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Relationship of the Knowledge-Attitudes of Sun Exposure and Physical Activity in Asthma and Non-Asthma

(Hubungan Pengetahuan-Sikap Terhadap Paparan Sinar Matahari dan Aktivitas Fisik pada Asma dan Non-Asma)

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ABSTRAK

Asma telah menjadi masalah kesehatan di dunia. Gejala asma berhubungan dengan rendahnya kadar vitamin D dalam tubuh, sehingga meningkatkan risiko serangan asma. Aktivitas fisik merupakan salah satu faktor yang mempengaruhi kadar vitamin D. Tujuan penelitian ini adalah menganalisis hubungan pengetahuan-sikap paparan sinar matahari terhadap aktivitas fisik pada penderita asma dan non asma. Penelitian dilaksanakan pada bulan Maret sampai dengan Juni 2018. Desain penelitian observasional dengan purposive sampling. Subyek penelitian berumur >18 tahun tidak mempunyai penyakit penyerta lainnya. Hasil penelitian menunjukkan sebagian besar subjek memiliki pengetahuan tinggi tentang paparan sinar matahari terkait vitamin D pada penderita asma (73,08 %) dan non asma (84,62 %). Selain itu, sebagian besar subjek asma mempunyai sikap kurang baik (96,15 %), dan pada subjek non asma seluruhnya mempunyai sikap kurang baik. Tidak terdapat hubungan antara pengetahuan paparan sinar matahari dengan tingkat aktivitas fisik, baik pada kelompok asma (P (0,657) > 0,05) maupun non asma (P (0,109) > 0,05). Terdapat hubungan antara sikap paparan sinar matahari dengan aktivitas fisik pada kelompok asma (P(0,000) < 0,05), namun pada kelompok non asma tidak dapat dianalisis karena semuanya memiliki sikap yang buruk. Sehingga pengetahuan dan sikap terhadap paparan sinar matahari harus ditingkatkan untuk menunjang aktivitas fisik yang cukup.

Kata Kunci: *Asma, aktivitas fisik, paparan sinar matahari*

ABSTRACT

Asthma has become a health problem in the world. Asthma symptoms are associated with low vitamin D levels in the body, which increase the risk of an asthma attack. Physical activity is one of the factors that influence vitamin D levels. The purpose was analyzing relationship knowledge-attitude of sun exposure to physical activity in asthma and non-asthma. The study was conducted from March to June 2018. The research design was observational with purposive sampling. Research subjects were > 18 yr did not have other co-morbidities. The results showed that most subjects had high knowledge of sun exposure related to vitamin D in asthma (73.08 %) and non-asthma (84.62 %). In addition, most asthma subjects had a poor attitude (96.15 %), and in non-asthma, all had a poor attitude. There was no correlation between knowledge of sun exposure and physical activity level, both in the asthma group (P (0.657) > 0.05) and non-asthma (P (0.109) > 0.05). There was a relationship between attitudes of sun exposure and physical activity in asthma group (P (0.000) < 0.05), but in a non-asthma group, it could not be analyzed because all had a poor attitude. So that knowledge and attitudes of sun exposure must be increased to support sufficient physical activity.

