JOURNAL OF PUBLIC HEALTH AND COMMUNITY MEDICINE
2024; 1(4): 143-151.
10.5455/JPHCM.20240706033121

WisdomGale

ORIGINAL ARTICLE

Open Access

Effectiveness of vitamin d3 supplements in Javanese ethnic with stable asthma in Indonesia: Improving asthma symptoms by identifying vdr gene polymorphism

Nyoman Budiartha Siada[1], Amelia Lorensia[2], Mariana Wahjudi[3]

[1]Postgraduate Student of Master of Pharmacy Science, Faculty of Pharmacy, University of Surabaya, Surabaya, Indonesia
[2]Departement of Clinical-Community Pharmacy, Faculty of Pharmacy, University of Surabaya, Surabaya, Indonesia
[3]Departement of Purification and Molecular Biology, Faculty of Biotechnology, University of Surabaya, Surabaya, Indonesia

ABSTRACT

Background: Monitoring asthma control is crucial as it directly impacts the patient's quality of life. The asthma control test (ACT) questionnaire is used to assess clinical symptoms for asthma control. Vitamin D deficiency can influence asthma symptoms. A study was conducted to evaluate how vitamin D affects symptoms in asthma patients through the identification of VDR gene polymorphism.

Method: This research was an experimental study with a pre-post test design method. Sampling with purposive sampling and snowball sampling techniques. To see an increase in clinical symptoms of asthma using a one-way ANOVA test and a descriptive technique for the VDR gene polymorphism test.

Result: The study sample was about 26 people aged ≥18 years with a minimum education level of SMA. Vitamin D was given at a dose of 400 IU for 8 weeks. ACT increased significantly in treatment frequency (p = 0.011), asthma control (p = 0.03, p = 0.02), and total ACT (p = 0.014, p = 0.023). There was a change in the increase in ACT scores at week 0 and week 8 after giving intervention in the form of vitamin D3. Improvements occurred in asthma control rates and total ACT scores. In this study, the distribution of the Taq1 polymorphism was the same between the control and test groups, namely the homozygous wild type.

Conclusion: Vitamin D supplementation has been shown to be effective in improving symptom control in asthma patients with wild-type homozygotes.

ARTICLE HISTORY

Received 06 July 2024
Accepted 15 October 2024
Published 01 November 2024

KEYWORDS

Asthma symptoms; vitamin D; VDR

Introduction

Respiratory diseases affect every country and all socioeconomic groups. The cost of lung disease reaches billions of dollars every year due to lost productivity and medical expenses [1,2]. In Indonesia alone, in 2013 there were 18 provinces that had an asthma prevalence that exceeded the national figure which reached 4.5%. Based on data from the Ministry of Health for 2020, Asthma is one of the most common types of disease suffered by Indonesian people. By the end of 2020, the number of asthma sufferers in Indonesia was 4.5% of the total population of Indonesia, or more than 12 million [3]. Therefore, asthma is a health problem that needs serious attention because it can interfere with one's activities.

Asthma treatment is an important key in controlling asthma symptoms. But asthma is also heavily influenced by the patient's lifestyle which is not good and can then trigger asthma symptoms. There have been many studies addressing the effects of nutrition on asthma [1,4]. One of the nutrients currently being studied is the use of vitamin D which shows a role in improving asthma symptoms as done by Salmanpour et al. [4], Lorensia et al. [5], Ogeyingbo et al. [6], and Alvi et al. [7]. In theory, vitamin D intake contributes to improving respiratory tract function to reduce asthma symptoms.

Contact Amelia Lorensia ✉ amelia.lorensia@gmail.com; amelia.lorensia@staff.ubaya.ac.id Departement of Clinical-Community Pharmacy, Faculty of Pharmacy, University of Surabaya, Surabaya, Indonesia.

Vitamin D levels are significantly related to asthma control levels, because the lower the vitamin D levels, the less controlled asthma is [6,8]. Vitamin D and asthma are a relationship between vitamin D intake and the inflammatory reaction that occurs in asthma, and low levels of vitamin D in asthmatic patients are at risk of increasing the severity of asthma [6,9,10]. Asthma therapy can be considered effective through monitoring during therapy. Monitoring the effectiveness of asthma treatment is a decrease in asthma symptoms. The instrument used to measure the increase in asthma symptoms is the Asthma Control Test (ACT), which is a simple, self-administered questionnaire and an easy-to-calculate assessment tool [11,12]. The ACT is a simple alternative instrument that can be used to assess asthma severity without the use of special tools [11,12].

Despite increasing public awareness about the various health benefits of vitamin D, epidemiological studies have revealed a very high prevalence of vitamin D deficiency worldwide, especially in Asian countries [13–15]. Indonesia, which is a tropical country and there is a lot of exposure to sunlight and sun, is not spared from the problem of deficiency of vitamin D intake [16,17]. This was proven by Poh et al. [18], through a cross-sectional study involving 16,744 participants in Southeast Asia including Indonesia.

