported by a significant correlation between knowledge and attitude regarding folate among the respondents. It can be concluded from this findings that, respondents with good knowledge

regarding folate have high level of attitude towards folate intake. The previous and similar findings is in the study done by Bayrami et al., (2013) where respondents with shorter work experience which is fresh university graduate had more positive attitude, better practice and more knowledge of pre-conception care compared to midwives, family healthcare team and physician with bachelor degree. Keshavarzi et al., (2016) recorded that respondent with higher educational level were more likely to carry a positive attitude towards periconceptual folic use.

However, even though the respondent have a good attitudes towards folate intake, it is not portrayed in their daily practice. Not more than half of the students regularly eat vegetables at least once in a day. Besides that, only 10 out of 111 respondents read the nutrition facts of food products. Our finding also demonstrate a poor communication or sharing knowledge about folate even they have good knowledge about nutrition. This finding is similar with previous study by Bayrami et al., (2013) where although most of the family health staff and midwives have knowledge on folic acid, they rarely spoken to their patient about the folic acid intake. Rodrigues & Dipietro (2012) also found that 18% of their respondents were occasionally or never speak to their female patients of childbearing age about folic acid and multivitamin. Statistically, no significant correlation between attitude and practice as well as between knowledge and practice towards folate intake was observed in this study. This result is consistent with the study conducted in Irish women population (Byrne & Byrne, 2006), but contrast to study done by Lane et al.,(2015) which showed a significant association between knowledge, age and folic acid consumption. One of possible reason for the lack of folate intake practice among our respondents could be due to lack of knowledge regarding source of food that contain the folic acids, as well as inappropriate information on the recommended amount of folic acids to be taken daily. In addition, all of the respondents are single and still in study period, thus they might yet to practice the folic acid intake which commonly emphasized on its relatedness towards good pregnancy.

## 5.0 Conclusion and recommendation

The study on KAP regarding folate among female IIUM Kuantan undergraduate students revealed that majority of the respondents have heard about folate. Lecture is the major source of information about folate among the respondents. Moreover, this study revealed that majority of the female undergraduate students had a moderate knowledge on folate. Apart from that, this study indicated that the level of attitude of folate is high. However, the level of knowledge and practice of folate intake was moderate. Lastly, there was a significant correlation between knowledge and attitude regarding folate. This findings of this study depicted that higher knowledge on folate leads to higher attitude toward folate intake. However, there is no relation between knowledge and practice and attitude and practice, which could be due to the status of the respondent who not married yet, thus not having pregnancy or to have the pregnancy in the recent time.

In the future, it is recommended to wider the targeted respondent, such as to include postgraduate students, staffs and lectures of IIUM Kuantan. Thus, it would yield more interesting results based on their knowledge, attitude and practice with different age and background.

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## Declaration

Author(s) declare that no conflict of interest exist in the study.

## Authors contribution

Author 1: Contribute in study design, data collection and analysing. The author also involved in manuscript writing,

Author 2: Contribute in study design, data analysing and manuscript writing.

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