Keywords: *Asthma, physical activity, sun exposure*

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INTRODUCTION

Respiratory diseases of each country and every socio-economic group. The cost of the treatment reaches billons of dollars every year due to equipment loss and medical expenses.[1–3] In Indonesia, especially in East Java province, the prevalence of asthma has reached 5.1 %, and it is estimated that the prevalence of asthma will continue to increase with age up to 5.6 % in the age range of 15 yr to 24 yr.[4] The high incidence of asthma in the world, one of which is influenced by vitamin D levels in the body, because low vitamin D levels can easily cause an asthma attack.[5] It is because vitamin D deficiency causes a decrease in lung function.[6–8] Low blood levels of vitamin D are associated with decreased lung function, increased inflammation, infectious or neoplastic disease. The mechanism underlying the emergence of respiratory diseases due to low vitamin D levels is not known, but it is suspected that vitamin D affects the function of inflammatory and structural cells. Many studies have shown that vitamin D deficiency causes more susceptible to respiratory diseases and requires a more extended recovery period than patients with normal vitamin D level.[9] Vitamin D is the only vitamin that can naturally be produced by the body when exposed to sunlight. Vitamin D has a strong relationship with inflammatory reactions that occur in asthma, so vitamin D deficiency in someone who has asthma can increase the risk of disease severity.[10] Vitamin D has been shown to have immunomodulatory properties by stimulating the immune system to inhibit cytokine production so as to reduce inflammation. Vitamin D can be considered a strong predictor of asthma by increasing the vitamin D status of asthma exacerbations can be reduced and can help in the prevention of primary asthma.[11,12]

In tropical countries in Asia, such as Indonesia, it should get enough sunlight, but in reality, it is estimated that there is a prevalence of vitamin D deficiency between 35% to 57%.[13] In India, although it is located close to the equator, vitamin D deficiency is common. This can be caused by factors such as season, duration, time of sun exposure, clothing, and skin pigmentation may be contributors to the occurrence of vitamin D deficiency. Modernization also brings changes in lifestyle and diet to be low in vitamin D. In addition; increased pollution prevents light the sun reaches the earth which results in obstruction of sunlight exposure on human skin.[14] Daily behavior of Asians can also be associated with vitamin D deficiency, where the assumption that white people look more beautiful than dark skin so that most Asians choose to protect their skin from sun exposure with sunscreen, which can cause sun damage to the skin.[15]

Knowledge and attitude of sun exposure are very important because sunlight has one of the advantages that can prevent vitamin D deficiency.[16,17] so that with enough levels in the blood, vitamin D can be involved in increasing the immune response and preventing several diseases related to the immune system.[18] The level of knowledge and attitudes of sun exposure possessed by a person can be measured using a questionnaire that was previously carried out.[19–21]

Vitamin D can also be increased by using vitamin D supplements and also doing enough physical activity. Having sufficient vitamin D levels can reduce the risk of severe asthma exacerbations and can also prevent the risk of hospitalization due to an asthma attack.[22] Low physical activity can be caused by a negative attitude of sun

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exposure and tends to avoid sunlight.[23] Physical activity is one of the factors that influence vitamin D levels in the blood: individual characteristics, social environment, and physical environment influence different levels of physical activity per individual. Asthma patients have the view that physical activity can worsen asthma symptoms for a long time. Patients with serious diseases have confidence that physical activity is not suitable for asthma.[23] The unwillingness to do physical activity is not only due to the worsening of asthma symptoms but also due to psychological factors.[24,25] Exercise-induced asthma is a symptom of asthma that arises in non-asthma patients due to excessive physical activity. It can happen when someone is doing vigorous/heavy physical activity; they will breathe more, faster by mouth. It then causes the air entering the lungs to be cooler and drier than normal air. Bronchial membranes in the lungs can swell, which then causes the appearance of asthma symptoms such as wheezing. Exercise-induced asthma generally occurs in winter.[26,27] It is challenging to do vigorous physical activity, which can lead to exacerbations in uncontrolled asthma patients. Some asthma patients can experience exacerbations when performing certain physical activities. This can be prevented if you have controlled asthma, and also understand the symptoms of an asthma exacerbation, easily get asthma medication, and perform physical activities that are compatible with asthma that you have.[28]

When an asthma patient can control the symptoms of asthma, doing an appropriate physical activity can prevent the occurrence of an asthma exacerbation later on. Doing physical activities like jogging, playing soccer, and playing basketball can improve the worsening of asthma symptoms. Adjustment to physical activity needs to be done in patients who have just been exposed to an asthma exacerbation.[29] Therefore this study aimed to determine the effect of physical activity on vitamin D levels in asthma and non-asthma patients. Therefore, this study aims to compare attitudes about sun exposure and physical activity in asthma and non-asthma.