The effect of a treatment can differ from one person to another and is closely related to a person's genetics because genetic factors contribute to a range of 20%–95% for different drugs [19]. Vitamin D is known to regulate receptors involved in processes of inflammation, immunity, and cell proliferation. The target for vitamin D activity is the vitamin D receptor (Vitamin D Receptor/VDR). Upon entering the cell, vitamin D binds to the VDR, and forms an active complex that translocates to the nucleus to bind to the vitamin D response element (Vitamin D Receptor Element/VDRE) in the genome [20,21]. VDR becomes active at the cellular level in lung tissue. The VDR gene itself is located on chromosome 12, which also binds to genes that determine the diagnosis of asthma and the severity of asthma [20]. Through a series of complex mechanisms, it is hoped that vitamin D intake can improve asthma control associated with genetic polymorphisms. The association of the VDR gene polymorphism with asthma is supported by a systematic review, meta analysis conducted by Tizaoui et al. [21], in eight case-control studies which showed that there was a relationship between the Taq1, Bsm1, and Fok1 polymorphisms in VDR with the susceptibility of developing asthma, especially Taq1. Now genetic information is needed to achieve optimal treatment. In Indonesia, no research has been conducted on the relationship between vitamin D and asthma, which is associated with the VDR gene polymorphism.

This study aimed to determine the effectiveness of vitamin D in asthma symptoms in adult asthma participants (≥18 years) who have at least high school or equivalent education. The educational level can affect asthma control [22]. The purpose of this study was to analyze the increase in clinical symptoms by administering vitamin D to outpatient asthma as measured by the ACT questionnaire by identifying VDR gene polymorphism.

Method

Research design

The research design used in this study was a one-group pre-post test design, to determine the effectiveness before and after administration of vitamin D supplementation on improving asthma symptoms. This research will be conducted for 8 weeks according to the results of research from Menon et al. [23]. Vitamin D products that use vitamin D3 at a dose of 400 IU comply with BPOM regulations which say that the maximum dose of vitamin D is 400 IU per day orally [24]. The study was conducted from May to September 2023. The ethical test score was 127/KE/V/2023 from the University of Surabaya.

Asthma symptoms were measured using the ACT questionnaire. ACT was a specific instrument for assessing asthma control in chronic asthma patients who describe the participant's current asthma condition. It consists of five questions covering restricted activity, duration of congestion, nocturnal asthma symptoms, frequency of use of reliever medication, and asthma control calculated over 4 weeks. Each question was given a 5-Likert scale answer choice. Patients will complete the ACT at study entry (week 0), fourth week, and eighth week after being given the intervention [25]. The range of values for this questionnaire was 5–25. A score of 20–25 was defined as well-controlled asthma, 16–20 was defined as uncontrolled asthma, and 5–15 is considered very poorly controlled asthma. The contents of this questionnaire consist of 4 questions related to symptoms plus the patient's opinion regarding asthma control [11,12].

The genetic factor studied is the vitamin D receptor (VDR). The interaction of VDR with

1,25-dihydroxyvitamin D3 affects various biological activities, such as regulation of helper T cell activation and cytokine secretion. VDR has 4 common SNPs (Single-Nucleotide Polymorphism), namely TaqI, FokI, ApaI, and BsmI. In this study, one of the SNPs considered to have the most influence was examined, namely TaqI [21]. In this study, sampling was carried out using the buccal swab method because the method was easier and considered convenient for the participants.

Population and Sample

The study population was asthma patients in the city of Surabaya, East Java, Indonesia. Subjects in this study were asthmatic patients who had met the inclusion and exclusion criteria and had filled out an informed consent form with criteria including: age ≥18 years, minimum high school education, having respiratory/kidney/heart problems, non-smokers, and not using asthma medications continuously (according to GINA Guideline [26], in step 1). The sampling technique used was purposive sampling to select the research sample. The sample calculation method uses the equation of the Lameshow formula (n = Z2.P.Q/d^2), with Z = 1.96; p = 0.017; Q = 1-0.017 = 0.983; and d = 0.05. Thus, the minimum sample size (n) was 25.67∼26 people. Participants in this study were obtained by purposive sampling and snowball sampling methods. This sampling was carried out by searching for stable asthma patients who live in the Rungkut sub-district, and then the search for potential research subjects was developed by asking other research subjects.

Methods of data collection and data analysis

Asthma symptoms were measured using the ACT questionnaire which was carried out before being given treatment, week 4, and week 8 after being treated. The VDR gene polymorphism will be tested at the Purification and Molecular Biology Laboratory, Faculty of Biotechnology, University of Surabaya. Genomic DNA was extracted from SK-2 buccal swabs using the QIAmp DNA Mini kit (Qiagen) protocol. The genomic DNA of each participant was used as a template for the PCR reaction [27]. PCR reactions were carried out in GoTaq Green 2x Master mix PCR reaction mixture (Promega). There are several types of PCR techniques depending on the purpose. In this study, the technique used was PCR-ARMS (Amplification Refractory Mutation System) to identify genomic DNA polymorphisms. The primers used in this analysis were Taq1 primers with sequences Taq1/TT (wild) CAGGACGCCGGCGCTGATT, Taq1/tt (mutant) CAGGACGCCGCGCTGATC.

