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Graphical Plot and Correlation Analysis for Establishing an Acceptance of Future Intention of Exclusive Breastfeeding among Medical and Dental Students: A Study from Hospital Universiti Sains Malaysia

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Key Words:

Exclusive breastfeeding, 3-D plot, contour plot, and correlation analysis

Abstract:

The objective of this research was to identify and analyse the correlation between various factors that could impact the likelihood of medical and dental students at Hospital Universiti Sains Malaysia (Hospital USM), Kelantan, Malaysia to intend to exclusively breastfeed in the future. The questionnaire was designed and validated. The validated questionnaire was distributed among medical dan dental students. The study involved 162 participants, comprising 25 (15.4%) students from the dental program and 137 (84.6%) from the medical program. There are 56 (34.6%) male and 106 (65.4%) female involved in this study. At first, the collected data were analysed using MINITAB software through the contour plot and surface plot. Second, the data were analysed using the Spearman correlation. The result from correlation analysis shows that, most of the studied factors related to general knowledge rather than other studied factors. The discovery indicates that one approach to promoting the acceptance of exclusive breastfeeding among medical and dental students is by improving their general knowledge about the topic. The correlation analysis, 3-D plot, and contour plot demonstrate that factors such as gender, marital status, and specific and general knowledge are associated with the intention to exclusively breastfeed in the future. This finding is very important especially for awareness education, and establishing the future exclusive breastfeeding practiced among future parents.

1. Introduction

Breastfeeding is highly recommended for infants as it provides them with the perfect balance of nutrients required during their first year of life [2]. Numerous health organizations advocate exclusive breastfeeding for the first 6 months of life, followed by the introduction of supplementary foods along with ongoing breastfeeding until the age of 2 years or beyond, due to the substantial evidence linking breastfeeding to favourable health outcomes for both mothers and infants [1,7]. Although breastfeeding awareness campaigns are widely used to promote exclusive breastfeeding, only 43% of infants under 6 months exclusively breastfeed worldwide [6]. According to the National Health and Morbidity Survey conducted in Malaysia in 2016, the percentage of infants under six months old who were exclusively breastfed was 47.1%, marking an increase from 14.5% in 2006 [9,4]. Several studies have investigated the views and understanding of university students towards exclusive breastfeeding. In a study conducted among 1106 female university students in Kuwait, it was found that while most participants recognized the advantages of breastfeeding, only a small number were familiar with the recommendation for exclusive breastfeeding

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during the first six months of an infant's life. The students held mistaken beliefs, such as thinking that mothers should temporarily stop breastfeeding if they had a fever, skin rash, or sore throat and that mothers should also discontinue breastfeeding if their child had diarrhea, vomiting, or skin rash. [3]. A study in Syria and Lebanon among 394 university students found that the participants had an average breastfeeding knowledge level and relatively positive attitudes toward breastfeeding [5]. Research conducted in Jordan revealed that the majority of the 418 undergraduate students who participated in the study exhibited sufficient knowledge, a favourable attitude, and a strong desire to breastfeed. However, the male students had better knowledge and a more positive attitude towards breastfeeding compared to their female counterparts. Furthermore, there was a noteworthy association between the students' attitudes and knowledge towards breastfeeding [7]. A study in Albania among 347 university students found that students' knowledge about infant feeding practices was adequate. However, there were gaps in the student's knowledge regarding the commencement of breastfeeding or the duration of exclusive breastfeeding [8].

Regarding future intentions to exclusively breastfeed their children, a study among Kuwait, Jordan, China, and Indian university students found that 87%, 80.6%, 75.1%, and 98% of the students had the intention to breastfeed their children in the future respectively [3,7,11,12]. Several studies have found that students who were breastfed as infants, possess better knowledge and have a positive attitude towards breastfeeding are more likely to have the intention to breastfeed their future child [11]. In Lebanon, students who displayed high levels of knowledge and positive attitudes towards breastfeeding also exhibited a greater intention to breastfeed [5]. Likewise, research conducted among 377 UiTM students in Malaysia showed that their intention to breastfeed was linked with their attitude and past experience with breastfeeding [6]. Similarly, in Kuwait, students who had prior exposure to breastfeeding and considered it a religious obligation were more inclined to have an intention to breastfeed in the future [3].