METHOD

Research Design

The research method used in this study is observational with observations of vitamin D levels and physical activity from March to June 2018. This study used a cross-sectional design with two groups, namely the asthma group and the non-asthma group from each group. The study was conducted in the city of Surabaya, namely at Universitas Surabaya in Surabaya, Indonesia. No Ethic 024/KE/VI/2018 in Universitas Surabaya.

Research Variable

The independent variable of this study were vitamin D levels and physical activity, while the dependent variable of this study were asthma and non-asthma patients. Knowledge in this study was the knowledge possessed by research subjects on sun exposure, which was the primary source of vitamin D. The attitude in this study was the daily attitude of research subjects when exposed to sunlight. Data collection on this variable used a questionnaire from previous research.[19–21]

Physical activity was any body movement produced by skeletal muscles which require energy to move. Physical activity was measured using a modified questionnaire form from the International Physical Activity Questionnaire (IPAQ).[30]

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Subjects were interviewed to see physical activity carried out during the past week, and grouped into three groups, namely mild physical activity (<600 MET min wk^{-1}), moderate physical activity [(600 to 1,500) MET min wk^{-1}], and vigorous physical activity (>1,500 MET min wk^{-1}).

Research Population and Subject

The population of this study was subjects with a history of asthma and non-asthma, with inclusion criteria: > 18 yr, often using a motorcycle when traveling, using a jacket and helmet in driving, and receiving informed consent. The exclusion criteria in this study were having other lung diseases such as COPD (Chronic Obstructive Pulmonary Disease) and tuberculosis. A smoker must also be exclused because it can reduce the metabolism of vitamin D in the body due to the many harmful components that are in the body, so the vitamin levels D is reduced,[31] and using glucocorticoid drugs in the past week, because the use of this class of drugs can cause a decrease in vitamin D levels in the body.[32] The sample size used in this study uses the equation of Fisher's Formula:

$$n = Z^2 \cdot P \cdot Q\, d^{-2} \quad (1)$$

with n: number of samples; Z: normal standard deviation, whose value depends on the P-value which can be seen in the distribution table (1.96); P: abnormalities for specific traits that are thought to occur in the population (East Java); Q: 1.0–P (Q is a natural value that does not occur in the population)= 1− 0.017 = 0.983; d: degree of deviation = 0.05. So, the sample size of (n) minimum in each group is 25.67 ~ 26 people.

Method of Collecting Data

Validation of Knowledge and Attitude Questionnaire on Sun Exposure. Questionnaires taken from previous research will be validated twice. The first validation is internal validation, where the questionnaire that has been obtained from the journal will be translated into Indonesian first, and the grammar will be re-validated by the peer group. The second validation is external validation, which will be done by giving questionnaires to 30 respondents; the questionnaire that has been filled in by the respondents will be collected and analyzed using the SPSS software program. Reliability was carried out on a validated questionnaire. The reliability test of the questionnaire was carried out with one test using Cronbach's alpha method on SPSS software.

Validate the Physical Activity Questionnaire. Questionnaire validation was conducted to see whether the questionnaire used was valid and reliable. Validation of the questionnaire will be done with two validations, namely content and construct validation. IPAQ modification is carried out by activities that are often carried out by the community.

Subject Collection. Collection of research subjects, researchers will use purposive sampling method. Researchers will search for research subjects that match the inclusion and exclusion criteria. Subjects who were willing to be the subject of the study contacted the researcher to make an appointment related to subject data collection. Measurement of knowledge and attitudes related to sun exposure by filling out a questionnaire. Subjects will be interviewed for one measurement to find out the physical activity carried out by the subject for a week.

Data Analysis

Data analysis was used to compare the influence of knowledge and attitudes of sun exposure and physical activity with vitamin D levels in the group of asthma and non-asthma using chi-square test analysis.

