PUBLIC HEALTH RESEARCH

Knowledge and Attitude of Universiti Kebangsaan Malaysia (UKM) Medical Students on Forest Bathing

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ABSTRACT

Introduction Forest bathing or Shinrin-Yoku is a practice of being mindful of nature and it offers multiple health benefits in both physiological and psychological factors. This study aimed to determine the knowledge and attitude of Universiti Kebangsaan Malaysia (UKM) medical students towards forest bathing and its relationship with the sociodemographic factors.

Methods A total of 165 UKM medical students were recruited using proportionate stratified random sampling. The subjects were then categorized based on the academic year (Year 1 - Year 5) from May 2021 until September 2021. Exclusion criteria includes those who deferred their academic year and/or who were hospitalized. A questionnaire was given via a google form consisting of sociodemographic data details and 15 questions for each knowledge and attitude on forest bathing.

Results The prevalence of good knowledge and good attitude of UKM medical students towards forest bathing were 64.2% (n=106) and 50.9% (n=84) respectively. Female medical students had a good knowledge (n=63, 73.3%) and good attitude (n=52, 60.5%) compared to male medical students' knowledge (n=43, 54.4%) and attitude (n=32, 10.5%), with a p-value of 0.012 and 0.010 respectively. Otherwise, other sociodemographic factors including race, medical year and level of lifestyle did not affect participants' knowledge and attitude on forest bathing.

Conclusions Majority of UKM medical students have a higher prevalence of good knowledge compared to good attitude on forest bathing. Therefore, we recommend forest bathing to be integrated into the medical curriculum as part of awareness especially in male medical students.

Keywords Shinrin-yoku - Preventive medicine - Nature therapy - Malaysia.

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INTRODUCTION

Forest bathing or else known as Shirin-yoku (森林浴), is a traditional Japanese practice of immersing into nature while mindfully paying attention to their senses.[1] It was advocated by the Japanese government in 1982 as a part of preventive health care and healing in Japan.[2,18] It is a form of nature-based recreational activity which involves walking and inhaling the substances produced by the trees. Studies showed that terpene components such as phytoncide are released by the trees that provide relaxation and the effects on the human body.

According to a survey done in March 2021, out of 93 students, only 5.4% of the medical students in UKM are aware of the concept of forest bathing. In order to flourish the idea of forest bathing as an interventional tool for preventive medicine, knowledge and attitude about forest bathing should be assessed and reinforced. Knowledge is the ability to pursue and use the information and by understanding as well as learning experience, and identifying the studying technologies.[3] Attitude is the result of reacting in a certain way under certain circumstances, and observing and explaining based on the result of the reaction, or combining it into a viewpoint.

"The art of healing comes from nature, not from the physician" was a quote given by 16th Century Swiss-German physician, Paracelsus. Historically, about 2500 years ago, lush green gardens were built in a busy city by Cyrus the Great with the aim to increase health and promote a sense of calmness in a busy city[1]. The foundation of the model is known as the concept of nature therapy. It starts with "Stressed State" followed by "Restorative Effects" of nature which includes the exposure to nature and is then leading to hypothesised improvement of "Physiological Relaxation" and "Immune Function Recovery" responses. These responses will then be incorporated into Evidence Based Medicine (EBM) as attestation for "Preventive Medical Effect".[4,17,20]

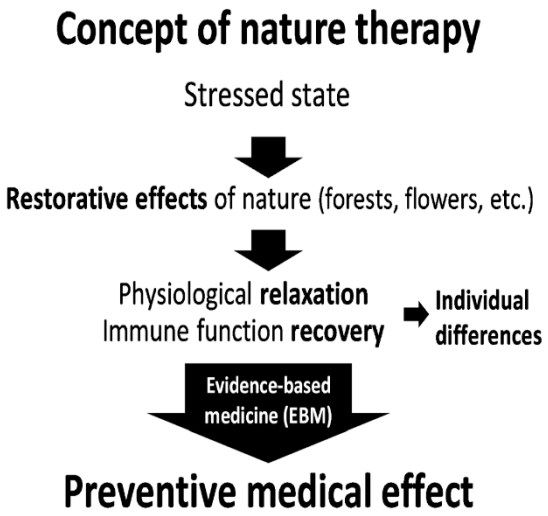

Figure 1 Concept of Nature Therapy[4]