Intending to breastfeed during pregnancy is a crucial factor in determining the likelihood of future breastfeeding practices [10]. In fact, having a high level of breastfeeding intention increases the likelihood of initiating breastfeeding by five times, compared to having a low intention [13]. Consequently, a study was undertaken to examine the correlation and pattern of various factors that could potentially influence the adoption of exclusive breastfeeding intention among medical and dental students at Hospital Universiti Sains Malaysia (Hospital USM).

2. Material and Methods

The research was carried out among medical and dental students studying at Universiti Sains Malaysia, and the data was obtained by administering a questionnaire to the students. Demographic characteristics and knowledge consists of seven domain based on KNOWLEDGE_A (Understanding of exclusive breastfeeding practice), KNOWLEDGE_B (Benefit of exclusive breastfeeding to infants), KNOWLEDGE_C (Benefit of exclusive breastfeeding to mothers), KNOWLEDGE_D (Problem with exclusive breastfeeding), KNOWLEDGE_E (Duration of feeding), KNOWLEDGE_F (Breast milk expression) and KNOWLEDGE_G (Effective feeding), attitude, and practice were recorded in the proforma. Statistical analysis was performed by using Statistical Package for the Social Sciences (IBM SPSS, Chicago, IL, USA, software version 24.0). To evaluate the strength of correlation among the variables examined, both descriptive analysis and Spearman correlation analysis were conducted. Spearman correlation coefficients have a range between -1 and +1, with a coefficient of +1 indicating a perfect positive correlation, -1 indicating a perfect negative correlation, and 0 indicating no correlation between the two variables. Correlation coefficients ranging from r_s = 0.10 to 0.29 or r_s = -0.10 to -0.29 were considered weak, r_s = 0.30 to 0.49 or r_s = -0.30 to -0.49 were considered moderate, and r_s = 0.50 to 1.00 or r_s = -0.50 to -1.00 were considered strong. Initially, crosstabulation analysis was conducted, followed by a surface plot and Spearman correlation analysis. A p-value of less than 0.05 was deemed significant for the results obtained.

3. Results

162 students were participating in this study. More than half (65.4%) were females with 25 (15.4%) of them from the School of Dental Sciences and 137 (84.6%) of them from the School of Medical Sciences. Table 1 summarizes the crosstabulation for gender with school with marital status.

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Table 1. Crosstabulation for gender with school with marital status

			School		
			Dental School	Medical School	Total
Status: Single	Male	n (%)	-	3(30.0%)	3(30.0%)
	Female	n (%)	-	7(70.0%)	7(70.0%)
Status: Married	Male	n (%)	7(4.6%)	46(30.3%)	53(34.9%)
	Female	n (%)	18(11.8%)	81(53.3%)	99(65.1%)

3.1 Contour plot analysis, surface plot analysis, and Spearman correlation analysis

The surface and contour plots depicted in Figure 1 illustrate that the optimal level of knowledge regarding exclusive breastfeeding practice is attained when there is a high total score for general knowledge and a high level of understanding of exclusive breastfeeding practice. This region is situated in the upper right corner of the plot. Moreover, by examining the shape of the response surface, we can obtain a broad understanding of the total knowledge score associated with comprehending exclusive breastfeeding practices in different settings of the fixed factor.

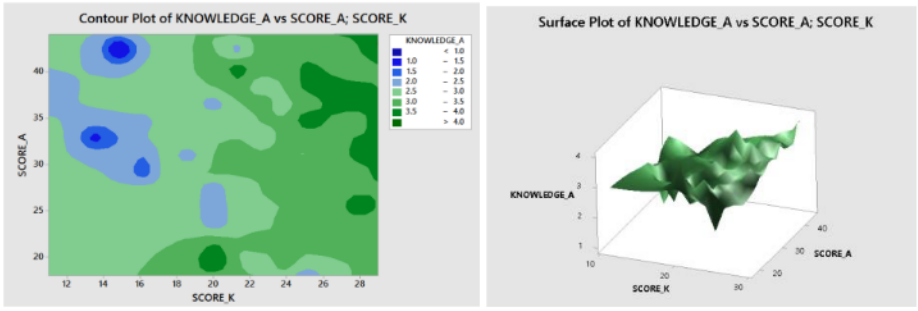

Figure 1. Contour plots and surface plots for the total score of respondents' attitudes vs. a total score of general knowledge and total score of knowledge on the understanding of exclusive breastfeeding practice