Asthma symptom analysis was tested for normality of data distribution using the Shapiro-Wilk test. If the p value > 0.05, then the data were normally normally distributed [28]. Then different tests were performed with one-way ANOVA.

Result and Discussion

The study was filling out questionnaires to participants and providing interventions in the form of capsules containing Vitamin D3 400IU. Participants in this study were stratified by sex, age, and medical history (Table 1). The number of research samples based on the characteristics of the participants including age and gender. The largest age category was late adolescent patients (17–25 years) which was 92.60% and the highest number were women, namely 84.6%.

This study used vitamin D3 at a dose of 400 IU which was taken once a day. The use of vitamin D in Indonesia is limited by BPOM with a daily dose of only 400 IU. However, in the RDA table

Table 1. Distribution of research subject frequency characteristics.

Characteristics		Frequency (n: 26)	Percentage (%)
Gender	Male	4	15.40
	Female	22	84.60
Age (years)	Late adolescence (17–25)	25	96.15
	Early adulthood (26–35)	1	3.85
Treatment history	Oral short-acting beta-2 agonists (if needed)	5	19.23
	Inhaled short-acting beta-2 agonist (if needed)	9	34.62
	Not currently using any medication	11	3.85
	Oral corticosteroids (only used if symptoms worsen)	1	42.31

Table 2. Frequency distribution of control asthma symptom values.

ACT Questions	Category	ACT Assessment					
		T0		T4		T8	
		Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
Asthma control based on activity limitation (over the past 4 weeks)	Always	0	0	0	0	0	0
	Often	0	0	1	3.85	0	0
	Sometimes	0	0	1	3.85	3	11.54
	Seldom	24	92.31	20	76.92	16	61.54
	Never	2	7.69	4	15.38	5	19.23
	Total	26	100	26	100	26	100
Asthma control based on the frequency of shortness of breath (during the last 4 weeks)	Always	0	0	1	3.85	0	0
	Often	0	0	1	3.85	0	0
	Sometimes	1	3.85	1	3.85	1	3.85
	Seldom	17	65.38	14	53.85	15	57.69
	Never	8	30.77	9	34.61	10	38.46
	Total	26	100	26	100	26	100
Asthma control Based on Asthma symptoms that cause night awakenings (in the past 4 weeks)	≥ 4 times a week	0	0	2	7.69	0	0
	2–3 times a week	2	7.69	1	3.85	3	11.54
	Once a week	3	11.54	3	11.54	1	3.85
	1–2 times a month	10	38.46	5	19.23	9	34.61
	Never	11	42.31	15	57.69	13	50.00
	Total	26	100	26	100	26	100
Asthma control based on frequency of use of asthma reliever medications (during the last 4 weeks)	≥ 3 times a day	1	3.85	0	0	0	0
	1–2 times a day	1	3.85	2	7.69	0	0
	2–3 times a week	2	7.69	2	7.69	1	3.85
	≤ 1 time a week	10	38.46	7	26.92	8	30.77
	Never	12	46.15	15	57.69	17	65.38
	Total	26	100	26	100	26	100
Asthma control based on level of asthma control (over the past 4 weeks)	Not controlled at all	0	0	0	0	0	0
	Less controlled	6	23.08	2	7.69	1	3.85
	Pretty controlled	6	23.08	4	15.38	4	15.38
	Well controlled	11	42.31	12	46.15	14	53.85
	Completely controlled	3	11.54	6	23.08	7	26.92
	Total	26	100	26	100	26	100
Total ACT Score	Not controlled (≤ 19)	0	0	2	7.69	0	0
	Partially controlled (20-24)	14	53.85	5	19.23	9	34.62
	Fully controlled (25)	12	46.15	19	73.08	17	65.38
	Total	26	100	26	100	26	100

T0 = Observations at week 0
T4 = Observations in the 4th week
T8 = Observations in the 8th week

from PERMENKES No. 75 of 2013 regarding the amount of nutritional adequacy recommended for Indonesians, it is stated that the need for Vitamin D per day for adults is 15 mcg or 600 IU [29]. Vitamin D has the ability to help absorb calcium. If the consumption of vitamin D is excessive, it will increase the absorption of calcium and cause high levels of calcium in the blood (hypercalcemia). Symptoms of

Table 3. Changes in asthma symptom control values with vitamin D therapy.

ACT Questions	ACT Assessment	Changes in ACT scores (*n*: 26)		
		increase	Fixed	Decrease
Asthma control based on activity limitation (over the past 4 weeks)	T0 & T4	3	20	3
	T0 & T8	6	16	4
Asthma control based on the frequency of shortness of breath (during the last 4 weeks)	T0 & T4	6	16	4
	T0 & T8	6	15	5
Asthma control based on asthma symptoms that cause night awakenings (in the past 4 weeks)	T0 & T4	9	12	5
	T0 & T8	8	14	4
Asthma control based on frequency of use of asthma reliever medications (during the last 4 weeks)	T0 & T4	9	13	4
	T0 & T8	9	16	1
Asthma control based on level of asthma control (over the past 4 weeks)	T0 & T4	14	10	2
	T0 & T8	17	6	3
Total ACT Score	T0 & T4	18	2	6
	T0 & T8	19	3	4

T0 = Observations at week 0
T4 = Observations in the 4th week
T8 = Observations in the 8th week

hypercalcemia are nausea, vomiting, fatigue, confusion, and frequent urination [30,31].