Forest therapy may have existed in Malaysia for centuries, especially where the Orang Asli community, the indigenous community of Malaysia, have culturally believed in the practice of 'Mandi Embun', which means "bathing in the forest dew". They emphasized on walking barefooted in forests early in the morning as it would improve spiritual and physical health.[5,16] Malaysia is a country with beautiful forests; yet there are minimal studies done in regards to the efficacy of forest bathing to society. With the geographically ideal location, this enables the execution of forest bathing to be easily available. In some forestry, there are no fees imposed while for others, a minimal fee is charged which is considered low-cost in comparison to seeking medical therapy.[6] Therefore, further studies and research should be done to support this intervention as a form of preventive medicine.

In this study, the objectives were to determine the knowledge and attitude of medical students on forest bathing as well as to determine the association between gender, race, academic year and lifestyle with the level of knowledge and attitude. Our hypothesis includes that female medical students have a good knowledge and attitude about forest bathing compared to male medical students; Chinese medical students have a good knowledge and attitude of forest bathing compared to other ethnic groups; clinical medical students have a good knowledge and attitude of forest bathing compared to preclinical medical students; people with a high active lifestyle have a good knowledge and attitude of forest bathing compared to people with a sedentary and low active lifestyle.

METHODS

Participants

A total of 165 students enrolled in the research study. Subjects were chosen via proportionate stratified random sampling from medical students who are from Year 1 until Year 5 from The National University of Malaysia who agreed to participate in the study. Proportionate random sampling was used to recruit the subjects in this study. The National University of Malaysia medical students are then categorized based on the academic year (Year 1 - Year 5). A total of 20% students from each batch were chosen from year 1 until Year 5. Thirty-three students from each batch have been chosen using a simple random sampling method. We excluded medical students who deferred their academic year and/or who were hospitalized. Subjects were provided with details of the study and online consent was obtained before enrolling them in the study.

Materials

A cross sectional study was conducted from May 2021 to October 2021 through a questionnaire via google form application that has been created and answered online. We use a validated KAP questionnaire as a guide to modify according to our topic which is then validated by an expert of content; an environmental physician.[13,15] The questionnaire comprised of three sections:

Section A: Sociodemographic factors
Section B: Knowledge on Forest bathing
Section C: Attitude on Forest bathing

There were 10 questions each in Section B and C. Section B - its assessment was based on 4 options in each question with only 1 correct answer. Section C - its assessment was based on Likert scale of 5. A 10-minute in duration promotional video was also produced for the research study as post-questionnaire education. The video was designed using Canva with natural visualizations i.e. forest, waterfall, trees and background audio i.e. waterfall effects, rain effects, bird chirping to provide an ultimate experience of forest bathing virtually. The contents of the video include educational materials of the knowledge and attitude model of forest bathing. The scoring system will be explained in the results section.

Procedure

Subjects were provided with details of the study and online consent was obtained before enrolling them in the study. The study protocol was reviewed and approved by the Research and Ethics Committee of Universiti Kebangsaan Malaysia (project code: FF-2021-270). The subjects answered a questionnaire on their sociodemographic details, knowledge and attitude on forest bathing. Gender, ethnicity and the description of their lifestyle were self-declared for the demographic details. The lifestyle description was divided into 3 categories which was sedentary (<5000 steps/day), low active lifestyle (5000-7499 steps/day) and a high active lifestyle (>7500 steps/day). There are 15 questions on knowledge on forest bathing and 15 questions on attitude on forest bathing. The subjects would find the answers to the questionnaire that they had attempted earlier in the video. This method is developed with such a purpose so that they would retain the information more effectively. However, the video has its limitation due to the ongoing Covid-19 pandemic.