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RESULTS AND DISCUSSION

The group of study subjects was divided into two, namely asthma and non-asthma patients. Characteristics of research subjects asthma and non-asthma respondents were predominantly female. The age of the respondents of both groups also included the late adolescent age (17 yr to 25 yr). Based on the results of the study showed that information about the history of asthma treatment obtained only through interviews of each respondent and demographic data, in Table 1 it could be seen that asthma respondents who used inhaled short-acting β-2 agonists (73.08 %) and oral short-acting β-2 agonists (26.92 %) (**Table 1**).

Table 1. Frequency distribution of subject characteristics

Characteristics		Asthma Group		Non-Asthma Group	
		Frequency (n: 26)	Percentage (%)	Frequency (n: 26)	Percentage (%)
Gender	Male	7	26.92	6	23.08
	Female	19	73.08	20	76.92
Age (yr)	17 to 19	26	100.00	26	100.00
Asthma treatment history	Oral short-acting β-2 agonist	7	26.92		
	Inhaled short-acting β-2 agonist	19	73.08		

The test resulted in the validity of each question item on the questionnaire regarding knowledge of sun exposure related to vitamin D was valid because $r_{count} > 0.361$ while for reliability test results with Cronbach's alpha reliability value 0.61 to 0.80 obtained the alpha coefficient reliability value of each question item was 0.709, so the questionnaire regarding knowledge of sun exposure related to vitamin D was reliable. Most subjects had high knowledge regarding knowledge of sun exposure related to vitamin D in subjects with asthma (73.08 %) and non-asthma (84.62 %) (**Table 2**). Profile answers to the knowledge of sun exposure related to vitamin D can be seen in **Table 3**.

Table 2. Distribution of knowledge levels of sun exposure

Characteristics		Asthma Group		Non-Asthma Group	
		Frequency (n: 26)	Percentage (%)	Frequency (n: 26)	Percentage (%)
Gender	Male	7	26.92	6	23.08
	Female	19	73.08	20	76.92
Age (yr)	17-19	26	100.00	26	100.00
Asthma treatment history	Oral short-acting β-2 agonist	7	26.92		
	Inhaled short-acting β-2 agonist	19	73.08		

Table 3. Answer profile knowledge of sun exposure

Knowledge of Sun Exposure	Asthma Group		Non-Asthma Group	
	Frequency (n: 26)	Percentage (%)	Frequency (n: 26)	Percentage (%)
Subject had heard information about Vitamin D.	24	92.31	22	84.62
The information about Vitamin D from ...				
Health team	5	19.23	5	19.23
Family	7	26.92	5	19.23
Book	6	23.08	9	34.62

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Knowledge of Sun Exposure	Asthma Group		Non-Asthma Group	
	Frequency (n: 26)	Percentage (%)	Frequency (n: 26)	Percentage (%)
School	16	61.54	15	57.69
Internet	5	19.23	4	15.38
Subject thought sun is the biggest source of vitamin D.	19	73.08	15	57.69
Subject thought vitamin D is beneficial for bone formation	21	80.77	18	69.23
Subject thought vitamin D deficiency cause ...				
Cancer	8	30.77	5	19.23
Bone disease	23	88.46	21	80.77
Hypertension	4	15.38	4	15.38
Subject thought the cause of the body could be deficient in vitamin D is ...				
Using an umbrella during the day	6	23.08	7	26.92
Using closed clothes	7	26.92	10	38.46
Using sunscreen	5	19.23	13	50.00
Subject thought the sun could help produce vitamin D.	9	34.62	21	80.77
Subject thought sunlight is harmful to the skin.	24	92.31	21	80.77
Subject thought time needed for the body to be exposed to sunlight is at 10.00 to 14.00.	1	3.85	0	0.00
Subject thought ideal duration for the body to get vitamin D from sun exposure is 15 min to 30 min	11	42.31	13	50.00
Subject thought the amount of SPF that is good for the body is more than ≥ 15	11	42.31	9	34.62

The results of the validity test on the attitude aspect, each question item on the questionnaire regarding attitudes of sun exposure related to vitamin D was valid because $r_{coun\ t} > 0.361$. The reliability test results of the questionnaire expressed reliably if the reliability of Cronbach's alpha was 0.61 to 0.80 and the value obtained from each question item, the alpha coefficient was 0.704, so the questionnaire regarding attitudes of sun exposure related to vitamin D was reliable.