The highest number of each ACT question did not change between weeks 0, 4, and 8 (Table 2). Based on the normality test of the *p* values of the five ACT questions and the total ACT scores indicate scores, both at T0, T1, and T2 show *p* values < 0.05, meaning that the data distribution is not normal.

Table 3 shows that most of the participants experienced improved asthma control. And when viewed from the total ACT score, the majority of participants experienced an increase.

The results showed that changes in ACT values increased from 14 participants (53.85%) who were not controlled for conditions before therapy and then became well controlled in 17 participants (65.38%) at the end of therapy. Although participants experienced improvement in ACT scores, there are several factors that can influence ACT scores, including:

a. Gender and age [32,33]. At the time before puberty, male asthma patients are more than female. However, when entering adulthood what happens is the opposite, namely the prevalence of female asthma patients is greater than that of men.
b. Genetic factors contribute to the severity of asthma and the effects of asthma medications [34,35].
c. Exposure triggers or triggers for asthma flare-ups due to factors such as contact with triggers, food, excessive physical activity, and so on. May affect the control of asthma symptoms [33,36,37].

Table 4 showed that there was a significant improvement in asthma control rates and total ACT values from both 4 weeks of Vitamin D administration and up to 8 weeks of Vitamin D administration.

Genetic test results on 26 patients, it was found that 1 sample could not be identified, so only 25 genetic samples were obtained. Figure 1 shows an example of the electrophoretic results of the VDR polymorphism using the Taq1 SNP. Figures showing the presence of a single band in the T region only as seen in T7 indicates the presence of a wild-type homozygote allele. The images showing the presence of double bands on T and t as in T8-t8 indicate the presence of heterozygote alleles. Each reaction contains an Internal Control to ensure the success of the amplification process.

Polymorphism testing in this study used the Amplification Refractory Mutation System method which had previously been used by Lombard et al. [38] in detecting VDR gene polymorphisms. Participants were divided into control and test groups as shown in Table 5. The SNP used is Taq1 because it refers to research from Tizaoui et al. [21] and Papadopoulou et al. [39], which showed that the polymorphism of Taq1 in VDR had an effect on asthmatic conditions. There are also studies saying that Taq1 has an important role in the balance of TH1 and TH2 in the immune system [40].

Table 4. Tests of different values for controlling asthma symptoms with vitamin D therapy.

ACT Questions	Average ACT Score			*p* value		Test used
	T0	T4	T8	T0 & T4	T0 & T8	
Asthma control based on activity limitation (over the past 4 weeks)	4.08	4.04	4.15	1.000	0.527	Friedman Test
Asthma control based on the frequency of shortness of breath (during the last 4 weeks)	4.27	4.12	4.35	1.000	0.527	Friedman Test
Asthma control based on asthma symptoms that cause night awakenings (in the past 4 weeks)	4.15	4.15	4.23	0.405	0.248	Friedman Test
Asthma control based on frequency of use of asthma reliever medications (during the last 4 weeks)	4.19	4.35	4.62	0.166	0.011*	Friedman Test
Asthma control based on level of asthma control (over the past 4 weeks)	3.42	3.92	4.04	0.03*	0.002*	Friedman Test
Total ACT Score	19.65	20.58	21.27	0.014*	0.023*	Friedman Test

* = there is a significant difference ($p < 0.05$, Ho is rejected, meaning there is a significant difference).
T0 = Observations at week 0
T4 = Observations in the 4th week
T8 = Observations in the 8th week