The surface and contour plots displayed in Figure 2 demonstrate that the maximum knowledge regarding the issues associated with exclusive breastfeeding is achieved when there is a high total score for general knowledge and a high understanding of exclusive breastfeeding practice. This region is situated in the right corner of the plot. Additionally, by analysing the response surface, we can acquire a general understanding of the level of knowledge pertaining to the challenges of exclusive breastfeeding in different settings of the fixed factor.

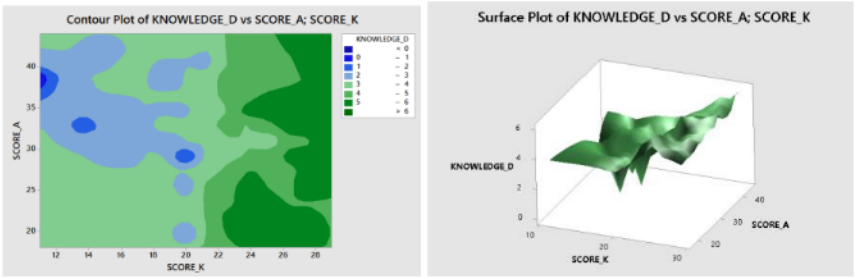

Figure 2. Contour plots and surface plots for the total score of respondents' attitudes vs. a total score of general knowledge and total score of knowledge on problems with exclusive breastfeeding

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Figure 3 illustrates the surface and contour plots, which reveal that the lowest level of knowledge regarding the duration of a feeding is observed when there is a low total score for general knowledge and a low understanding of exclusive breastfeeding practice. This region appears in the upper left corner of the plot. Moreover, by examining the response surface, we can obtain a general idea of the knowledge related to the feeding duration in different settings of the fixed factor.

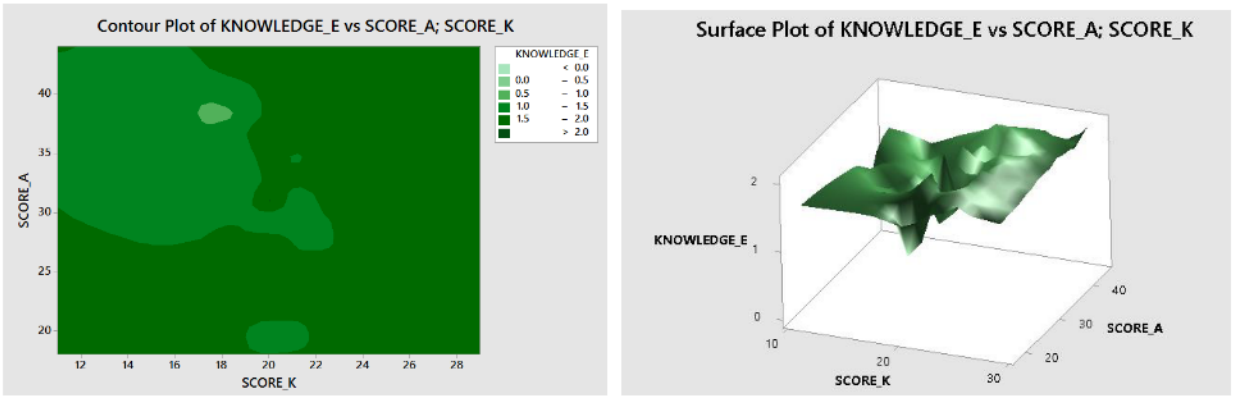

Figure 3. Contour plots and surface plots for the total score for respondents' attitudes vs. a total score of general knowledge and total score of knowledge on the duration of feeding

The surface and contour plots presented in Figure 4 demonstrate that the greatest level of knowledge concerning breast milk expression is achieved when there is a high total score for general knowledge and a high understanding of exclusive breastfeeding practice. This region is located in the upper right corner of the plot. Furthermore, by analysing the response surface, we can acquire a general understanding of the knowledge related to breast milk expression in different settings of the fixed factor.

