

BUKTI KORESPONDENSI
ARTIKEL JURNAL KESEHATAN MASYARAKAT NASIONAL

Judul artikel : *Vitamin D and Reduced Academic Stress of Health Students*

Jurnal : Jurnal Kesehatan Masyarakat Nasional (*National Public Health Journal*)

Penulis : Yuni Kusmiyati

No	Perihal	Tanggal
1	Submit melalui OJS	2 September 2019
2	Pemberitahuan review naskah	22 Desember 2019
	Pemberitahuan review naskah	26 Desember 2019
3	Pengiriman hasil review naskah	17 Februari 2020
4	Pemberitahuan review naskah	18 Februari 2020
		22 Februari 2020
		24 Februari 2020
5	Pengiriman hasil review naskah	4 Maret 2020
6	Naskah terbit	28 Agustus 2020

journal.fkm.ui.ac.id/kesmas/author/submissionReview/3274

Kesmas

Jurnal Kesehatan Masyarakat Nasional
(National Public Health Journal)

HOME ABOUT USER HOME SEARCH CURRENT ARCHIVES ANNOUNCEMENTS EDITORIAL TEAM EDITORIAL POLICIES
AUTHOR GUIDELINES PUBLICATION ETHIC REVIEWER ACKNOWLEDGEMENT

Home > User > Author > Submissions > #3274 > Review

#3274 Review

SUMMARY REVIEW EDITING

Submission

Authors Yuni Kusmiyati, Emy Suryani, Lucky Herawati, Amalia Firdausi
 Title Vitamin D and Reduced Academic Stress of Health Students
 Section Articles
 Editor Dewi Susanna

Peer Review

Round 1

Review Version 3274-9979-1-REV.DOCX 2019-09-02
 Initiated 2019-11-19
 Last modified 2019-11-26
 Uploaded file None

Editor Decision

Decision Accept Submission 2020-04-13
 Notify Editor Editor/Author Email Record 2020-03-02
 Editor Version None
 Author Version

3274-11136-1-ED.DOCX	2019-12-22	DELETE
3274-11136-2-ED.DOCX	2019-12-23	DELETE
3274-11136-3-ED.DOCX	2019-12-26	DELETE
3274-11136-4-ED.DOCX	2020-02-17	DELETE
3274-11136-5-ED.DOCX	2020-02-18	DELETE
3274-11136-6-ED.DOCX	2020-02-22	DELETE
3274-11136-7-ED.DOCX	2020-02-24	DELETE
3274-11136-8-ED.DOCX	2020-03-04	DELETE

Upload Author Version Tidak ada file yang dipilih

LANGUAGE Select Language English

JOURNAL CONTENT Search Search Scope

REGISTER
LOGIN

p-ISSN: 1907-7505
e-ISSN: 2460-0601

Home - Sistem Penilaian Angka Persyaratan Umum Usulan ke L... #3274 Review

journal.fkm.ui.ac.id/kesmas/author/submissionReview/3274

English

Peer Review

Round 1

Review Version 3274-9979-1-REV.DOCX 2019-09-02
 Initiated 2019-11-19
 Last modified 2019-11-26
 Uploaded file None

Editor Decision

Decision Accept Submission 2020-04-13
 Notify Editor Editor/Author Email Record 2020-03-02
 Editor Version None
 Author Version

3274-11136-1-ED.DOCX	2019-12-22	DELETE
3274-11136-2-ED.DOCX	2019-12-23	DELETE
3274-11136-3-ED.DOCX	2019-12-26	DELETE
3274-11136-4-ED.DOCX	2020-02-17	DELETE
3274-11136-5-ED.DOCX	2020-02-18	DELETE
3274-11136-6-ED.DOCX	2020-02-22	DELETE
3274-11136-7-ED.DOCX	2020-02-24	DELETE
3274-11136-8-ED.DOCX	2020-03-04	DELETE

Upload Author Version Tidak ada file yang dipilih

Kesmas: Jurnal Kesehatan Masyarakat Nasional (National Public Health Journal) indexed in

DOAJ DIRECTORY OF OPEN ACCESS JOURNALS Member of Crossref ICMJE INTERNATIONAL COMMISSION OF MEDICAL JOURNAL EDITORS ELSEVIER Scopus

PDF Tutorial Submit Article
 WE Covering Letter and Statements
 WE Manuscript Template

USER You are logged in as... kusmiyati2006
 My Journals
 My Profile
 Log Out

PREPARING FOR SUBMISSION

INTERNATIONAL EDITOR/REVIEWER FORM

ISJD sinta S1 BASE

https://www.scopus.com/sourceid/21100934559

Vitamin D and Reduced Academic Stress of Students of Health
Vitamin D dan Penurunan Stress Akademik Mahasiswa Kesehatan

Abstract

Stress condition shall reduce academic ability that influence the grade point average and encourage negative behavior. The objective of this research was to find out the influence of vitamin D to reduce stress academic of students of health. This study used a randomized controlled trial (RCT). The population, were students of midwifery who lived in dormitory of Health Polytechnic Ministry of Health Yogyakarta in 2017. Samples were 77 students of midwifery who did not suffer chronic disease, experiencing academic stress and who were willing to become research subjects. Samples were 39 respondents in treatment group were administered with 1 tablet of 400 mg of vitamin D supplement daily during 30 days, and control group was given placebo during 30 days. Academic stress was assessed by using Depression Anxiety and Stress Scale 42 (DASS 42). Data were analyzed by using linear regression. The result showed that vitamin D supplement administration influenced reduced academic stress (p-value 0.000 < 0.05). Once dose of 400 IU of vitamin D daily during 30 days could reduce academic stress by 11.28 point. To reduce academic stress, students should consume vitamin D and let their skin exposed to sunrays with ultraviolet.

Keywords: Akademik stress, sunrays exposure, vitamin D

Introduction

Academic stress is an individual condition who experiences stress as a result of perception and assessment toward academic stressors that are related to knowledge and education in higher education. Increasing stress shall reduce academic ability that in turn influences grade point average and encourage negative behaviors such as smoking, consuming alcohol, leaving, low sex, abusing drugs like narcotics, psychotropics, and other addictive substances.^{1,2} Prolonged stress experienced by an individual can reduce ability for adaptation with stress.³

The prevalence of student's academic stress was high enough. Studies with academic stress level reached 43.3% and students with severe stress reached 31.2%.⁴ Based on some research results, female students had academic stress level compared to male students in all types of stressors.⁵ Academic stress can be caused by many factors including monotone situation, noise, too many academic assignments, ambiguous academic assignments, lack of control, learning and critical reactions, not being appreciated, reduced learning opportunities, conflicting regulations, conflicting academic assignment deadline, time management, financial problems, learning disorder, personality type, and social activity.^{6,7} In addition, academic stress is also influenced by health conditions including malnutrition and vitamin D deficiency.

Previous researches show that vitamin D receptor can be found a lot in the brain area, including cortex cingulate and hippocampus, the areas that are involved in the depression pathophysiology. Vitamin D is very important for the brain to produce serotonin, dopamine, and other neurotransmitters. It is an important factor that affect serotonin when had it

exposed to bright light and shall decrease along with reduced light exposure.^{8,9} Some studies showed that there was a correlation between lower level of serum 25-(OH)D to psychiatric disorders including depression, eating disorder and schizophrenia.^{10,11} Vitamin D deficiency becomes a common problem in all various life spans and population in all over the globe.¹² The prevalence of vitamin D insufficiency was high. Children's vitamin D status in Indonesia showed that 5.6% children suffered deficiency, 45.1% children suffered insufficiency, and 49.3% children suffered inadequacy.¹³ The causing factors of vitamin D deficiency include low vitamin D diet, food nutrient intake is not sufficient and lack of sunrays exposure.¹⁴ Unhealthy public life style is another factor that cause low vitamin D. vitamin D supplementation is required. 1000 IU/day Vitamin D supplement is recommended to adolescent to ages of 19 to 50 years old and 5 day based on Reference Nutrient Intake (RNI).¹⁵ Some researches show that there are correlations of lower vitamin D level to severe depression case, emotional mood symptoms of pre-menstruation women, and adult mood and cognitive disorder.¹⁶ Vitamin D administration by supplements and by sunrays exposure in one month show positive effects for affective disorder.¹⁷ Based on that background of the problem, a research to find out the influence of vitamin D supplement administration to reduce academic stress is required because the prevalence of student's academic stress in Indonesia was high enough.