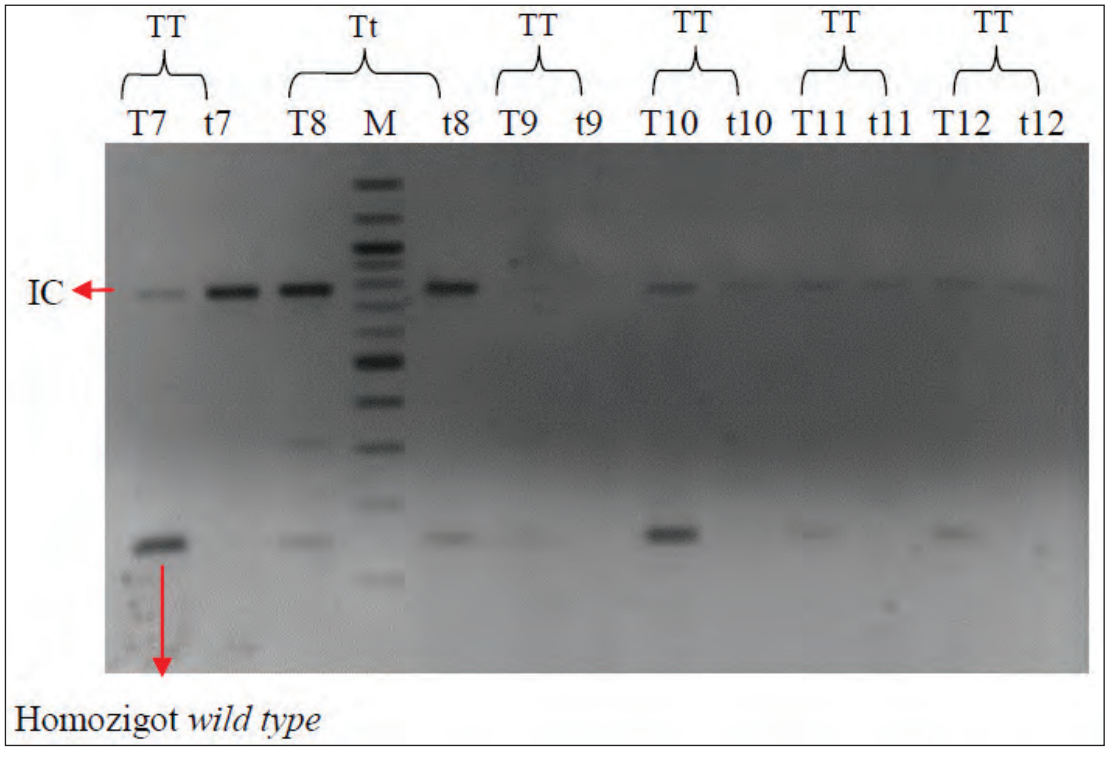

Figure 1. Snippet of observation results of genetic polymorphism.

Information :
TT = wild type homozygous allele
Tt = heterozygous allele
IC = Internal Control
M = Markers

In this study, most of the participants in the control and test groups were detected to have homozygous wild type (TT) polymorphisms, namely in the control group there were 8 people, in the test group there were 22 people. There were 2 participants who were heterozygous in the control group

Table 5. Frequency distribution of the effect of VDR gene polymorphism on changes in ACT values.

Genotype type	Test group (*n* = 25)				Control group
	Changes in ACT scores				
	Increase	Fixed	Decrease	Total	
Homozygote wild type (TT)	14	4	4	22	8
Homozygote mutant type (tt)	0	0	0	0	0
Heterozygote type (Tt)	1	0	0	1	2

and only 1 person in the test group. Participants did not find any homozygous mutant genotype (tt). The highest number was found in the wild homozygous polymorphism with ACT measurement results of 14 people experiencing improvement, 4 people experiencing no improvement, and 4 people experiencing decreased asthma control. In the heterozygous group, only 1 person who experienced improved asthma control was measured using ACT.

The results obtained by Papadopoulou et al. [39], who tested the VDR polymorphism in adolescent asthmatic patients in the Republic of Cyprus showed that there were significant differences in the distribution of the Taq1 polymorphism (TT, tt, Tt) in the control group and the asthmatic group. In a different experiment, when the vitamin D levels were normal in both the test and control groups, the homozygous mutant polymorphism (tt) was more prevalent in asthmatic patients. However, in this study, there was no treatment involving the administration of vitamin D. In this study, all participants showed most of the participants experienced an increase in ACT scores. Most of the participants had wild-type homozygous polymorphism (TT). When observed individually, both participants with the homozygous wild type (TT) or heterozygous (Tt) genotypes showed a response to vitamin D administration in the form of increased ACT values.

Conclusion

There was a change in the increase in ACT scores at week 0 and week 8 after giving intervention in the form of vitamin D3. Improvements occurred in asthma control rates and total ACT scores. In this study, the distribution of the Taq1 polymorphism was the same between the control and test groups, namely the homozygous wild type. Further research needs to focus on developing factors that can affect vitamin D levels, such as age, asthma severity, sun exposure, physical activity, and intake of foods containing vitamin D. In addition, the role of gene polymorphisms other than VDRs can also be developed.