Attitude assessment was seen from the respondent's answers in each question in the questionnaire regarding attitudes of sun exposure related to vitamin D. Each question in the questionnaire were given two points if the respondent is considered likely to have poor attitude of sun exposure that can be at risk of vitamin D deficiency In the asthma group, showed that there were 73.08 % of respondents had high knowledge and there were 3.85 % of respondents who had good attitude and 96.15 % who had poor attitude of sun exposure related to vitamin D. Whereas in the group non-asthma, that no respondent had good attitude and 100 % who had poor attitude of sun exposure related to vitamin D (**Table 4**). Profile answers to attitudes to sun exposure related to vitamin D can be seen in **Table 5**.

Table 4. Distribution of attitude levels of sun exposure

Number of Right Questions	Attitude Levels of Sun Exposure	Asthma Group		Non-Asthma Group	
		Frequency (n: 26)	Percentage (%)	Frequency (n: 26)	Percentage (%)
≤ 9 item	Good	1	3.85	0	0.00
> 9 item	Poor	25	96.15	26	100

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p-ISSN 2723-097X

Table 5. Answer profile attitude of sun exposure

Attitude of Sun Exposure	Asthma Group		Non-Asthma Group	
	Frequency (n: 26)	Percentage (%)	Frequency (n: 26)	Percentage (%)
Subject were often traveling or taking a walk in direct sunlight.	16	61.54	16	61.54
Subject got sun exposure for > 20 min d^{-1}	17	65.39	10	38.46
Subject avoided direct sun exposure.	23	88.46	19	73.08
Subject used skin protective equipment to avoid sun exposure	23	88.46	25	96.15
e of protective equipment used by the subject:				
Jacket	19	73.08	25	96.15
Sunblock	4	15.38	8	30.77
Jacket and sunblock	7	26.92		
Others			5	19.23
Reason for the subject to use skin protective equipment:				
Followed religious / belief orders	2	7.69	0	0.00
Avoided blackened skin	11	42.31	3	11.54
Avoided heat	6	23.08	6	23.08
Was easier for application	2	7.69	10	38.46
Avoided the wind	1	3.85	1	3.85
Avoided black & sweaty skin	1	3.85	0	0.00
The subject did not take vitamin D supplements.	16	61.54	16	61.54
The subject felt sufficient vitamin D needs in the body.	9	34.62	12	46.15
The subject had an interest in knowing more about vitamin D.	21	80.77	23	88.46

The results of the normality test related to physical activity on the respondents of asthma and non-asthma had P_{value} (0.185) > α_{value} (0.05) so that it was concluded that the two groups of respondents have data that was normally distributed. The results of homogeneity test related to physical activity in the respondents of asthma and non-asthma had P_{value} (0.104) > α_{value} (0.05) so that it was concluded that the existing data had the same variant. The result of chi-square test related to physical activity of asthma and non-asthma respondents had $p < 0.001$, so it was concluded that there were significant differences related to physical activity in asthma and non-asthma respondents.

Table 6 showed that most subjects who had good knowledge also had severe physical activity, both in asthma patients (57.69 %) and non-asthma (42.08 %). In contrast to the attitude data, asthma subjects with vigorous activity mostly had poor attitudes (76.92 %). While non-asthma subjects with a poor attitude had moderate physical activity (50 %) (**Table 7**).