Method

This study used a Randomized Controlled Trial (RCT) design. The population was midwifery students who lived in the Health Polytechnic dormitory of the Ministry of Health in Yogyakarta in 2017. The sample was midwifery students who lived in dormitories, willing to be the subject of research and experience academic stress and who were willing to be exposed to sunrays with ultraviolet. The sample was divided into two groups based on the doctor's diagnosis. Subjects were given an explanation of the aims, risks and procedures of the study and signed an informed consent as an agreement before the study was conducted. The research procedure begins with a pre-test to determine the level of academic stress and the health status of the subject. Subjects who met the criteria (experienced academic stress, did not suffer from chronic illness and were willing to be the subject of research) totaled 77 randomly selected to determine the treatment group and the control group. The treatment group was given 1 tablet 400 mg of vitamin D supplement daily for 30 days and asked to walk to be exposed to sunrays with ultraviolet light for approximately 60 minutes between 08.00 to 11.00 am with the face, arms and legs not covered and without using sunscreen. The control group was given 1 tablet placebo daily for 30 days and asked to walk to be exposed to sunrays with ultraviolet light for approximately 60 minutes between 08.00 to 11.00 am with the face, arms and legs not covered and without using sunscreen. On the 1st day were conducted post test to measure academic stress and other confounding variables in both groups. Academic stress is assessed before and after treatment using Depression Anxiety and Stress Scale 42 (DASS 42). For the purpose of sunrays exposure, stress levels were divided into normal (0-23), mild (24-31), moderate (34-37), severe (38-43) and very severe (44-52). Possible confounders are nutritional patterns assessed using the Food Frequency Questionnaire (FFQ), and personality type measured by the Jenkins Activity Survey questionnaire (containing 20 question items). The highest score indicates that the subject has extrovert personality, while the lowest score represents an introvert personality. Inverness personality type (type A) is characterized by a score of 40-60 and extrovert (type A) at a score of 20-39. Data were analyzed using linear regression. All p values are valid and the level of statistical significance is set to less than 0.05. Ethical

approval was given from the Health Polytechnic Ethics Committee of the Ministry of Health in Yogyakarta No: LB.01.01-KE.02-XXI-489-2017

Results

The randomized controlled trial of "Vitamin D supplement and reduced academic stress" was done to 77 midwifery students. The description of recruitment flow chart is presented in Figure 1

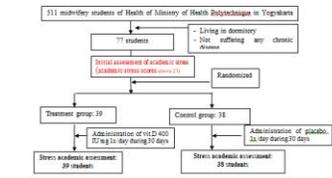


Figure 1. Recruitment flow chart of research samples

The research results showed that 5.2% midwifery students suffered severe stress, 68.8% suffered moderate stress and 26.0% suffered mild stress. After vitamin D supplement administration, the student's academic stress reduced into 1.3% students with severe stress, 42.3% students with moderate stress, 56.4% students with mild stress and 21.1% normal. There is a significant difference between the group given vitamin D and not with academic stress (p-value 0.003). Subject comparability (vitamin D vs. Placebo) based on personality type and food consumption is presented in Table 1 and 2.

Table 1. Subject Comparability (Vitamin D vs. Placebo) Based on Personality Type and Food Consumption

Variable	n=77	%	Vitamin D n=39	Placebo n=38	p-value	
Personality Type	- Extrovert	46	59.7	22	57.9	1.00
	- Introvert	31	40.3	17	44.6	
Diet Consumption	- Normal	33	42.9	17	44.7	0.458
	- Severe	0	0.0	0	0.0	

Adaptation diet intake	n	%	Vitamin D n=39	Placebo n=38	p-value
- >13/day	69	89.6	34	35	92.1
- 10-12/day	0	0.0	0	0	0.003
- 7-9/day	7	9.1	3	4	
- 4-6/day	48	63.3	25	23	86.5
- 1-3/day	8	10.4	4	4	0.682
Vegetable and fruit source diet intake					
- 3-4 times/week	3	3.9	2	1	2.6
- 2-3 times/week	17	22.1	10	7	21.1
- 1-2 times/week	47	61.0	23	24	62.2
- 0 times/week	8	10.4	3	5	13.2
Vegetable intake					
- 1-2 times/week	1	1.3	0	1	2.6
- 1-2 times/week	17	22.1	9	8	21.1
- 1-2 times/week	15	19.2	12	3	38.7
- >10/day	15	19.2	12	3	38.7
Vegetable and fruit source diet intake					
- 3-4 times/week	5	6.5	3	2	5.3
- 2-3 times/week	15	19.2	8	7	18.2
- 1-2 times/week	21	27.1	12	9	23.7
- >10/day	21	27.1	12	9	23.7

Table 1 showed that the majority of student's personality is introvert (57.1%) and 56.4% students belong to intervention group of vitamin D administration. Most of subjects (89.6%) consume carbohydrate for >13/day, and the most carbohydrate type to consume is rice. Most subjects (62.3%) consume animal diet source intake for 3-6 times/week. The most diets to consume are egg and chicken meat. Most of subjects (61.0%) consume vegetable and fruit source diet for 3-4 times/week. The most diet to consume are fermented soybean (tempeh). Most subjects (17.1%) consume vegetable for 3-6 times/week, the most consumed vegetables come from green vegetables. Most of subject consume dairy and fortified products for >1 times/week. The most dairy and fortified product to consume is fermented condensed milk. There was no significant difference in personality type and food consumption between the two groups. This shows that the treatment group of vitamin D and the placebo group were comparable.

The influence of vitamin D administration to academic stress was analyzed by using a test. The result of normality data test showed that data of academic stress were normally distributed (p-value of academic stress before and after treatment were 0.869 and 0.660 respectively). The analysis result of the influence of vitamin D administration to academic stress is presented in Table 2.

Table 2. The influence of vitamin D supplement administration to academic stress

Variable	Mean before	Mean after	Mean difference	SD	F	P-value	95% CI
- Treatment	37.87	24.43	13.44	11.1	4.576	0.000	7.33-18.44
- Control	37.66	37.12	0.45	11.7	0.011	0.923	-3.11-4.21

Table 2 shows that there is a significant influence between the groups given vitamin D and not with academic stress with a p value of 0.00 < 0.05 (95% CI: 7.33-18.44). The effect of vitamin D on academic stress after being controlled by confounding variables: the personality type, carbohydrate intake, animal diet source intake, vegetable and fruit diet source intake, vegetable intake, and dairy intake, is presented in Table 3.

Table 3. The effect of vitamin D on academic stress after being controlled by variables: the personality type, carbohydrate intake, animal diet source intake, vegetable and fruit diet source intake, vegetable intake, and dairy intake

Variable	F	df	Mean ^a	Mean ^b	p-value
- Vitamin D	4.520				0.034
- Vitamin D administration	21.223	2,666	0.000	-17.78	4.87
- Personality type	0.000	1,333	0.000	0.000	1.000
- Carbohydrate intake	0.000	2,333	0.000	-4.43	10.47
- Animal diet source intake	0.000	1,333	0.000	0.000	1.000
- Vegetable and fruit diet source intake	2.310	1,334	0.017	-2.28	0.48
- Vegetable intake	0.000	1,333	0.000	0.000	1.000
- Dairy consumption	1.044	1,336	0.498	-2.01	4.10

The variable of personality type and food consumption, although statistically not significant is a substance a variable that influence academic stress, so it is still included in the model. Table 3 shows there was a significant effect of vitamin D administration with academic stress after being controlled by personality type, variables carbohydrate intake, animal diet source intake, vegetable and fruit diet source intake, vegetable intake and dairy intake (p-value 0.03 < 0.05). Once dose of 400 IU of vitamin D daily during 30 days could reduce academic stress by 11.28 point.

Discussion

This study found evidence of the effect of vitamin D supplement administration on reducing academic stress in health student. This is consistent with previous research conducted by Balle (2014) and Aylin et al (2015) that vitamin D is very important for brain to produce serotonin, which has an important role to create mood condition so that it can reduce stress.¹⁸ The criteria of vitamin D in this research were vitamin D 50-60 IU/dose and it was administered one time daily in one capsule during 30 days. In this research, the vitamin D dose administered to the students was under vitamin D supplement used recommended by Ministry of Health (1000 IU/day for 19 to 50 years old adult). Pure vitamin D without combination with other minerals and vitamins molecule calcium is difficult to find both in supplements and drug stores. This is a distinctive problem. The pure vitamin D administration program shall be implemented for youths or public. Vitamin D is rarely found in foods. The best vitamin D source is salmon and fish liver oil. Vitamin D can be found in small amount in cow liver, cheese, and egg white. Vitamin D in these foods, commonly in form of vitamin D2 (cholecalciferol), and in combination D3 (ergocalciferol).

The sunrays exposure in this research was conducted by outdoor sunbathing between 08.00 to 11.00 am during 60 minutes without using umbrella or sunblock lotion, and it was conducted two times a week. This is in line with a research done by Sunm (2003) that the intensity of ultra violet B (UVB) increases from 07.00 to 11.00 am. The UVB-sunrays-exposed group was exposed to UVB at 09.00 am during 25 minutes at their face and both

arms for three times in a week, without using umbrella and sunblock lotion. After six weeks, they got significant average of 25 (OH)D concentration increase.¹⁹

Academic stress in this research was defined as a response the student perceived poor variables received from academic life that might cause individual welfare condition disorder. Academic stress was assessed before and after by using Depression Anxiety and Stress Scale 42 (DASS 42) questionnaire containing 60 items. The research results showed vitamin D supplement can reduce academic stress. After vitamin D supplement treatment and sunrays exposure, the student's academic stress reduced into 1.3% students with severe stress, 42.3% students with moderate stress and 56.4% students with mild stress and 21.1% normal. There was 43.3% student with moderate stress and 31.2% students with severe stress.⁴ Female stress level was higher compared to male in all types of stressors.⁵ Data related to academic stress before and after treatment in this study were conducted in the middle of the semester during the lecture period of students in class. The high rate of academic stress can be caused by many factors including monotone situation, noise, too many academic assignments, ambiguous academic assignments, lack of control, learning and critical conditions, not being appreciated, reduced learning opportunities, conflicting regulations, conflicting demands, academic assignment deadline, time management, financial problems, learning disorder, and social activity.^{6,7} It can be seen that most stressors for students related with learning activities. The Midwifery Department at a vocational institution with a learning system containing of 40% of theories and 60% of practice; very dense learning activities and many targets must be achieved. These might be the factors causing high rate of student's academic stress. The research result showed that student's stress was related to learning and academic activities. Stress because of basic character was difficult to change and it also became the factor influencing student's stress condition.