RESULTS

Sociodemographic Factors of Participants

The majority of participants were female (n=86, 52.1%), led by the race, Malay (n=91, 55.2%) and most of the participants are from clinical years, comprising Year 3-5 (n=99, 60.0%) which is presented in Table 1. The majority participants have a low active lifestyle defined by 5000-7499 steps/days (n=74, 44.8%).

Table 1 Sociodemographic factors of participants

Sociodemographic factors (n=165)	
Gender	n (%)
Male	79 (47.9)
Female	86 (52.1)
Race	n (%)
Malay	91 (55.2)
Chinese	29 (17.6)
Indian	33 (20.0)
Others	12 (7.2)
Level of Medical Year	n (%)
Preclinical (Year 1,2)	66 (40.0)
Clinical (year 3,4,5)	99 (60.0)
Level of lifestyle	n (%)
High Active Lifestyle (>7500 steps/day)	22 (13.3)
Low Active Lifestyle	74 (44.8)

(5000 - 7499 steps/day)	
Sedentary (<5000 steps/day)	69 (41.9)

The Knowledge Score and Attitude score of UKM Medical Students on Forest Bathing

Table 2 shows total knowledge and attitude score. The total knowledge score of the participants ranged from 4 points to 13 points, with a median score of 8.00 and interquartile range of 3.00. The attitude score of the participants ranged from 28 points to 67 points, with a median score of 53.00 and interquartile range of 8.00.

Table 2 Knowledge and Attitude score of UKM medical students on forest bathing

Total knowledge score	
Minimum (Lowest score = 0)	4.00
Maximum (Highest score = 15)	13.00
Median	8.00
Interquartile Range	3.00
Total attitude score	
Minimum (Lowest score = 15)	28.00
Maximum (Highest score = 75)	67.00
Median	53.00
Interquartile Range	8.00

Table 3 shows the normality test for knowledge score and attitude score of medical students' on forest bathing. Normality test showed that both the total knowledge score and total attitude score of participants in this study did not have a normal distribution. Median is used as the cut-off point. The total knowledge score of each participant was classified into two types, poor- and good knowledge in forest bathing. The total attitude score of each participant was classified into two types, poor- and good attitude in forest bathing. Non-parametric statistical test was used for analysis in this study.

Table 3 Normality test for knowledge score and attitude score of UKM medical students on forest bathing

Normality test	Total knowledge score		
	Statistics	df	Sig.*
Kolmogorov-Smirnov	0.120	165	0.000
	Total attitude score		
	Statistics	df	Sig.
Kolmogorov-Smirnov	0.072	165	0.035

**Significant at p<0.05*

The knowledge and attitude model of UKM medical students on forest bathing.

Based on Table 4, the majority of UKM medical students have good knowledge on forest bathing (n=106, 64.2%). The prevalence of good attitude of medical students on forest bathing was (n=84, 50.9%). Spearman's rho correlation was used to show the relationship between knowledge and attitude scores. Consistent with the knowledge and attitude, it is expected that each of the dimensions could be related. However, in this study, the results indicate that there is no significant correlation between knowledge and attitude in this study.

Table 4 Knowledge and attitude of UKM medical students on forest bathing.

Level of Knowledge and Attitude	
i)The level of knowledge	
Good knowledge (n, %)	106, 64.2
Poor knowledge (n, %)	59, 35.8
i)The level of attitude	
Good attitude (n, %)	84, 50.9
Poor attitude (n, %)	81, 49.1
iii) Correlation between knowledge and attitude	
Spearman's rho	*p* value
0.102	0.192

Relationship of sociodemographic factors with i) level of knowledge and ii) level of attitude

Chi-squared test was employed for analysis with 95% Confidence Interval with p-value <0.05. More female medical students (n=63, 73.3%) of UKM have good knowledge on forest bathing compared to male medical students (n=43, 54.4%). More female medical students (n=52, 60.5%) of UKM have a good attitude on forest bathing compared to male medical students (n=32, 40.5%). Otherwise, other sociodemographic factors including race, medical year and level of lifestyle do not affect participants' knowledge and attitude on forest bathing. The results are shown in Table 5.