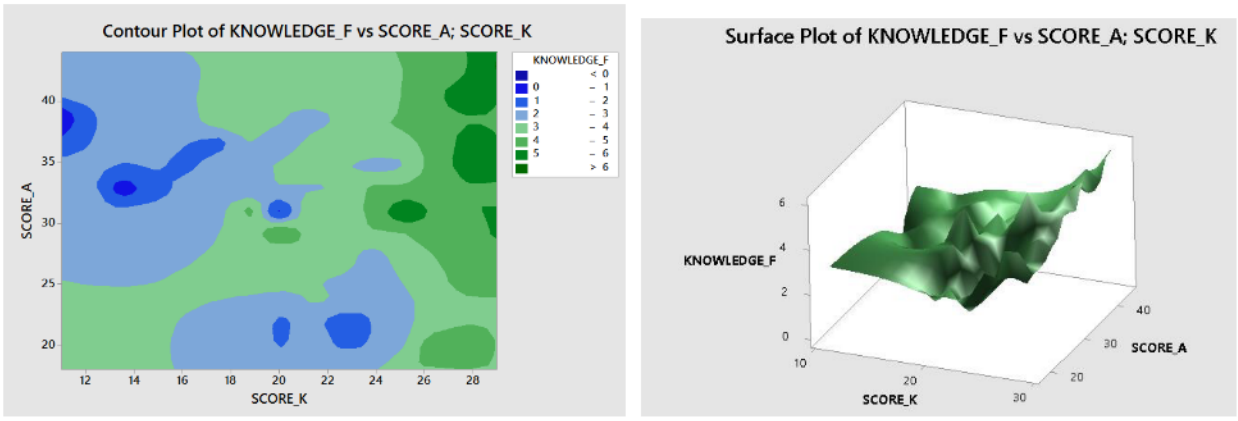

Figure 4. Contour plots and surface plots for a total score for respondents' attitudes vs. a total score of general knowledge and total score of knowledge on breast milk expression

The surface and contour plots displayed in Figure 5 reveal that the highest score for attitude is observed when there is a high total score for general knowledge, and the gender factor is female. This region is located in the upper right and lower right corners of the plot. Additionally, by examining the response surface, we can obtain a general idea of the overall attitude score for the participants in different settings of the fixed factor.

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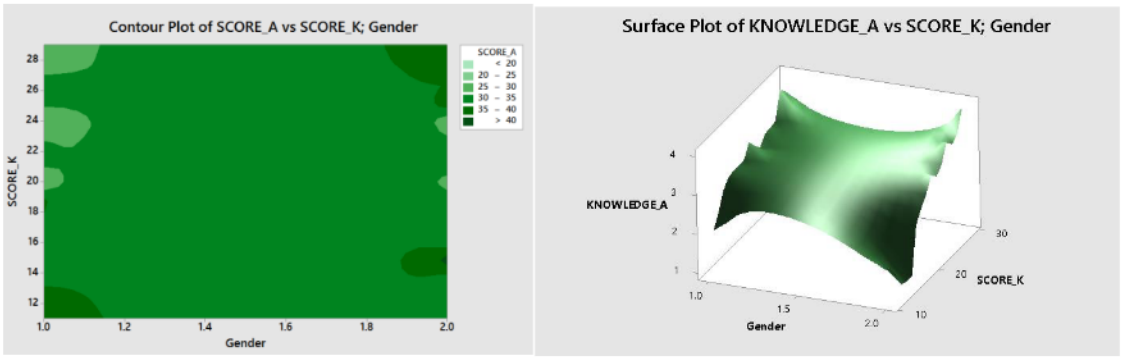

Figure 5. Contour plots and surface plots for the total score of general knowledge vs. gender and total score of attitudes for respondent

Figure 6 shows the surface and contour plots; this indicates that the highest attitude score is obtained when the total score of general knowledge is high. This happens among those who are married. The region is located in the upper left corner of the plot. It is very interesting to know that from the plot. The score of an attitude is also high among unmarried students with the lowest of the total score of general knowledge. Furthermore, by analysing the response surface, we can obtain a general understanding of the overall attitude score for the students in different settings of the fixed factor.