Lower level of vitamin D is found to be associated with severe depression, mood of premenstruation women, mood disorder and cognitive disorder of adult.^{10,11} Two randomized controlled trial (RCT) between sunrays exposure vs vitamin D supplementation for seasonal affective disorder show the positive effect of vitamin D both by consuming supplement and sunrays exposure during one month to reduce affective disorder.¹⁷ This research has a superiority compared to other research because a study on the influence of vitamin D to academic stress had never been done before in Indonesia. The limitation of this research is that the vitamin D consumption was not observed directly, however, to reduce bias, the researcher made UVB sensor to remind subject to consume the vitamin D or placebo. Another limitation is that the sunrays exposure was only done two times in a week on Saturday and Sunday for 120 minutes. This study also did not measure serum 25-(OH)D levels.

A confounding is a situation where other external risk factor affects intervening the effect of sunrays exposure (main risk factor) so that it may cause association disturbance between exposure (main risk factor) and the outcome to study. In this study, to prevent and avoid confounding problem, some approaches had been done including selection phase by using restrictions. In the data analysis phase, all suspected variables to be confounder had been analyzed with multivariable analysis. The opportunity for bias to occur had also been anticipated by developing theoretical and conceptual frames from varying sources, so that all variables that might be confounders could be covered and identified properly.

Conclusion

There is significant difference of academic stress level between group that is given vitamin D and the group with placebo. Therefore, vitamin D is proved to reduce academic stress. To reduce academic stress, students should consume vitamin D and let their skin exposed to sunrays with ultraviolet.

Recommendation

Each individual should consume vitamin D and let their skin exposed to sunrays with ultraviolet. The Ministry of Health should make a program to promote vitamin D supplementation for students/teengers.

References

1. Eddy KJ, Mon KP, Thant A. Academic stress and its source among university students. *Biomedical & Pharmacology Journal*. 2018; 11(1): 531-37.
2. Saqib M. Impact of stress on students' academic performance at secondary school level at district Ndwari. *International Journal of Learning and Development*. 2018; 8(1): 43-49.
3. Ranaivosoa, MZ. Academic stress among undergraduate student: The case of education faculty at Kong Saad University. *International Interdisciplinary Journal of Education*. 2013; 2(1): 82-8.
4. Goff AM. Stressor, academic performance and learned resourcefulness in baccalaureate nursing students. *International Journal of Nursing Education Scholarship*. 2011; 8: 1-135.
5. Lepo-Joyeski D, Vuokori O, Stapanian J. Stress and scholarship. *Psychiatry*. 2011; 22(4): 290-7.
6. Puwanti S. Tingkat stress akademik pada mahasiswa regulat angkatan tahun 2010. [Skripsi] Depok: Fakultas Ilmu Keperawatan Universitas Indonesia; 2012.
7. Rohandi E, Sonwarkita I, Nurida A. Analisis faktor yang berhubungan dengan tingkat stress akademik mahasiswa regulat prodi DIII Keperawatan Cirebon Politeknik Kesehatan Tasikmalaya. *The Soedjarna Journal of Nursing*. 2014; 9(3): 173-8.
8. Agnewstein CE, Daniel YE, Ashby EO. Associations between academic stressors, reaction to stress, coping strategies and maladjustment disorders among college students. *Ethiopian Journal of Health Science*. 2013; 23(2): 98-112.
9. Bakovic DV, Zlotoplosky JI, Makarewicz J & Makarewicz M. Gender differences in academic stress and burnout among medical students in final year old education. *Psychiatria Danubina*. 2012; 24(2): 175-81.
10. Kusumawati Y, Nurhidayah CT, Sulaimi, Widiyungsih HP. Extrovert Personality Type and Prolonged Second Stage of Labor. *Konsum Nasional Public Health Journal*. 2017; 11(4): 173-177.
11. Widyandani SA. Vitamin D deficiency: effects on oxidative stress, epigenetics, gene regulation, and aging. *Biochemistry*. 2019; 9(30): 1-15.
12. Black LJ, Jacoby P, Allen KL, Trapp GS, Hart PH, Byrne SM, Mori TA, Beilin LJ, Oddy WH. Low vitamin D levels are associated with symptoms of depression in young adult males. *Acta Psychiatrica*. 2014; 46: 464-71.
13. Binkova M, Daskova M, Viska J, Kalvachova B, Rigoza D, Mohr P, Stark S. Vitamin D in anxiety and affective disorders. *Physiol Res*. 2015; 64(2): 101-3.
14. Edwards MR, Cole ZA, Harvey NC, Cooper C. The global epidemiology of vitamin D status. *University of Southampton*. 2012.
15. Enayati F & Budiman B. Status vitamin D terkuat anak Indonesia usia 2.0-12.9 tahun. *Gizi Indonesia*. 2015; 38(1): 73-80.
16. Viet R, and Mareeh A. Vitamin D: The "sunshine" vitamin. *J Pharmaco Pharmacother*. 2012; 3(2): 118-26.

17. Kementerian Kesehatan (Kompone on the Internet). Pusat Data dan Informasi Kesehatan Jakarta. Data dan kondisi penyakit osteoporosis di Indonesia. [updated 2015 October 25; cited 2018 January 17]. Available from: <http://www.pudainf.kemkes.go.id/article/view/1610400003/data-dan-kondisi-penyakit-osteoporosis-di-indonesia.html>
18. Abdi F, Dagalji G, and Rahmawati FS. A systematic review of the role of vitamin D and calcium in premenstrual syndrome. 2019; 6(2): 13-86.
19. Johnson ERB. Vitamin D and the Occurrence of Depression: Causal Association or Circumstantial Evidence? 2009; 6(3): 481-92.
20. Spalding S. Vitamin D and Depression: A Systematic Review and Meta-Analysis Comparing Studies with and without Biological Flaws. 2014. *Nutrients*. 6(4): 1501-18.
21. Balle DD. Vitamin D metabolism, mechanism of action, and clinical applications. *Chem Biol*. 2014; 21(2): 219-229.
22. Aylin EP, Varkal MD, Iker O G, Ozer OA, Karasmutfalioğlu OK. Vitamin D deficiency in depressive, anxiety and adjustment disorder. *Bulletin of Clinical Psychopharmacology*. 2015; 25(1): 41-3.
23. Setiati S. Pengaruh sinar ultraviolet B matahari terhadap konsentrasi vitamin D dan hormon paratiroid pada perempuan usia lanjut Indonesia. *Kesehatan*. 2008; 2: 1-7.
24. Josephin B, Khusman A, Binungu D, Kusumawati. The role of ultraviolet B from sun exposure on vitamin D status and blood pressure in women of child-bearing age. *Kemala: Jurnal Kesehatan Masyarakat Nasional*. 2014; 8(6): 256-60.

**Vitamin D and Reduced Academic Stress of Students of Health
Vitamin D dan Penurunan Stress Akademik Mahasiswa Kesehatan**

Abstract
Stress condition shall reduce academic ability that influences the grade point average and encourages negative behaviors. The objective of this research was to find out the influence of vitamin D to reduce stress academic of students of health. This study used a randomized controlled trial (RCT). The population, were students of midwifery who lived in dormitory of Health Politeknik University of Health Yogyakarta in 2017. Samples were 77 students of midwifery who did not suffer chronic disease, experience academic stress and who were willing to become research subjects. Samples were 39 respondents in treatment group were administered with 1 tablet of 400 mg of vitamin D supplement daily during 30 days, and control group was given placebo during 30 days. Academic stress was assessed by using *Depression Anxiety and Stress Scale 42 (DASS-42)*. Data was analyzed by using linear regression. The result showed that vitamin D supplement administration influenced reduced academic stress by 11.28 point. To reduce academic stress, students should consume vitamin D and let their skin exposed to sunrays with ultraviolet.