The chi-square test results on knowledge data showed that there was no correlation between knowledge to physical activity, both in the asthma group (P_{value} (0.657) > α_{value} (0.05)) and non-asthma (P_{value} (0.109) > α_{value} (0.05)). There was a relationship between attitudes of sun exposure and physical activity in the asthma group (p (0,000) < 0.05), but in the non-asthma group it could not be analyzed because all have a poor attitude.

e-ISSN 2722-8169
p-ISSN 2723-097X

Table 6. Cross tabulation between knowledge of sun exposure and physical activity

Physical activity	Knowledge Levels of Sun Exposure											
	Asthma Group (n: 26)						Non-Asthma Group (n: 26)					
	High		Low		TOTAL		High		Low		TOTAL	
	n:	Percentage (%)	n:	Percentage (%)	n:	Percentage (%)	n:	Percentage (%)	n:	Percentage (%)	n:	Percentage (%)
mild	1	3.85	0	0	1	3.85	1	3.85	1	3.85	2	3.85
moderate	3	11.54	2	7.69	5	19.23	10	38.46	3	11.54	13	50.00
vigorous	15	57.69	5	19.23	20	76.92	11	42.31	0	0	11	42.31

Table 7. Cross tabulation between attitude of sun exposure and physical activity

Physical activity	Attitude Levels of Sun Exposure											
	Asthma Group (n: 26)						Asthma Group (n: 26)					
	Good		Poor		TOTAL		Good		Poor		TOTAL	
	n:	Percentage (%)	n:	Percentage (%)	n:	Percentage (%)	n:	Percentage (%)	n:	Percentage (%)	n:	Percentage (%)
mild	0	0	1	3.85	1	3.85	0	0	2	7.69	2	7.69
moderate	1	3.85	4	15.38	5	19.23	0	0	13	50.00	13	50.00
vigorous	0	0	20	76.92	20	76.92	0	0	11	42.31	11	42.31

The level of knowledge of sun exposure had a relationship with vitamin D levels because knowledge of the risks to sun exposure that can cause skin cancer made subjects afraid to be exposed to sunlight, most respondents used sunscreen to protect the skin from sun exposure so that it could increase the risk the occurrence of vitamin D deficiency. Vitamin D can help bone formation because has a function to absorb calcium and phosphorus from the intestine for bone mineralization.[33] The biggest source of vitamin D is the sun. Vitamin D is a vitamin produced by the body naturally when exposed to sunlight because UVB radiation contained in sunlight can convert provitamin D under the skin to active vitamin D. More than 90 % of the need for vitamin D comes from sun exposure, while for other sources only produces a little vitamin D.[34]

Another benefit of vitamin D that is being developed is as an immune system that can fight infection can maintain cardiovascular conditions, maintain muscle function, and as an immunomodulator that can inhibit inflammatory reactions.[35] A body that lacks vitamin D can cause cancer, bone disease, and high blood pressure. Protective devices may be used, but the body's need for sun exposure in order to produce vitamin D must be met. In this study the attitude of subjects to sun exposure can be viewed from each respondent's answer to the questions contained in the questionnaire regarding attitudes of sun exposure related to vitamin D. Attitude assessment was divided into two categories, namely good attitude and poor attitude categories. Each question item will be given a score of two points if the respondent is considered likely to have an attitude that is at risk of experiencing vitamin D deficiency.

In this questionnaire there are nine questions yielding a maximum value of eighteen points, if from the respondent's answer produces $\leq$ 9 points then good attitude can be categorized, but if > 9 points, the attitude of respondents is categorized as poor attitude. Consuming supplements that contain vitamin D can be used as a source of vitamin D. Based on the results that respondents can consume supplements but not supplements that contain vitamin D, most of the respondents took supplements that contain vitamin C, supplements for endurance, and supplements for the skin.

IPAQ (International Physical Activity Questionnaire) questionnaire,[30] had been translated, and then the construct had been

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validated by peer-group. The questionnaires had been validated and was tested on 20 respondents. As a result of the questionnaire trial, most of the respondents had difficulty relating to moderate physical activity or vigorous physical activity. Modifications were made to overcome the possibility of biased data; the questionnaire was modified by collecting data on physical activity classified as mild, moderate, and vigorous. This was what distinguishes the questionnaire used in which the subject did not need to determine the level of physical activity they were doing (the physical activity of mild, moderate, or vigorous), but only describes the type and frequency of physical activity. The modification questionnaire contained various physical activities validated by 20 other subjects to find out whether there was physical activity outside of the given list and then made into one same physical activity questionnaire. Respondents who were given this modification questionnaire were more understanding about the physical activity questionnaire.