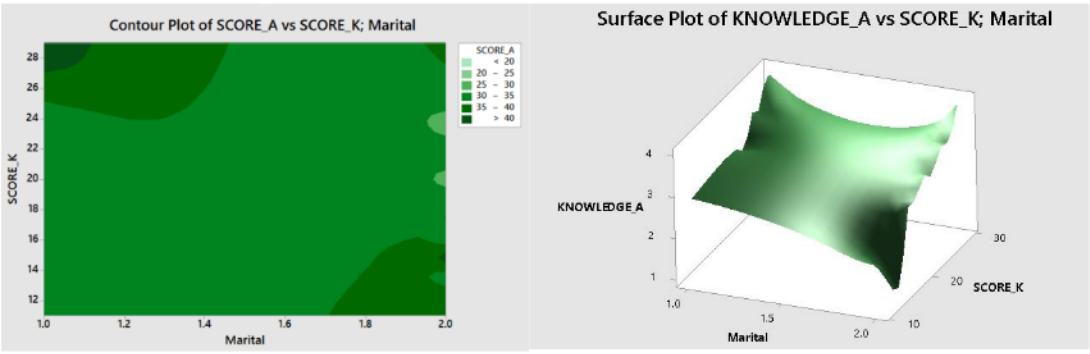

Figure 6. Contour plots and surface plots for the total score of general knowledge vs. Marital status and total score of attitudes for students

Table 2 presents the findings of the correlation analysis conducted to examine the factors related to the future intention of exclusive breastfeeding among medical and dental students at Hospital Universiti Sains Malaysia (Hospital USM). The results indicate that there is a significant association between the knowledge of understanding exclusive breastfeeding practice and the knowledge of the benefits of exclusive breastfeeding to infants (r_s = 0.176*, p < 0.05). Furthermore, the knowledge of understanding exclusive breastfeeding practice is also positively correlated with the knowledge of breast milk expression (r_s = 0.277**, p < 0.05). Both of these factors have an association with general knowledge, which is given as (r_s= 0.440**, p < 0.05). Knowledge of the benefit of exclusive breastfeeding to infants has an association with the knowledge of the benefit of exclusive breastfeeding to the mothers (r_s = 0.155*, p < 0.05), with the knowledge of the problem with exclusive breastfeeding (r_s = 0.243**, p < 0.05), with the knowledge on the duration of feeding (r_s = 0.258**, p < 0.05). These three factors have an association with general knowledge (r_s = 0.406**, p < 0.05). Other than that, the knowledge on the benefit of exclusive breastfeeding to mothers shows that there is a significant association between the knowledge problem with exclusive breastfeeding (r_s = 0.222**, p < 0.05), with the knowledge of the duration of feeding (r_s = 0.261**, p < 0.05). Knowledge of problems with exclusive breastfeeding has a moderate association with duration of feeding (r_s = 0.435**, p < 0.05) with knowledge of effective feeding (r_s = 0.186*, p < 0.05).

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Both of these factors shows lead to the high value of correlation to the general knowledge ($r_s = 0.690^{**}$, $p < 0.05$). Knowledge of the duration of feeding has an association with the knowledge of effective feeding ($r_s = 0.217^{**}$; $p < 0.05$) and with general knowledge($r_s = 0.481^{**}$; $p < 0.05$). Knowledge of breast milk expression has a moderate association with the attitude score toward breastfeeding ($r_s = 0.335^{*}$, $p < 0.05$) with general knowledge ($r_s = 0.626^{**}$; $p < 0.05$). The gender factor also shows a significant association with general knowledge ($r_s = 0.230^{**}$; $p < 0.05$) and knowledge of effective feeding ($r_s = 0.194^{*}$; $p < 0.05$).