Keywords: Academic stress, sunrays exposure, vitamin D

Introduction

Academic stress is an individual condition who experiences stress as a result of perception and assessment toward academic pressure that are related to knowledge and education in higher education. Increasing stress shall reduce academic ability that in turn influences grade point average and encourage negative behaviors such as smoking, consuming alcohol, learning, free sex, and using recreational substances. Prolonged stress experienced by an individual can reduce ability for adaptation with stress. The prevalence of student's academic stress was high enough. Students with moderate stress level reached 43.3% and students with severe stress reached 31.2%. Based on some research results, female students had higher academic stress level compared to male students in all types of stresses. Academic stress can be caused by many factors including monotonous situation, the main academic assignments, lack of control, learning and critical conditions, not being appreciated, losing opportunities, conflicting regulations, conflicting demands, academic assignment deadline, time management, monotonous situation, personality type and social activity. In addition, academic stress is also influenced by health conditions including malnutrition and vitamin D deficiency. Possible confounder are nutritional patterns and personality type. People with introverted personality type (Type A) tend to be more susceptible to stress than extroverted personality types (Type B). Previous researches show that vitamin D receptor can be found a lot in the brain area, including cortex cerebellum and hippocampus, the areas that are involved in the depression

pathophysiology. Vitamin D is very important for the brain to produce serotonin hormone that has an important role to create brain serotonin mood, that shall increase when body is exposed to bright light and shall decrease along with reduced light exposure. In this study, the results showed that there was a correlation between lower level of serum 25-(OH) D to psychiatric disorders including depression, using disorder and schizophrenia. Vitamin D deficiency because of its role in varying life span and population in all over the globe. The prevalence of vitamin D insufficiency was high. Children, vitamin D status in Indonesia showed that 5.6% children had deficiency, 45.1% children suffered insufficiency, and 49.3% children suffered inadequacy. The causing factors of vitamin D deficiency include low vitamin D diet, food nutrition intake is not sufficient and lack of sunrays exposure. Unhealthy public life style to expose to bright these conditions, so that vitamin D supplementation is needed. 1000 IU/day Vitamin D supplement is recommended to administered in age of 19 to 50 years old and 1 g/day based on Reference Nutrient Intake (RNI). Some researches show that there are correlations of lower vitamin D level to severe depression case, emotional mood symptoms of pre-menstruation women, and adult mood and cognitive disorder. Vitamin D administration by supplementation and by sunrays exposure in one month show positive effect for affective disorder. Based on this background of the problem, a research to find out the influence of vitamin D supplement administration to reduced academic stress is required because the prevalence of student's academic stress in Indonesia was high enough. The objective of this research was to find out the influence of vitamin D to reduced stress academic of students of health.

Method

This study uses a Randomized Controlled Trial (RCT) design. The population was midwifery students (all women) who lived in the Health Politeknik dormitory of the Ministry of Health in Yogyakarta in 2017. The sample was midwifery students who lived in dormitories, willing to be the subject of research and experience academic stress (academic stress score above 23). Subjects were excluded if suffering from a chronic disease (more than 2 weeks) based on the doctor's diagnosis. The research procedure began with a pre-test (initial assessment of academic stress using Depression Anxiety and Stress Scale 42 (DASS-42)) to determine the level of academic stress of the subject. Subjects who met the criteria (experienced academic stress, did not suffer from chronic illness and were willing to be the subject of research) totaled 77 randomly selected from the treatment group and the control group. The treatment group was given 1 tablet 400 mg of vitamin D supplement daily for 30 days and asked to walk to be exposed to sunrays twice a week (Monday and Sunday) for approximately 60 minutes between 08:00 to 11:00 am with the face, arms and legs not covered and without using sunscreen. The control group was given 1 tablet placebo daily for 30 days and asked to walk to be exposed to sunrays twice a week (Monday and Sunday) for approximately 60 minutes between 08:00 to 11:00 am with the face, arms and legs not covered and without using sunscreen. The most daily and controlled post-test to measure academic stress and other confounding variables in both groups. Academic stress is assessed before and after treatment using Depression Anxiety and Stress Scale 42 (DASS-42). For the purpose of univariate analysis, stress levels were divided into normal (stress score 0-2), mild (stress score 24-31), moderate (stress score 34-52), and severe (stress score 53-71) and very severe (stress score > 74). Possible confounders on nutritional patterns assessed using the Food Frequency Questionnaire (FFQ), and personality types measured by the Jenkins Activity Survey Questionnaire (containing 20 question items). The highest score indicates that the subject has an extrovert personality, while the lowest score represents an introvert personality. Introvert personality type (Type B) is obtained at a score of 40-200 and extrovert

(type A) at a score of 201-380. Data were analyzed using linear regression. All p values are t-tailed and the level of statistical significance is set to less than 0.05. Ethical approval was given from the Health Politeknik Ethics Committee of the Ministry of Health of Yogyakarta. No: LB.01.01-KE-62/XXI-489-2017. Subjects were given an explanation of the aims, risks and procedures of the study and signed an informed consent as an agreement before the study was conducted.

Results

The randomized controlled trial of vitamin D supplement and reduced academic stress was done to 77 midwifery students. The description of recruitment flow chart is presented in Figure 1.

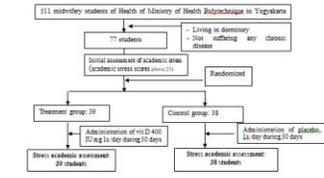


Figure 1. CONSORT diagram showing the progression of participants. Treatment allocation and number of participants are given.

Descriptive analysis results showed that 5.2% midwifery students suffered severe stress (stress score 53-71), 68.7% suffered moderate stress (stress score 34-52), and 26.0% suffered mild stress (stress score 24-31). After vitamin D supplement treatment and sunrays exposure, the student's academic stress with severe stress reduced from 1.3%, students with moderate stress 40.3%, students with mild stress 36.4% and normal to 22.1%.

The influence of vitamin D administration to academic stress was analyzed by using t-test. The result of normality data test showed that data of academic stress were normally distributed (p-value of academic stress before and after treatment were 0.869 and 0.660 respectively). The analysis result of the influence of vitamin D administration to academic stress is presented in Table 1.

Table 1. The influence of vitamin D supplement administration to academic stress

Variable	Mean/ before	Mean/ after	t	P-value	95% CI	
- Treatment	37.87	24.43	11.44	12.1	4.576 0.000	7.33-18.64
- Control	37.60	37.13	0.45	11.7		

Table 1 shows that there is a significant influence between the groups given vitamin D and not with academic stress with a p-value < 0.05 (95% CI: 7.33-18.64). Subject consumption (vitamin D with placebo) based on personality type and food consumption are presented in Table 2.

Table 2. Subject Consumption (Vitamin D with Placebo) Based on Personality Type and Food Consumption

Variable	% Vitamin D	Placebo	p-value
Personality Type			
- Introvert	27.1	22	0.19
- Extrovert	42.1	47.6	0.21
Diet Consumption			
- New	0.0	0.0	0.0
- 1-2x/week	12.3	2.6	0.419
- 3-4x/week	9.1	10.2	3
- 1x/day	89.4	84.4	92.1
Actual source diet intake			
- New	0.0	0.0	0.0
- 1-2x/week	27.3	20	0.1
- 3-4x/week	62.3	62.2	33
- 1x/day	10.4	10.0	4
Vegetable and fruit source diet intake			
- New	3.9	2	0.6
- 1-2x/week	24.5	11	27.2
- 3-4x/week	59.3	57.2	24
- 1x/day	10.4	3	7.5
Dairy and seafood products			
- New	6.3	7.5	2
- 1-2x/week	13.6	0.0	1
- 3-4x/week	37.1	23	62.2
- 1x/day	19.5	12.2	10

Table 2 showed there was no significant differences in personality types and food consumption between the two groups. This shows that the treatment group (Vitamin D) and the placebo group were comparable (p-value > 0.05). Most of subjects (89.6%) consume

carbohydrate and the most carbohydrate type to consume is rice. Most subjects (62.3%) consume animal egg and chicken meat. Most of subjects (81.0%) consume vegetable and fruit source diet. The most diet to consume are fermented soybean (tempeh). Most subjects (57.1%) consume vegetable, the most consumed vegetables come from green vegetables. Most of subjects consume dairy and fortified food. The most dairy and fortified products to consume is sweetened condensed milk. Daily food consumed is also a source of vitamin D. Vitamin D is also found in dairy and fortified products, animal foods such as eggs, fish, beef, liver and others, in plant foods such as tempeh, soybean, soybean oil, soybean sprouts, and vegetables such as mushrooms, cabbage, beans. Based on the analysis there was no difference in food consumption between the experimental and control groups in their daily nutrition.

The effect of vitamin D on academic stress after being controlled by confounding variables: the personality type, carbohydrate intake, animal diet source intake, vegetable and fruit diet source intake, vegetable intake, and dairy intake are presented in Table 3.

Table 3. The effect of vitamin D on academic stress after being controlled by variables: the personality type, carbohydrate intake, animal diet source intake, vegetable and fruit diet source intake, vegetable intake, and dairy intake

Variable	F	SE	MSig ^a	Lower	Upper
Constant	4.83				
Vitamin D administration	-11.28	2.866	0.000	-17.78	-4.87
Extrovert Personality type	2.09	4.239	0.029	-6.43	10.47
Carbohydrate intake	1.19	2.773	0.277	-3.29	5.11
Animal source diet intake	2.310	2.275	0.317	-2.26	6.88
Vegetable and fruit diet source intake	3.968	2.624	0.001	0.704	7.232
Vegetable intake	1.056	1.488	0.201	-1.410	3.300
Dairy and seafood products	1.056	1.488	0.201	-1.410	3.300

Table 3 shows there was a significant effect of vitamin D administration with academic stress after being controlled by personality type, variables carbohydrate intake, animal diet source intake, vegetable and fruit diet source intake, vegetable intake, and dairy intake (p-value < 0.05). Once dose of 400 IU of vitamin D daily during 30 days could reduce academic stress by 11.28 point.