Table 5 Relationship of sociodemographic factors with i) level of knowledge and ii) level of attitude

Sociodemographic factors	Level of knowledge			
	Good (n, %)	Poor (n, %)	$\chi 2$	*p* value
Gender				
Male (n=79)	43, 54.4	36, 45.6	6.352	0.012
Female (n=86)	63, 73.3	23, 26.7		
Race				
Malay (n=91)	51, 56.0	40, 44.0	7.517	0.057
Chinese (n=29)	23, 79.3	6, 20.7		
Indian (n=33)	22, 66.7	11, 33.3		
Others (n=12)	10, 83.3	2, 16.7		
Medical Year				
Preclinical (n=66)	40, 60.6	59, 35.8	0.633	0.426
Clinical (n=99)	66, 66.7	33, 33.3		
Level of Lifestyle				
High Active Lifestyle (n=22)	16, 72.7	6, 27.3	2.227	0.328
Low Active Lifestyle (n=74)	50, 67.6	24, 32.4		
Sedentary (n=69)	40, 58.0	29, 42.0		
Sociodemographic factors	Level of attitude			
Gender				
Male (n=79)	32, 40.5	47, 59.5	6.563	0.010
Female (n=86)	52, 60.5	34, 39.5		
Race				
Malay (n=91)	46, 50.5	45, 49.5	1.598	0.660
Chinese (n=29)	15, 51.7	14, 48.3		
Indian (n=33)	15, 45.5	18, 54.5		
Others (n=12)	8, 66.7	4, 33.3		
Medical Year				
Preclinical (n=66)	35, 53.0	31, 47.0	0.198	0.656
Clinical (n=99)	49, 49.5	50, 50.5		
Level of Lifestyle				
High Active Lifestyle (n=22)	11, 50.0	11, 50.0	1.173	0.556
Low Active Lifestyle (n=74)	41, 55.4	33, 44.6		
Sedentary (n=69)	32, 46.4	37, 53.6		

**Significant at p<0.05*

DISCUSSION

Forest bathing provides numerous physical and psychological effects including cardiovascular and respiratory medicine, immunological function and mental health. There are studies that reported greater physiological effects from forest than urban areas including decreased in blood pressure, activation of parasympathetic nervous system with suppression of sympathetic nervous activity, decreased salivary amylase, blood cortisol concentration as well as increased immune function [7] and improvement in psychological functioning such as alleviating negative emotion and boosting of positive emotions.[1]

In our research, the results showed that the knowledge and attitude scores of the medical students towards forest bathing had no significant correlation. These findings were inconsistent with the formal Knowledge-Attitude model which showed a significant relationship between the two dimensions. The knowledge and attitude model stipulated that knowledge has a positive impact on personal attitudes, and attitudes will affect practice or behavior.[8] It is most likely other influencing factors outside the Knowledge-Attitude model could affect the medical students' knowledge and attitude towards forest bathing. For example, socioeconomic background, residency area and political ideas. Thus, our research showed that medical students with good knowledge do not necessarily have good attitudes and vice versa. Based on another paper, the Knowledge-Attitude model does not explain persons' behavior, therefore, it is important to measure other factors.[9]

Of the 165 participants in this study, (n = 81, 52.1%) were females and (n= 79, 47.9%) were males. From our finding, using the Chi-squared test for analysis with 95% Confidence Interval, more female medical students (n=63, 73.3%) of UKM have good knowledge on forest bathing compared to male medical students (n=43, 54.4%). For attitude, a Chi- squared test was employed for analysis with 95% Confidence Interval. More female medical students (n=52, 60.5%) of UKM have a good attitude on forest bathing compared to male medical students (n=32, 10.5%). In observance of our data which showed that female medical students to lead in both knowledge and attitude, we found a previous study conducted in China\demonstrated that forests can have a more pronounced anxiolytic effect on females rather than males.[10]