Table 2. Correlation among all possible factors for the future intention of exclusive breast-feeding among the medical and dental in Hospital Universiti Sains Malaysia (Hospital USM)

			1	2	3	4	5	6	7	8	9	10	11	12
1.	KNOWLEDGE_A	Correlation												
		Sig. (2-tailed)	.											
2.	KNOWLEDGE_B	Coefficient	0.176*											
		Sig. (2-tailed)	0.025											
3.	KNOWLEDGE_C	Coefficient	0.004	0.155*										
		Sig. (2-tailed)	0.956	0.049										
4.	KNOWLEDGE_D	Correlation	0.071	0.243**	0.222**									
		Sig. (2-tailed)	0.367	0.002	0.005									
5.	KNOWLEDGE_E	Correlation	0.117	0.258**	0.261**	0.435**								
		Sig. (2-tailed)	0.137	0.001	0.001	0.000								
6.	KNOWLEDGE_F	Correlation	0.277**	0.050	0.066	0.045	0.026							
		Sig. (2-tailed)	0.000	0.527	0.401	0.571	0.747							
7.	KNOWLEDGE_G	Correlation	-0.002	0.031	0.030	0.186*	0.217**	-0.002						
		Sig. (2-tailed)	0.976	0.694	0.703	0.018	0.005	0.984						
8.	SCORE_A	Correlation	0.133	0.018	-0.011	-0.124	-0.036	0.335**	-0.021					
		Sig. (2-tailed)	0.092	0.822	0.894	0.116	0.653	0.000	0.790	.				
9.	SCORE_K	Correlation	0.440**	0.406**	0.269**	0.690**	0.481**	0.626**	0.230**	0.170*				
		Sig. (2-tailed)	0.000	0.000	0.001	0.000	0.000	0.000	0.003	0.031				
10.	Age	Correlation	0.060	-0.016	0.027	0.070	-0.003	-0.035	0.038	-0.043	0.026			
		Sig. (2-tailed)	0.445	0.839	0.729	0.376	0.968	0.663	0.634	0.589	0.744			
11.	Gender	Correlation	0.026	-0.013	0.115	-0.017	0.149	0.151	0.194*	0.222**	0.134	-0.007		
		Sig. (2-tailed)	0.746	0.873	0.145	0.826	0.058	0.056	0.013	0.004	0.090	0.930		
12.	Marital	Correlation	-0.037	-0.107	-0.069	-0.084	-0.022	-0.099	-0.066	-0.100	-0.121	-.172*	-0.025	
		Sig. (2-tailed)	0.636	0.176	0.381	0.290	0.777	0.209	0.406	0.207	0.125	0.029	0.756	

**. Correlation is significant at the 0.05 level (2-tailed), **. Correlation is significant at the 0.01 level (2-tailed).*

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4. Discussion

The primary objective of this research is to investigate the level of knowledge, attitude, and future intention regarding the practice of exclusive breastfeeding among medical and dental students at Universiti Sains Malaysia (USM). From the conducted study, by referring to the correlation analysis, knowledge of breast milk expression and affective feeding had less association with the others of the seven knowledge domains. At the very basic level, medical and dental students have good knowledge of breastfeeding. However, among the seven studied domains, only two domains still need to improve which were knowledge of breast milk expression and effective feeding. This finding can be used to formulate a suitable approach to increase their awareness and knowledge regarding exclusive breastfeeding.

5. Conclusion

The aim of this study was to investigate the relationship between various factors influencing the acceptance of future intention to practice exclusive breastfeeding among medical and dental students at Hospital Universiti Sains Malaysia (Hospital USM). The analysis revealed that general knowledge plays a crucial role in determining the acceptance of future intentions regarding exclusive breastfeeding. In this study, general knowledge was categorized into seven domains, including understanding exclusive breastfeeding practice, benefits of exclusive breastfeeding for infants and mothers, challenges associated with exclusive breastfeeding, feeding duration, breast milk expression, and effective feeding. Correlation analysis, as presented in Table 2, was conducted to examine the associations between these factors. The results showed significant findings, particularly in the general knowledge factor ($p < 0.05$). These findings can greatly contribute to increasing awareness and promoting future intention to practice exclusive breastfeeding among prospective parents. It is anticipated that this study will provide valuable insights and a deeper understanding of the importance of prenatal exclusive breastfeeding intention for successful postnatal exclusive breastfeeding practice.