Discussion

This study found evidence of the effect of vitamin D supplement administration on reduced academic stress in health students. This disorder shows the positive effect of vitamin D both by consuming supplement and sunrays exposure during one month to reduce affective disorder. To reduce academic stress, students should consume vitamin D and let their skin exposed to sunrays with ultraviolet. The Ministry of Health should make a program to promote vitamin D supplementation for students/teenagers. This research has a significance compared to other research because a study on the influence of vitamin D to academic stress had never done before in Indonesia. The limitation of this research is that the vitamin D consumption was not observed directly, however, to reduce bias, the researcher made Vitamins Group to remind subjects to consume their vitamin D on placebo. Another limitation is that the sunrays exposure was only done two times in a week in Saturday and Sunday for 120 minutes. This study also did not measure serum 25-(OH) D levels.

where Vitamin D in these foods commonly in form of vitamin D₂ (cholecalciferol) and its metabolite 25(OH)D₂.

The sunrays exposure in this research was conducted by outdoor sunbathing between 08:00 to 11:00 am during 60 minutes without using umbrella or sunblock lotion, and it was conducted 2 times in a week. This is in line with a research that the effect of sun exposure can improve vitamin D, Ultraviolet B from sun exposure at 09:00 to 09:30 for 30 minutes, 3 times a week for 12 weeks improves the vitamin D status. Serum 25 (OH)D increase 15.9%, 15.2, 15.2, 15.2, 15.2%.

Academic stress in this research was defined as a response the students perceived upon stimulus received from academic life that might cause individual balance condition disorder. Academic stress was assessed before and after by using *Depression anxiety and Stress Scale 42 (DASS-42)* questionnaire containing 40 items. The research results showed vitamin D supplementation can reduce stress levels. After vitamin D supplement treatment and sunrays exposure, the student's academic stress reduced from 24.43 from 37.87 before treatment. This reduce in academic stress scores was far greater than in the group without vitamin D, which was 37.6 to 37.13. The results of this study also present the prevalence of student academic stress descriptively. The research results showed that 68.4% midwifery students suffered moderate stress. This result showed a bigger prevalence compared to previous research which stating that academic stress prevalence of health students was high enough. There were 43.3% students with moderate stress and 31.2% students with severe stress. Female stress level was higher compared to male in all types of stresses.

Data related to academic stress before and after treatment in this study were conducted in the middle of the semester during the lecture period of students in class. The high rate of academic stress can be caused by many factors including monotonous situation, note, too many academic assignments, ambiguous academic assignments, lack of control, learning and critical conditions, not being appreciated/ignored, losing opportunities, conflicting regulations, conflicting demands, academic assignment deadline, time management, financial problems, sleeping disorder, and social activity. It can be seen that most stressors for students related with learning activities. The Midwifery Dormitory is a vocational institution with a learning system containing of 40% of theories and 60% of practice, very dense learning activities and many targets must be achieved. There might be the factors causing high rate of student's academic stress. The research result showed that student's stress was related to learning and academic activities. Stress because of basic character was difficult to change and it also became the factor influencing student's stress condition.

Lower level of vitamin D found to be associated with severe depression, mood of premenstrual women, mood disorder and cognitive disorder of adult. Two randomized controlled trial (RCT) between sunrays exposure vs vitamin D supplementation for seasonal affective disorder shows the positive effect of vitamin D both by consuming supplement and sunrays exposure during one month to reduce affective disorder. To reduce academic stress, students should consume vitamin D and let their skin exposed to sunrays with ultraviolet. The Ministry of Health should make a program to promote vitamin D supplementation for students/teenagers. This research has a significance compared to other research because a study on the influence of vitamin D to academic stress had never done before in Indonesia. The limitation of this research is that the vitamin D consumption was not observed directly, however, to reduce bias, the researcher made Vitamins Group to remind subjects to consume their vitamin D on placebo. Another limitation is that the sunrays exposure was only done two times in a week in Saturday and Sunday for 120 minutes. This study also did not measure serum 25-(OH) D levels.

Confounder is often referred to as a "mixing of effects" wherein the effects of the exposure under study on a given outcome are mixed in with the effects of an additional factor (or set of factors) resulting in a distortion of the true relationship. In a clinical trial, this can happen when the distribution of a known prognostic factor differs between groups being compared. In this study, to prevent and overcome confounding problems, some approaches had been done including selection phase by using restrictions. In the data analysis phase, all suspected variables to be confounder had been analyzed with multivariable analysis. The opportunity for bias to occur had also been anticipated by developing theoretical and conceptual frames from varying sources, so that all variables that might be confounders could be covered and identified properly.

Conclusion

There was a significant effect of vitamin D administration with academic stress. Once dose of 400 IU of vitamin D daily during 30 days could reduce academic stress by 11.28 point. To reduce academic stress, students should consume vitamin D and let their skin exposed to sunrays with ultraviolet.

Recommendation

Each individual should consume vitamin D and let their skin exposed to sunrays with ultraviolet. The Ministry of Health should make a program to promote vitamin D supplementation for students/teenagers.

References

- Reddy KJ, Mason KR, Thampi A. Academic stress and its source among university students. *Biochemical & Pharmacology Journal*. 2018; 11(10): 531-57.
- Saghi M. Impact of stress on students' academic performance at secondary school level at district Vahdat. *International Journal of Learning and Development*. 2018; 8(1):84-93
- Baronick MZ. Academic stress among undergraduate student: The case of education faculty at King Saud University. *International Interdisciplinary Journal of Education*. 2013; 2(1): 62-8.
- Goff AM. Stressors, academic performance and learned helplessness in baccalaureate nursing students. *International Journal of Nursing Education*. 2011; 5(1): 151-155
- Leoni-Losenzki D, Vukovic O, Stjepanovic J. Stress and personality. *Psychiatriki*. 2011; 22(4):290-7
- Purwati S. Tingkat stress akademik pada mahasiswa regulasi regulasi kesehatan tahun 2010. (Skripsi). Depok: Fakultas Ilmu Keperawatan Universitas Indonesia; 2012.
- Ruhmani E, Suparwati I, Nuraini A. Analisis faktor yang berhubungan dengan tingkat stress akademik mahasiswa regulasi poli DIII Keperawatan Cirebon. *Eschikles Kesehatan Tasikmalaya. The Soediman Journal of Health Science*. 2013; 2(2): 98-112.
- Eksenyong CE, Damed YE, Anbo EO. Associations between academic stressors, reactions to stress, coping strategies and maladjustment disorders among college students. *Eschikles Journal of Health Science*. 2013; 2(2): 98-112.
- Bacovic DV, Zvezdovic JL, Maksimovic J & Maksimovic M. Gender differences in academic stress and burnout among medical students in final years old education. *Psychiatria Danubina*. 2012; 24(2):175-81.
- Kusumawati N, Nuraini CT, Suharti, Wahyuningih HP. Extrovert Personality Type and Prolonged Second Stage of Labor. *Kemana Nasional Public Health Journal*. 2017; 11(4):117-177.

- Wimalakumari SJ, Vitamin D deficiency: effects on oxidative stress, epigenetics, gene regulation, and aging. *Biology*. 2019; 8(50):1-15
- Black LL, Jacoby P, Allen KL, Trapp GS, Hart PH, Byrne SM, Mori TA, Beilin LJ, Oddy WH. Low vitamin D levels are associated with symptoms of depression in young adult males. *Aust J Psychol*. 2014; 46: 464-471.
- Biskova M, Dusakova M, Viska J, Kalvachova B, Pajova D, Mohr P, Stark S. Vitamin D in anxiety and affective disorders. *Physiol Res*. 2015; 64(2): 101-3.
- Edwards MR, Gohil ZA, Harvey NG, Cooper C. The global epidemiology of vitamin D status. *University of Southampton*. 2012.
- Erwan F & Budiman B. Status vitamin D teskan: anak Indonesia usia 2,6-12,9 tahun. *Gizi Indonesia*. 2015; 38(1):79-80.
- Nar R, and Majeed A. Vitamin D: The "sunshine" vitamin. *J Pharmacol Pharmacother*. 2012; 3(2): 118-26.
- Komunikasi Kesehatan (Homepage on the Internet). Pusat Data dan Informasi Kementerian Kesehatan Jakarta: Data dan kondisi penyakit osteoporosis di Indonesia [updated 2013 October 25]; cited 2018 January 17]. Available from: <http://www.pusdatin.kemkes.go.id/article/view/16010400003/data-dan-kondisi-penyakit-osteoporosis-di-indonesia.html>
- Ahdi F, Ozgali G, and Rahmawan FS. A systematic review of the role of vitamin D and calcium in premenstrual syndrome. 2019; 6(2): 73-86.
- Johnson ERB. Vitamin D and the Occurrence of Depression: Causal Association or Circumstantial Evidence? 2009; 6(7): 481-92.
- Spangola S, Vitamin D and Depression: A Systematic Review and Meta-Analysis. *Comparative Studies with and without Biological Flaws*. 2014. *Nutrients*. 6(4): 1901-16.
- Bikbe DV, Vitamin D metabolism, mechanism of action, and clinical applications. *Chem Biol*. 2014; 21(3): 315-329.
- Aydin EP, Yazici MD, Toker O G, Ozar A, Karatuzuloglu OK. Vitamin D deficiency in depressive, anxiety and adjustment disorder. *Bulletin of Clinical Psychopharmacology*. 2015; 25(1):41-47.
- Vasconcelos B, Kloman A, Ribeiro D, Rimbauer. The role of ultraviolet B from sun exposure on vitamin D status and blood pressure in women of childbearing age. *Kemana, Jurnal Keperawatan Masyarakat Nasional*. 2015; 8(2): 156-60.
- Skelly AC, Dempsey JR, and O'Connell D. The importance of considering confounding. *Evik Based Spine Care J*. 2012; 20(1): 9-12.