References

1. GBD Chronic Respiratory Disease Collaborators. Prevalence and attributable health burden of chronic respiratory diseases, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet Respir Med 2020; 8(6):585–96; doi:10.1016/S2213-2600(20)30105-3
2. Quaderi SA, Hurst JR. The unmet global burden of COPD. Glob Health Epidemiol Genom 2018; 3:e4; doi:10.1017/gheg.2018.1.
3. Kementerian Kesehatan Direktorat Jenderal Pelayanan Kesehatan. Asma. 2022.. Available via https://yankes.kemkes.go.id/view_artikel/1433/asma (Accessed 12 Augst 2023).
4. Salmanpour F, Kian N, Samieefar N, Khazeei Tabari MA, Rezaei N. Asthma and vitamin D deficiency: occurrence, immune mechanisms, and new perspectives. J Immunol Res 2022; 2022:6735900; doi:10.1155/2022/6735900.
5. Lorensia A, Wahyudi M, Yudiarso A, Kurnia SED. Effect of illness perception on improving asthma symptoms with omega-3 fish oil therapy: pre-post design. *J App Pharm Sci*. 2020; 10(6):62–71; doi:10.7324/JAPS.2020.10609.
6. Ogeyingbo OD, Ahmed R, Gyawali M, Venkatesan N, Bhandari R, Botleroo RA, Kareem R, Elshaikh AO. The relationship between vitamin D and asthma exacerbation. Cureus 2021; 13(8):e17279; doi:10.7759/cureus.17279.
7. Alvi S, Syed JG, Nusrat B, Abbas Razvi SK, Shah ZZ, Shafaat Khan Y, Danish Khan M, Ali Khan M. Frequency of vitamin D deficiency in patients of asthma. Cureus 2021; 13(5):e14828; doi:10.7759/cureus.14828.
8. Ozkars MY, Keskin O, Almacioglu M, Kucukosmanoglu E, Keskin M, Balci O. The relationship between serum vitamin D level and asthma. North Clin Istanb 2019; 6(4):334–40; doi:10.14744/nci.2019.82195.
9. Ali NS, Nanji K. A review on the role of vitamin D in asthma. Cureus 2017; 9(5):e1288; doi:10.7759/cureus.1288.
10. Hall SC, Agrawal DK. Vitamin D and bronchial asthma: an overview of data from the past 5 years.

Clin Ther. 2017; 39(5):917–29; doi:10.1016/j.clinthera.2017.04.002.
11. Wahyuni AS, Hamid RZ, Syafiuddin T, Bachtiar A, Nerdy N. The correlation between adherence and asthma patients quality of life in medan, Indonesia. Open Access Maced J Med Sci 2018; 6(11):2198–205; doi:10.3889/oamjms.2018.362.
12. van Dijk BCP, Svedsater H, Heddini A, Nelsen L, Balradj JS, Alleman C. Relationship between the asthma control test (ACT) and other outcomes: a targeted literature review. BMC Pulm Med 2020; 20(1):79; doi:10.1186/s12890-020-1090-5.
13. Octavius GS, Shakila A, Meliani M, Halim A. Vitamin D deficiency is a public health emergency among Indonesian children and adolescents: a systematic review and meta-analysis of prevalence. Ann Pediatr Endocrinol Metab 2023; 28(1):10–9; doi:10.6065/apem.2244170.085.
14. Siddiqee MH, Bhattacharjee B, Siddiqi UR, Meshbahur-Rahman M. High prevalence of vitamin D deficiency among the South Asian adults: a systematic review and meta-analysis. BMC Public Health 2021; 21(1):1823; doi:10.1186/s12889-021-11888-1.
15. Jiang Z, Pu R, Li N, Chen C, Li J, Dai W, Wang Y, Hu J, Zhu D, Yu Q, Shi Y, Yang G. High prevalence of vitamin D deficiency in Asia: a systematic review and meta-analysis. Crit Rev Food Sci Nutr 2023; 63(19):3602–11; doi:10.1080/10408398.2021.1990850.
16. Lorensia A, Suryadinata RV, Inu IA. Comparison of vitamin D status and physical activity related with obesity in student. *J App Pharm Sci* 2022; 12(4):108–18; doi:10.7324/JAPS.2022.120412.
17. Suryadinata RV, Boengas S, Lorensia A. Effect of knowledge and attitude toward sun exposure related vitamin D to lung function. Teikyo Med J 2021; 44(4):957–69.
18. Poh BK, Rojroongwasinkul N, Nguyen BKL, Ruzita AT, Yamborisut U, Hong TN, Ernawati E, Deurenberg P, Parikh P, SEANUTS Study Group. 25-hydroxy-vitamin D demography and the risk of vitamin D insufficiency in the South East Asian Nutrition Surveys (SEANUTS). Asia Pac J Clin Nutr 2016; 25(3):538–48.
19. Oates JT, Lopez D. Pharmacogenetics: an important part of drug development with a focus on its application. Int J Biomed Investig 2018; 1(2):111; doi:10.31531/2581-4745.1000111.
20. Galvão AA, de Araújo Sena F, Andrade Belitardo EMM, de Santana MBR, Costa GNO, Cruz ÁA, Barreto ML, Costa RDS, Alcantara-Neves NM, Figueiredo CA. Genetic polymorphisms in vitamin D pathway influence 25(OH)D levels and are associated with atopy and asthma. Allergy Asthma Clin Immunol 2020; 16:62; doi:10.1186/s13223-020-00460-y.
21. Tizaoui K, Berraies A, Hamdi B, Kaabachi W, Hamzaoui K, Hamzaoui A. Association of vitamin D receptor gene polymorphisms with asthma risk: systematic review and updated meta-analysis of case-control studies. Lung 2014; 192(6):955–65; doi:10.1007/s00408-014-9648-8.
22. Emilio CC, Mingotti CFB, Fiorin PR, Lima LA, Muniz RL, Bigotto LH, Marchi E, Ponte EV. Is a low level of education a limiting factor for asthma control in a population with access to pulmonologists and to treatment? J Bras Pneumol 2019; 45(1):e20180052; doi:10.1590/1806-3713/e20180052.
23. Menon B, Nima G, Dogra V, Mittal A, Kaur C, Mittal U. Evaluation of vitamin D in bronchial asthma and the effect of vitamin D supplementation on asthma severity and control: a randomised control trial. Eur Respir J 2014; 44(Suppl. 58).
24. Badan Pengawas Obat dan Makanan. Keputusan Kepala Badan Pengawas Obat dan Makanan Tentang Ketentuan Pokok Pengawasan Suplemen Makanan. BPOM. 2004. Available via https://asrot.pom.go.id/img/Peraturan/Keputusan%20Kepala%20BPOM%20No.%20HK.00.05.23.3644%20tentang%20Ketentuan%20Pokok%20Pengawasan%20SM.pdf (Accessed 12 Augst 2023).
25. Soler X, Holbrook JT, Gerald LB, Berry CE, Saams J, Henderson RJ, Sugar E, Wise RA, Ramsdell JW. Validity of the asthma control test questionnaire among smoking asthmatics. J Allergy Clin Immunol Pract 2018; 6(1):151–8; doi:10.1016/j.jaip.2017.05.010.
26. Reddel HK, Bacharier LB, Bateman ED, Brightling CE, Brusselle GG, Buhl R, Cruz AA, Duijts L, Drazen JM, FitzGerald JM, Fleming LJ, Inoue H, Ko FW, Krishnan JA, Levy ML, Lin J, Mortimer K, Pitrez PM, Sheikh A, Yorgancioglu AA, Boulet LP. Global initiative for asthma strategy 2021: executive summary and rationale for key changes. Am J Respir Crit Care Med 2022; 205(1):17–35; doi:10.1164/rccm.202109-2205PP.
27. Mulot C, Stücker I, Clavel J, Beaune P, Loriot MA. Collection of human genomic DNA from buccal cells for genetics studies: comparison between cytobrush, mouthwash, and treated card. J Biomed Biotechnol 2005; 2005(3):291–6; doi:10.1155/JBB.2005.291. PMID: 16192688; PMCID: PMC1224694.
28. Mishra P, Pandey CM, Singh U, Gupta A, Sahu C, Keshri A. Descriptive statistics and normality tests for statistical data. Ann Card Anaesth 2019 Jan–Mar; 22(1):67–72; doi:10.4103/aca.ACA_157_18. PMID: 30648682; PMCID: PMC6350423.
29. Kementrian Kesehatan Republik Indonesia. Permenkes No.75 Tahun 2013 Tentang Angka Kecukupan Gizi Yang Dianjurkan Bagi Bangsa Indonesia. Kementrian Kesehatan Republik Indonesia. 2013. Available via https://peraturan.bpk.go.id/Details/139226/permenkes-no-75-tahun-2013 (Accessed 12 Augst 2023).