Ethical Approval

The Human Research and Ethics Committee at Universiti Sains Malaysia approved this study on October 20, 2015, with the reference number USM/JEPeM/150602018. Prior to participation, written informed consent was obtained from the students who voluntarily agreed to take part in the study.

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References

[1] American Academy of Pediatrics. Breastfeeding and the use of human milk. Pediatrics 2012;129:827-841.

[2] Butte NF, Lopez-Alarcon MG, Garza C. Nutrient adequacy of exclusive breastfeeding for the term infant during the first six months of life. Geneva: World Health Organization;2002

[3] Ebrahim B, Al-Enezi H, Al-Turki M, et al. Knowledge, misconceptions, and future intentions towards breastfeeding among female university students in Kuwait. J Hum Lact. 2011;27(4):358-366.

[4] Fatimah S, Saadiah HN, Tahir A, Hussain Imam MI, Ahmad Faudzi Y. Breastfeeding in Malaysia: Results of the Third National Health and Morbidity Survey (NHMS III) 2006. Malays J Nutr. 2010;16(2):195-206.

[5] Hamade H, Naja F, Keyrouz S, et al. Breastfeeding knowledge, attitude, perceived behavior, and intention among female undergraduate university students in the Middle East: the case of Lebanon and Syria. Food Nutr Bull. 2014;35(2):179-190.

[6] Hamid SBA, Yahya N. Knowledge, Attitude, Prior Exposure and Intention to Breastfeed among Undergraduate University Students. Journal of clinical and health sciences. 2018;3 (2):26-35

[7] Hatamleh R, Maghaydah SS, Abuhammad S, Rababah H. Knowledge, attitudes and future intentions towards breastfeeding among undergraduate students at a Jordanian public

ISSN: 2309-5288 (Print)
ISSN: 2309-6152 (Online)
CODEN: JCLMC4
Journal of Coastal Life Medicine

university. Evidence Based Midwifery. 2018;16(4):136-142.

[8] Hyska J, Mersini E, Mone I, et al. Assessment of knowledge, attitudes and practices about public health nutrition among students of the University of Medicine in Tirana, Albania. South Eastern European Journal of Public Health (SEEJPH). 2015:1-8.

[9] Institute for Public Health, National Institutes of Health, Ministry of Health Malaysia. National Health and Morbidity Survey (NHMS) 2016: Maternal and Child Health. Vol. II: Maternal and Child Health Findings. Kuala Lumpur: Institute for Public Health, National Institutes of Health, Ministry of Health Malaysia;2016

[10] Leclair E, Robert N, Sprague AE, Fleming N. Factors associated with breastfeeding initiation in adolescent pregnancies: a cohort study. Journal of pediatric and adolescent gynecology. 2015;28(6):516-521.

[11] Lou Z, Zeng G, Orme JG, et al. Breastfeeding knowledge, attitudes, and intention in a sample of undergraduate students in mainland China. Journal of Human Lactation. 2014;30(3):331-339.

[12] Padmanabhan R, Thulasingam M, Chinnakalai P. Female college students knowledge, attitude and future intention towards breastfeeding: implications for advocacy. Journal of clinical and diagnostic research: JCDR. 2016;10(11):11-14.

[13] Permatasari TAE, Achadi EL, Purwono RU, Irawati A, Ocviyanti D, Martha E. Does breastfeeding intention among pregnant mothers associated with early initiation of breastfeeding? Indonesian Journal of Reproductive Health. 2016;7(3):169-184.

[14] United Nations Children's Fund. From The First Hour Of Life. Making the case for improved infant and young child feeding everywhere. New York: UNICEF;2016.

[15] World Health Organization,UNCEF. Global strategy for infant and young child feeding. 2003