Vitamin D dan Penurunan Stress Akademik Mahasiswa Kesehatan

Abstract
 Stress condition shall reduce academic ability that influences the grade point average and encourage negative behaviors. The objective of this research was to find out the influence of vitamin D to reduce stress academic of students of health. This study used a randomized controlled trial (RCT). The population, stress students of midwifery who lived in dormitory of Health Polytechnic Ministry of Health Yogyakarta in 2017. Samples were 77 student of midwifery who did not suffer chronic disease, experiencing academic stress and who were willing to become research subjects. Samples were 39 respondents in treatment group were administered with 1 tablet of 400 mg of vitamin D supplement daily during 30 days, and control group was given placebo during 30 days. Academic stress was assessed by using *Depression Anxiety and Stress Scale-42* (DASS-42). Data were analyzed by using linear regression. The result showed that vitamin D supplement administration influenced reduced academic stress (p-value 0.000 < 0.05). Once dose of 400 international units (IU) of vitamin D daily during 30 days could reduce academic stress by 11.28 point. To reduce academic stress, students should consume vitamin D and let their skin exposed to sunrays with ultraviolet.

Keywords: Academic stress, sunrays exposure, vitamin D

Introduction

Academic stress is an individual condition who experiences stress as a result of perception and assessment toward academic stressors that are related to knowledge and education in higher education.¹ Increasing stress shall reduce academic ability that in turn influences grade point average and encourage negative behaviors such as smoking, consuming alcohol, leaving, fire sex, abusing drugs like narcotics, psychotropics, and other addictive substances.¹ Prolonged stress experienced by an individual can reduce ability for adaptation with stress.²
 The prevalence of student's academic stress was high enough. Students with moderate stress level reached 43%, and students with severe stress reached 31.2%.³ Based on some research results, female students had higher academic stress level compared to male students in all types of stresses.⁴ Academic stress can be caused by many factors including nutritional situation, noise, too many academic assignments, ambiguous academic assignments, lack of control, learning and critical conditions, not being appreciated/ignored, losing opportunities, conflicting regulations, conflicting demands, academic assignment deadline, time management, financial problems, sleeping disorder, personality type and social stress.⁵⁻⁷ In addition, academic stress is also influenced by individual characteristics including subpersonality and vitamin D deficiency.⁸ Possible confounders are nutritional patterns and personality types. People with introverted personality type (type A) tend to be more susceptible to stress than extroverted personality type (type B).

Table 1. The influence of vitamin D supplement administration to academic stress

Variable	Mean/SD before	Mean/SD after	difference	SD	P-value	95% CI
Treatment	71.87 17.60	24.43 17.15	13.44 0.45	11.11	0.000	7.33-18.64
Control	71.87 17.60	24.43 17.15	13.44 0.45	11.11	0.000	7.33-18.64

Table 2. Subject Characteristics (Vitamin D with Placebo) Based on Personality Type and Food Consumption

Variable	% Vitamin D n=39	Placebo n=38	%	p-value
Personality Type				
- Introvert	57.1	22	58.4	0.44
- Extrovert	42.9	17	44.6	0.21
Diet Consumption				
- 1-2x/day	0.0	0.0	0.0	0.439
- 1-3x/day	9.0	4	10.5	0.70
- 2-3x/day	89.4	87.2	89.5	0.20
Animal source diet intake				
- 1-2x/week	27.0	0.0	0.0	0.983
- 1-3x/week	62.3	29	75.5	0.21
- 2-3x/week	10.4	4	10.6	0.85
Vegetarian and fruit source diet intake				
- 1x/day	3.0	2	5.0	0.24
- 1-2x/week	24.1	11	28.9	0.11
- 1-3x/week	72.9	77	80.1	0.23
- 2-3x/week	0.0	0	0.0	0.999
- 1-2x/day	1.3	3	7.9	0.26
- 1-3x/day	98.7	97	92.1	0.24
Vegetarian and fruit source diet intake				
- 1x/day	1.3	0	0.0	1.000
- 1-2x/week	7.7	25	65.8	0.00
- 1-3x/week	91.5	75	100	0.00
- 2-3x/week	16.7	8	20.0	0.13
- 1-2x/day	28.3	22	58.0	0.38
- 2-3x/day	47.7	22	58.0	0.38

compared.⁹ In this study, to prevent and overcome confounding problem, some approaches had been done including selection phase by using restrictions. In the data analysis phase, all suspected variables to be confounded had been analyzed with multivariable analysis. The opportunity for bias to occur had also been anticipated by developing theoretical and conceptual frames from varying sources, so that all variables that might be confounder could be covered and identified properly.

Conclusion
 There was a significant effect of vitamin D administration with academic stress. Once dose of 400 IU of vitamin D daily during 30 days could reduce academic stress by 11.28 point. To reduce academic stress, students should consume vitamin D and let their skin exposed to sunrays with ultraviolet.

Recommendation
 Each individual should consume vitamin D and let their skin exposed to sunrays with ultraviolet. The Ministry of Health should make a program to promote vitamin D supplementation for students/healthmen.

References
 1. Raddy KI, Memon KR, Thattai A. Academic stress and its source among university students. *Biomedical & Pharmacology Journal*. 2018;11(1):531-37.
 2. Saqib M. Impact of stress on students' academic performance at secondary school level at district Vaher. *International Journal of Learning and Development*. 2018; 8(1):94-93.
 3. Batanah, MZ. Academic stress among undergraduate student. *The case of education faculty at King Saud University. International Interdisciplinary Journal of Education*. 2015; 2(1): 82-85.
 4. Goff AM. Stressor, academic performance and learned resourcefulness in baccalaureate nursing students. *International Journal of Nursing Education Scholarship*. 2011; 8:1-135.
 5. Leticia-Lorenski D, Yskozos O, Seprenosa J. Stress and personality. *Psychiatria*. 2011; 22(4):290-7.
 6. Purwati S. Tingkat stress akademik pada mahasiswa regulasi angkatan tahun 2010. [Skripsi]. Geotek Fakultas Ilmu Keguruan Universitas Indonesia; 2012.
 7. Rohandi E, Suwarka I, Nurdin A. Analisis faktor yang berhubungan dengan tingkat stress akademik mahasiswa regulasi prodi DIII Keguruan Cirebon Fakultas Kesehatan Takmadika. *The Ejournal of Nursing*. 2014; 9(3):173-6.
 8. Kopersewa CE, Driand YP, Anho EO. Associations between academic stressors, reaction to stress, coping strategies and musculoskeletal disorders among college students. *Ethiopian Journal of Health Science*. 2015; 23(2): 98-112.
 9. Bakovic DV, Zvonkovic II, Makrisovic J, & Makrisovic M. Gender differences in academic stress and burnout among medical students in final years of education. *Psychiatria Danubina*. 2012; 24(2):175-80.
 10. Kusumawati N, Nafina CT, Suberni, Wahyuningih HP. Extrovert Personality Type and Prolonged Second Stage of Labor. *Kemasa Nasional Public Health Journal*. 2017;11(4):173-177.
 11. Wipulawansa SS. Vitamin D deficiency: effects on oxidative stress, epigenetics, gene regulation, and aging. *Biology*. 2019; 8(30):1-15.
 12. Black LJ, Jacoby P, Allen KL, Trapp GS, Hart PH, Byrne SM, Mori TA, Beilin LJ, Oddy WH. Low vitamin D levels are associated with symptoms of depression in young adult males. *Aust N Z J Psychiatry*. 2014; 48: 464-471.

Previous researches show that vitamin D receptor can be found a lot in the brain area, including cortex cerebri and hippocampus, the areas that are involved in the depression pathophysiology.¹⁰ Vitamin D is very important to produce serotonin hormone that has an important role to create least nausea emotion, that shall increase when body is exposed to bright light and shall decrease along with reduced light exposure.¹¹ Some studies showed that there was a correlation between lower level of serum 25-(OH) D to psychiatric disorder including depression, eating disorder and schizophrenia.¹²
 Vitamin D deficiency becomes an endemic in all varying life span and population in all over the globe.¹³ The prevalence of vitamin D insufficiency was high. Children, vitamin D status in Indonesia showed that 16% children suffered deficiency, 43.1% children suffered insufficiency, and 49.3% children suffered inadequacy.¹⁴ The causing factors of vitamin D deficiency include low vitamin D diet, food nutrient intake is not sufficient and lack of sunrays exposure.¹⁵ Usability public life style is difficult to fulfil these basic necessities, so that vitamin D supplementation is required. 1000 IU/day Vitamin D supplement is recommended to administered to age of 19 to 50 years old and 700 IU/day based on Reference Nutrient Intake (RNI).¹⁶ Some researches show that there are correlations of lower vitamin D level to severe depression case, emotional mood symptoms of pre-menstruation women, and adult mood and cognitive disorder.¹⁷ Vitamin D administration by supplementation and by sunrays exposure in one month show positive effects for affective disorder.¹⁸ Based on this background of the problem, a research to find out the influence of vitamin D supplement administration to reduce academic stress is required because the prevalence of student's academic stress in Indonesia was high enough.¹⁹ The objective of this research was to find out the influence of vitamin D to reduce stress academic of students of health.