30. Levita J, Wilar G, Wahyuni I, Bawono LC, Ramadaini T, Rohani R, Diantini A. Clinical toxicology of vitamin D in pediatrics: a review and case reports. Toxics 2023; 11(7):642; doi:10.3390/toxics11070642
31. Tinawi M. Disorders of calcium metabolism: hypocalcemia and hypercalcemia. Cureus 2021; 13(1):e12420; doi:10.7759/cureus.12420
32. Fuseini H, Newcomb DC. Mechanisms driving gender differences in asthma. Curr Allergy Asthma Rep 2017; 17(3):19; doi:10.1007/s11882-017-0686-1
33. Dharmage SC, Perret JL, Custovic A. Epidemiology of asthma in children and adults. Front Pediatr 2019; 7:246; doi:10.3389/fped.2019.00246
34. Park HW, Tantisira KG. Genetic signatures of asthma exacerbation. Allergy Asthma Immunol Res 2017; 9(3):191–9; doi:10.4168/aair.2017.9.3.191
35. Louisias M, Ramadan A, Naja AS, Phipatanakul W. The effects of the environment on asthma disease activity. Immunol Allergy Clin North Am 2019; 39(2):163–75; doi:10.1016/j.iac.2018.12.005
36. Lorensia A, Muntu CM, Suryadinata RV, Septiani R. Effect of lung function disorders and physical activity on smoking and non-smoking students. J Prev Med Hyg 2021; 62(1):E89–96. doi: 10.15167/2421-4248/jpmh2021.62.1.1763.
37. Lorensia A, Suryadinata RV, Savitri KYD. COPD symptoms and risk factors of respiratory disorders in builders. Kemas 2022; 17(4):552–65.
38. Lombard Z, Dalton DL, Venter PA, Williams RC, Bornman L. Association of HLA-DR, -DQ, and Vitamin D receptor alleles and haplotypes with tuberculosis in the Venda of South Africa. Hum Immunol 2006; 67(8):643–54; doi: 10.1016/j.humimm.2006.04.008
39. Papadopoulou A, Kouis P, Middleton N, Kolokotroni O, Karpathios T, Nicolaidou P, Yiallouros PK. Association of vitamin D receptor gene polymorphisms and vitamin D levels with asthma and atopy in Cypriot adolescents: a case-control study. Multidiscip Respir Med 2015;10(1):26; doi:10.1186/s40248-015-0025-0
40. Zhao F, Qu J, Wang W, Li S, Xu S. The imbalance of Th1/Th2 triggers an inflammatory response in chicken spleens after ammonia exposure. Poult Sci 2020; 99(8):3817–22; doi:10.1016/j.psj.2020.04.029