Adequate and controlled physical activity has many benefits in asthma: i) adequate and controlled physical activity can reduce inflammation in the respiratory tract;[36] ii) can reduce asthma symptoms that occur and improve quality of life,[25] and iii) reduce the risk of asthma exacerbations.[25] Good physical activity is to do at least 150 min wk^{-1} of physical activity that is classified as moderate or does at least 75 min wk^{-1} of relatively heavy physical activity or equivalent moderate to heavy physical activity.[37] In this study, there were five most physical activities carried out by respondents were driving a vehicle such as a car/motorcycle, walking more than 100 m, cooking, washing, and cleaning room/house. Physical activity driving car/motor vehicle were mild physical activity, and physical activity of cooking, washing, and cleaning the room/house were vigorous physical activity. Respondents who engaged in vigorous physical activity had spent at least 100 min wk^{-1} doing activities, exceeding the recommended limit for optimal physical activity. There were significant differences between respondents with asthma and non-asthma related to physical activity. Asthma respondents did more physical activity that was classified as more severe than non-asthma respondents. Many factors can affect a person's physical activity, but in this study did not see the underlying factors. Therefore further research is needed to be able to explore the influencing factors, such as time ("day"), intrinsic (eg: mood), extrinsic (eg: environment), and resources.[24,37]

Physical activity can also affect vitamin D levels in the blood. A study,[38] stated that there is an increase in plasma concentration of vitamin D in someone who is physically indoors and outdoors. Other studies,[39] in a total of 6 370 respondents aged 18 yr and over were measured for vitamin D levels and physical activity. The results of their study were physical activity can be one way to achieve higher vitamin D levels, where physical activity for at least 10 min was classified as moderate in a day for at least seven consecutive days, can increase the circulation of vitamin D in the blood. Measurement of physical activity could be done in various ways, such as using self-report questionnaires (IPAQ-S, RPAQ, PAR), using accelerometers, and using pedometers. Using self-report questionnaires had the advantage of being low cost, not charging respondents, and getting the flow of physical activity that respondents do. The self-report questionnaires method also had weaknesses, which have low accuracy and reliability, because the data was obtained

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based on the respondents' memories. In this study, physical activity measurements did not use accelerometers because of the inability to measure various physical activities. This study also did not use pedometers to measure physical activity because it was limited to physical activity on foot.[40]

Most asthma subjects had high knowledge of sun exposure, but they had a poor attitude. They mostly do vigorous physical activity compared to non-asthma subjects. Non-asthma subjects also mostly had high knowledge of sun exposure, and all of them had a poor attitude. This result were in line with previous research,[16] which aims to explore participants' knowledge about vitamin D and attitudes toward sun exposure. This study also aimed to explore social and cultural factors that have the potential to contribute to vitamin D deficiency in Saudi Arabia. In addition, study participants identified several barriers to sun exposure, including hot climates, living in high-rise buildings, limited public areas that allow outdoor activities, lifestyle issues such as physical activity, and some religious issues such as wearing a hijab. Some respondents believed that the Saudi lifestyle might be the reason for the high prevalence of vitamin D deficiency in this country. They pointed to several problems related to indoor lifestyle and lack of physical activity as a barrier to achieving adequate serum vitamin D levels. several lifestyle factors, such as using a car for transportation and rarely walking outside and physical activity, led to reduced opportunities for sun exposure. It also had a significant impact on public health with respect to the amount of physical activity needed to prevent chronic diseases such as obesity and coronary heart disease.

CONCLUSION

There was no correlation between knowledge of sun exposure and levels of physical activity, both in asthma and non-asthma groups. There was a relationship between attitudes towards sun exposure and physical activity in the asthma group, but in the non-asthma group, it could not be analyzed because all have a poor attitude.

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