Method
 This study used a Randomized Controlled Trial (RCT) design. The population was midwifery students (all women) who lived in the Health Polytechnic dormitory of the Ministry of Health in Yogyakarta in 2017. The sample was midwifery students who lived in dormitories, willing to be the subject of research and experienced academic stress (academic stress score above 23). Subjects were excluded if suffering from a chronic illness (more than 2 weeks) based on the doctor's diagnosis. The research program began with a pre-test to measure the state of cognitive-emotional which includes depression, anxiety and stress using related to academic stress instrument. The questionnaire asked about physical and psychological conditions related to academic stress, feelings of self, image, interest in learning activities. Initial assessment of academic stress using Depression Anxiety and Stress Scale 42 (DASS 42) to determine the level of academic stress of the subject. Subjects were then not met the criteria (respondents) were 77 randomly selected to determine the treatment group and the control group. The treatment group was given 1 tablet 400 mg of vitamin D supplement daily for 30 days and asked to be exposed to sunrays two a week (Saturday and Sunday) for approximately 60 minutes between 08.00 to 11.00 am with the face, arms and legs not covered and without using sunscreen. The control group was given 1 tablet placebo daily for 30 days and asked to be exposed to sunrays two a week (Saturday and Sunday) for approximately 60 minutes between 08.00 to 11.00 am with the face, arms and legs not covered and without using sunscreen. On the 31st day were conducted post test to measure academic stress and other confounding variables in both groups. Academic stress in this research was measured using Depression Anxiety and Stress Scale 42 (DASS 42). For the purpose of univariate analysis, stress levels were divided into normal (stress score 0-23), mild (stress score 24-33), moderate (stress score 34-43),

Table 2 showed there were no significant differences in personality types and food consumption between the two groups. This shows that the treatment group (Vitamin D) and the placebo group were comparable (p-value > 0.05).

The effect of vitamin D on academic stress after being controlled by confounding variables: the personality type, carbohydrate intake, animal diet source, vegetable and fruit diet source, intake, and dairy intake are presented in Table 3.

Table 3. The effect of vitamin D on academic stress after being controlled by variables: the personality type, carbohydrate intake, animal diet source, vegetable and fruit diet source, intake, and dairy intake.

Variable	B	SE	p-value	95%CI Lower	Upper
Vitamin D administration	-11.28	2.66	0.000	-17.78	-4.87
Personality type	0.00	0.00	0.999	-0.00	0.00
Adequate carbohydrate intake	2.09	4.29	0.636	-6.43	10.47
Adequate vegetable and fruit diet source	2.06	2.02	0.323	-1.94	6.06
Adequate vegetable and fruit diet source	2.10	2.294	0.317	-2.26	6.88
Adequate vegetable intake	1.901	2.222	0.403	-0.52	5.34
Non dairy consumption	1.664	1.688	0.326	-2.01	4.10

Table 3 shows there was a significant effect of vitamin D administration with academic stress after being controlled by personality type, variables carbohydrate intake, animal diet source, intake, vegetable and fruit diet source, vegetable intake and dairy intake (p-value 0.000 < 0.05). Once dose of 400 IU of vitamin D daily during 30 days could reduce academic stress by 11.28 point.

Discussion
 This study found evidence of the effect of vitamin D supplement administration on reducing academic stress in health students. This is consistent with previous research that vitamin D is very important for brain to produce serotonin hormone, that has an important role to create mood condition so that it can reduce stress.^{10,12} The stress of vitamin D in this research were Vitamin D with 400 IU dose and it was administered one time daily in one capsule during 30 days. In this research, the vitamin D dose administered to the students was under vitamin D supplement need recommended by Ministry of Health (1000 IU/day for 19 to 50 years old adult). Pure vitamin D without combination with other minerals and vitamins including calcium is difficult to find both in supplement and drug store. This is a distinctive problem of the pure vitamin D administration program shall be implemented for youth or public. Vitamin D is rarely found in foods. The best vitamin D source is salmon and tuna fish and cod liver oil. Vitamin D can be found in small amount in cow liver cheese, and egg whites. Vitamin D in these foods, commonly, in form of vitamin D2 (cholecalciferol) and its metabolite, 25(OH)D.²⁰
 The stress exposure in this research was conducted by outdoor sunbathing between 08.00 to 11.00 am during 60 minutes without using umbrella or sunblock lotion, and it was

severe (stress score 33-73) and very severe (stress score > 74). Possible confounders are nutritional patterns assessed using the Food Frequency Questionnaire (FFQ), and personality type assessed by the Jackson Anxiety Survey questionnaire (containing 20 question items). The highest score indicates that the subject has an extroverted personality, while the lowest score represents an introverted personality. Introvert personality type (type B) is obtained in a score of 40-200 and extrovert type (type A) at a score of 201-380. Data were analyzed using linear regression. All p values are tailed and the level of statistical significance is set to less than 0.05. Ethical approval was given from the Health Polytechnic Ethics Committee of the Ministry of Health in Yogyakarta No. LB.01.01/KE-02/ XXI/ 489/2017. Subjects were given an explanation of the main risks and procedures of the study and signed an informed consent in a statement before the study was conducted. The description of recruitment flow chart is presented in Figure 1.

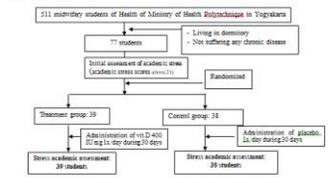


Figure 1. CONSORT diagram showing the progression of participants. Treatment allocation and number of participants are given.

Results
 The randomized controlled trial of vitamin D supplement and reduced academic stress was done to 77 midwifery student. Descriptive analysis results showed that 7.2% midwifery students suffered severe stress (stress score above 74), 43.1% suffered moderate stress (stress score 34-52), and 56.0% suffered mild stress (stress score 24-33). After vitamin D supplement treatment and sunrays exposure, the student's academic stress with severe stress reduced into 1.3%, students with moderate stress 40.3%, student with mild stress 56.4% and normal to 22.1%.

The influence of vitamin D administration to academic stress was analyzed by using t-test. The result of normally data test showed that data of academic stress were normally distributed (p-values of academic stress before and after treatment were 0.869 and 0.660 respectively). The analysis result of the influence of vitamin D administration to academic stress is presented in Table 1.

Two randomized controlled trials in a week. This is in line with a research that the effect of sun exposure can improve Vitamin D. Ultraviolet B from sun exposure at 09.00 to 09.30 for 30 minutes, 3 times a week for 12 weeks improves the vitamin D status. Serum 25 (OH)D2 increased 15.9% from 15.7 ng/dL to 18.2 ng/dL.²¹

Academic stress in this research was defined as a response the student perceived upon stimulus received from academic life that might cause individual biological condition disorder. Academic stress was assessed before and after by using *Depression Anxiety and Stress Scale 42* (DASS-42) questionnaire containing 60 items. The research results showed vitamin D supplement administration can reduce stress level. After vitamin D supplement treatment and sunrays exposure, the student's academic stress reduced into 24.43 from 71.87 before treatment. This reduce in academic stress score was far greater than in the group without vitamin D, which was 37.6 to 37.15. The result of this study also present the prevalence of student academic stress decompress. The research results showed that 68.8% midwifery students suffered moderate stress. This result showed a higher prevalence compared to previous research which stating that academic stress prevalence of health student was high enough. There were 43.3% student with moderate stress and 31.2% student with severe stress.⁴ Female stress level was higher compared to male in all types of stresses.⁴

Data related to academic stress before and after treatment in this study were conducted in the middle of the semester during the lecture period of students in class. The high rate of academic stress can be caused by many factors including monotone situation, noise, too many academic assignments, ambiguous academic assignments, lack of control, learning and critical conditions, not being appreciated/ignored, losing opportunities, conflicting regulations, conflicting demands, academic assignment deadline, time management, financial problems, sleeping disorder, and social activity.⁵⁻⁷ It can be seen that most stressors for students related with learning activities. The Midwifery Department is a vocative institution with a learning system containing of 40% of theories and 60% of practice; very dense learning activities and many targets must be achieved. These might be the factors causing high rate of student's academic stress. The research result showed that student's stress was related to learning and academic activities. Stress because of basic character was difficult to change and it also became the factor influencing student's stress condition.

Lower level of vitamin D is found to be associated with severe depression, mood of premenstrual women, mood disorder and cognitive disorder of elderly.^{10,12} Two randomized controlled trial (RCT) between sunrays exposure vs vitamin D supplementation for seasonal affective disorder show the positive effect of vitamin D both by consuming supplement and sunrays exposure during one month to reduce affective disorder.¹⁸ To reduce academic stress, students should consume vitamin D and let their skin exposed to sunrays with ultraviolet. The Ministry of Health should make a program to promote vitamin D supplementation for students/healthmen.