JOURNAL OF PUBLIC HEALTH AND COMMUNITY MEDICINE

2024
VOL: 1- ISSUE: 1

EDITORIAL BOARD

EDITORS

Recai Ogur, MD, PhD

Assoc Prof of Public Health

PhD of Environmental Health

Satoshi Miyahara, MD, PhD

Associate Professor

Department of Microbiology, School of Medicine, University of Occupational and Environmental Health, Kitakyushu, Japan

Corrections, Retractions & Expressions of Concern (index.php?sec=correctionretractionconcern)
Go to other WisdomGale Journals
Self-Archiving Policies (index.php?sec=selfarchivingpolicy)
Digital Archiving & Preservation Policies (index.php?sec=digitalarchiving)
Terms of Use (index.php?sec=policytermofuse)
License Information (index.php?sec=licenseinfo)
Copyright Information (index.php?sec=copyrightinfo)

About Journal of Public Health and Community Medicine

Journal of Public Health and Community Medicine is an international, peer-reviewed, open access journal, providing a platform for advances in basic, tran ... Read more (index.php?sec=about).

For best results, please use Internet Explorer or Google Chrome.

Contact Information

Your comments are very important to us

We welcome your ideas, suggestions, comments, or questions. To reach Editorial Board please use one of the methods provided below.

Emails:

info@wisdomgale.com
editorinchief@ejmanager.com

Office Address:
WisdomGale Publishing
14 Rue de Grand-Bigard,
1082 Brussels
Belgium

We will respond within 48 to 72 hours.

Change of address or personal information?
Please visit your account at www.ejmanager.com to update your information.

J Pub Health Comm Med. Year: 2024, Volume: 1, Issue: 4

Original Article

1. **The noma survivors; should they be educated as a special target group? A crossectional study. (?mno=214366)**
   Mujtaba Bala, Abubakar Abdullahi Bello, Ramat Oyebunmi Braimah, Abdulrazaq Olanrewaju Taiwo, Mike Eghosa Ogbeide, Rufai Jaafaru, Muhammad Sheikh Adam Abdullahi, Muhammad Kaura Abubakar, Shafiu Isah Abdulazeez, Abubakar Sadeeq Fawa, Malami Muhammad Bello
   J Pub Health Comm Med. 2024; 1(4): 127-131
   » Abstract (?mno=214366) » PDF (index.php?fulltxt=214366&fulltxtj=272&fulltxtp=272-1722864971.pdf) » doi: 10.5455/JPHCM.20240805013611 (http://dx.doi.org/10.5455/JPHCM.20240805013611)

Review Article

2. **One Health Approach to Antimicrobial Resistance: Integrating Human, Animal, and Environmental Perspectives (?mno=221130)**
   January G. Msemakweli, Khalid Mzuka, Aneth Osward,
   J Pub Health Comm Med. 2024; 1(4): 132-142
   » Abstract (?mno=221130) » PDF (index.ph

fulltxt=221130&fulltxti=272&fulltxtp=272-1726698901.pdf) » doi: 10.5455/JPHCM.20240918103501 (http://dx.doi.org/10.5455/JPHCM.20240918103501) Cited 3 (https://scholar.google.com/scholar?cites=8852023287892013570&hl=en)

Original Article

3. **EFFECTIVENESS OF VITAMIN D3 SUPPLEMENTS IN JAVANESE ETHNIC WITH STABLE ASTHMA IN INDONESIA: IMPROVING ASTHMA SYMPTOMS BY IDENTIFYING VDR GENE POLYMORPHISM (?mno=208518)**
   Amelia Lorensia,
   J Pub Health Comm Med. 2024; 1(4): 143-151
   » Abstract (?mno=208518) » PDF (index.php?fulltxt=208518&fulltxtj=272&fulltxtp=272-1720236681.pdf) » doi: 10.5455/JPHCM.20240706033121 (http://dx.doi.org/10.5455/JPHCM.20240706033121)

Original Article

4. **Pediatric Hemophilia: A Study of Prevalence and Risk Factors in Nineveh Province (?mno=224993)**
   Ahmad Talib Ibrahem, Khalid Satam Sultan, Asmaa Mohammed Khaleel,
   J Pub Health Comm Med. 2024; 1(4): 152-156
   » Abstract (?mno=224993) » PDF (index.php?fulltxt=224993&fulltxtj=272&fulltxtp=272-1729178804.pdf) » doi: 10.5455/JPHCM.20241017032644 (http://dx.doi.org/10.5455/JPHCM.20241017032644)

First (index.php?iid=2024-1-4.000&jid=272&pg=1) Previous (index.php?iid=2024-1-4.000&jid=272&pg=0) 1 Next (index.php?iid=2024-1-4.000&jid=272&pg=2) Last (index.php?iid=2024-1-4.000&jid=272&pg=1)