Our study is participated by students from various races which comprised of Malay, Chinese, Indian, and Bornean which we categorized as others. Malay makes up the majority of the participants (n = 91, 55.2%), followed by Indian (n = 33, 20.0%), Chinese (n = 29, 17.6%) and finally others (n = 12, 7.3%). However, from our statistical test, the race factor does not show any correlation or does not affect the participant's knowledge of forest bathing. The p-value is 0.0570 which is statistically not significant. In relation with the attitude, our data showed that the race and attitude p-value score is 0.060 which is also not significant. We hypothesized that race does not reflect as the best determinant but the better parameter that should have been measured is the socioeconomic status of the participants. Based on a previous study, a negative association between the green view index and the proportion of Hispanics disappeared when controlled with income levels, indicating that access to street greenery is related more to socioeconomic status than to ethnicity or race. The researchers noted in their study that members of racial minorities often had lower socioeconomic status, which may explain the initial correlation between the proportion of Hispanics and a reduced green view index in the Hartford, Connecticut study.[11]

In our study which involved students from Year 1 to Year 5, we found no association between the year of education and the knowledge and attitude of forest bathing. With a p-value of 0.656 and 0.426 respectively which are both not significant, we believed that preclinical (n =66) or clinical year (n = 99) does not affect their knowledge of forest bathing. Our hypothesis to this is because the curriculum does not include any form of education regarding forest bathing and does not stress its importance in view of it being novel in Malaysia. Based on research on medical students' clinical reasoning ability, the survey did not identify any significant difference between the attitudes of pre-clinical and clinical students in most of the domains.[12] The last sociodemographic factor that we looked at is the lifestyle factor. With a sedentary group, n = 69, low active group, n = 74, and high active group, n = 22, we found that there exists no association between lifestyle and the knowledge of forest bathing with a p-value of 1.173. While for lifestyle and the attitude has a p-value of 0.328 which is also not significant.

This study has some limitations. Due to COVID-19 pandemic and the government's implementation of Movement Control Order (MCO), the study has been converted from having real forestry exposure to a virtual questionnaire to determine the knowledge and attitude of the participants on forest bathing. This had a significant influence in the results as the participants were only able to imagine it rather than to experience it mindfully. As the questionnaire was released virtually, we were not able to control participants' urge to find the answers in the questionnaire. This can lead to bias of data and may influence the analysis of association of each category with knowledge and attitude. Next, our data of preclinical students consists of Year 1 and 2; while the clinical students include Year 3, 4 and 5 causes the interpretation of data is 40% to 60%. As there is a discrepancy in the number of participants among the clinical and preclinical; the analysis of data may have differed if there is a similar number of participants.

This study on knowledge and attitude of forest bathing among medical students is one of the first few studies done on this topic in Malaysia. Forest bathing has proven to be associated with many benefits and having this study is a good start in promoting this intervention method as a part of preventive medicine among the future health care professions. In the United Kingdom, forest bathing has been implemented as preventive medicine for depression and various studies have been done to prove that forest bathing is a non-economically

burdening alternative[2]. Therefore, Malaysia should further study and progress towards this path as forestry is abundant in this country with its benefits shown in multiple studies.

CONCLUSION

Majority of UKM medical students have a higher prevalence of good knowledge compared to the prevalence of good attitude on forest bathing. There are no significant relationships of knowledge and attitude of forest bathing among UKM medical students with the sociodemographic factors except gender as female showed a higher knowledge and attitude in forest bathing. Forest bathing offers a lot of medical benefits in both physiological and psychological factors. Hence, medical students who will be future medical professionals should be aware of its benefits and responsible bodies should be aware of this alternative as part of preventive medicine.

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