This research has a superiority compared to other research because a study on the influence of vitamin D to academic stress had never been done before in Indonesia. The limitation of this research is that the vitamin D consumption was not observed directly, however, to reduce bias, the researcher made WhatsApp Group to remind subjects to consume their vitamin D or placebo. Another limitation is that the sunrays exposure was only done two times a week in Saturday and Sunday for 120 minutes. This study also did not measure serum 25-(OH)D level.
 Confounding is often referred to as a "mixing of effects" wherein the effects of the exposure under study on a given outcome are mixed in with the effects of an additional factor (or set of factors) resulting in a distortion of the true relationship. In a clinical trial, this can happen when the distribution of a known prognostic factor differs between groups being

13. Biskovica M, Dukaova M, Vido J, Kalachova B, Pajovic D, Mohr P, Stark S. Vitamin D in anxiety and affective disorders. *Physiol Res*. 2013;64(2):101-3.
 14. Edwards MH, Cole ZA, Harvey NC, Cooper C. The global epidemiology of vitamin D status. *University of Southampton*. 2012.
 15. Enayati F and Bostman B. Status vitamin D teskinis anak Indonesia usia 2,0-12,9 tahun. *Gizi Indonesia*. 2015; 38(1):73-80.
 16. Nasr R, and Masheh A. Vitamin D: The "sunshine" vitamin. *J Pharmacol Pharmacother*. 2017;2(2): 113-26.
 17. Kementerian Kesehatan (Kemkes) on the internet. *Paed Data dan Informasi Kemkes Jakarta: Data dan kondisi penyakit osteoporosis di Indonesia*. [Updated 2015 October 25]; cited 2018 January 17. Available from: <http://www.pudatan.kemkes.go.id/article/view/1610440003/data-dan-kondisi-penyakit-osteoporosis-di-indonesia.html>
 18. Abdi F, Ozgözü G, and Rahmetullah FS. A systematic review of the role of vitamin D and calcium in premenstrual syndrome. *Int J Gynecol*. 2019; 6(2): 73-86.
 19. Johnson ERB. Vitamin D and the Occurrence of Depression: Causal Association or Circumstantial Evidence? *2002*; 67(8): 481-92.
 20. Spandidis S. Vitamin D and Depression: A systematic review and meta-analysis comparing studies with and without biological flows. *2014*; *Nutrients* 6(4): 1601-18.
 21. Bikle DD. Vitamin D metabolism, mechanism of action, and clinical applications. *Chem Biol*. 2014; 21(12): 1318-29.
 22. Aydın EP, Vaytal MD, Toker O, Oztepe OA, Karasultuzalpoglu OK. Vitamin D deficiency in depressive, anxiety and adjustment disorder. *Bulletin of Clinical Psychopharmacology*. 2015; 25(1):41-47.
 23. Yosephin B, Khomsan A, Brijawan D, Bambang. The role of ultraviolet B from sun exposure on vitamin D status and blood pressure in women of childbearing age. *Kemasa Nasional Kesehatan Masyarakat*. 2010; 14(4):256-60.
 24. Skelly AC, Dettoni JR, and Brock ED. Assessing bias: the importance of considering confounding. *Evid Based Pract Res C*. 2012; 3(1): 9-12.

Vitamin D and Reduced Academic Stress of Students of Health
Vitamin D dan Penurunan Stres Akademik Mahasiswa Kesehatan

Abstract

Stress condition shall reduce academic ability that influences the grade point average and encourage negative behavior. The objective of this research was to find out the influence of vitamin D to reduce academic stress of students of health. This study used a randomized controlled trial (RCT). The population, young students of mid-level who lived in dormitory of Health Polytechnic Ministry of Health Yogyakarta in 2017. Sample were 77 students of mid-level who did not suffer chronic disease, experiencing academic stress and who were willing to become research subjects. Samples were 39 respondents in treatment group were administered with 1 tablet of 400 mg of vitamin D supplement daily during 30 days, and control group was given placebo during 30 days. Academic stress was assessed by using Depression Anxiety and Stress Scale (DASS-21). Data were analyzed by using t-test regression. The result showed that vitamin D supplement administration influenced reduced academic stress (p-value 0.000 < 0.05). Once dose of 400 international units (IU) of vitamin D daily during 30 days could reduce academic stress in 31.38 points. To reduce academic stress, students should consume vitamin D and let their skin exposed to sunrays with ultraviolet.

Keywords: Academic stress, sunrays exposure, vitamin D

Introduction

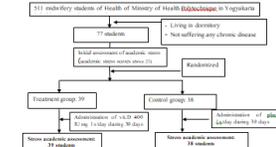
Academic stress is an individual condition who experiences stress as a result of perception and assessment toward academic stressors that are related to knowledge and experience in higher education. Increasing stress shall reduce academic ability that in turn influence grade point average and encourage negative behavior such as smoking, consuming alcohol, burning, etc. Academic stress can be caused by many factors including moderate situation, too many academic assignments, suboptimal academic assignment, lack of interest, learning and critical condition, not being appreciated/ignored, losing opportunities, conflicting conditions, conflicting academic assignment and pressure, lack of interest, learning and critical condition, not being appreciated/ignored, losing opportunities, conflicting conditions, conflicting academic assignment and pressure. In addition, academic stress is also influenced by health conditions including malnutrition and vitamin D deficiency. Possible contributors are nutritional patterns and personality type. People with introverted personality type (type A) tend to be more susceptible to stress than extroverted personality type (type B).

Previous researches show that vitamin D receptor can be found a lot in the brain area, including cortex cingulate and hippocampus, the areas that are involved in the depression pathophysiology. Vitamin D is a very important for the brain to produce serotonin, because that has an important role to cross hair mucosa secretion, that shall increase when body is exposed to bright light and shall increase along with reduced light exposure. Some studies showed that there was a correlation between lower level of serum 25-(OH)D to psychiatric disorder including depression, anxiety and schizophrenia. Vitamin D deficiency becomes an endemic in all varying life span and population in all over the globe. The prevalence of vitamin D deficiency was high. Children's vitamin D status in Indonesia showed that 5.6% children suffered deficiency, 45.1% children suffered insufficiency, and 49.3% children suffered adequately. The causing factors of vitamin D deficiency include low vitamin D diet, food restriction intake is not sufficient and lack of sunrays exposure. Ubiquitous public life style is difficult to fulfill their basic necessities, so that vitamin D supplementation is required. 1000 IU/day. Vitamin D supplement is recommended to administration to ages of 10 to 50 years old and 1 day based on Reference Nutrient Intake (RNI). Some researches show that there are correlation of lower vitamin D level to severe depression case, emotional mood symptoms of post-menstruation women, and additional cognitive disorder. Vitamin D administration by supplementation and by levels to severe depression case, emotional mood symptoms of post-menstruation women, and additional cognitive disorder. Vitamin D administration by supplementation and by levels to severe depression case, emotional mood symptoms of post-menstruation women, and additional cognitive disorder. Vitamin D administration by supplementation and by levels to severe depression case, emotional mood symptoms of post-menstruation women, and additional cognitive disorder.

Method

This study used a Randomized Controlled Trial (RCT) design. The population was mid-level student (all women) who lived in the Health Polytechnic dormitory of the Ministry of Health in Yogyakarta in 2017. The sample was mid-level students who lived in dormitories, willing to be the subject of research and experience academic stress (academic stress score above 21). Subjects were included if (suffering from a chronic illness (more than 1 week) based on the doctor's diagnosis. This research procedure begins with a pre-test to measure the state of cognitive-emotional health including depression, anxiety and stressors related to academic stress among students. The questionnaire asked about physical and psychological conditions related to academic stress, feelings of the self, anger, interest in academic activities, social assessment of academic stress, using Depression Anxiety and Stress Scale (DASS-21) to determine the level of academic stress of the subject. Subjects who met the criteria experienced academic stress, did not suffer chronic disease, and were willing to be the subject of research (total 77 randomly selected) were divided into the treatment group and the control group. The treatment group was given 1 tablet 400 mg of vitamin D supplement daily for 30 days and asked to bath to be exposed to sunrays once a week (Monday to Friday) for 15 minutes. The control group was given 1 tablet 400 mg of vitamin D supplement daily for 30 days and asked to bath to be exposed to sunrays once a week (Saturday and Sunday) for approximately 60 minutes between 08.00 to 11.00 am with the skin, arms and legs not covered and without using sunscreen. On the 31st day they were conducted post test to measure academic stress and other conducting variables in both groups. Academic stress is assessed before and after treatment using Depression Anxiety and Stress Scale (DASS-21). For purpose of statistical analysis, the results were divided into normal (stress score 0-23), mild (stress score 24-32), moderate (stress score 34-52),

severe (stress score 53-73) and very severe (stress score > 74). Possible confounders are nutritional patterns and personality type measured by the Inclusion Activity Survey questionnaire (containing 20 question items). The highest scores indicate that the subject has an introverted personality, while the lowest score represents an extroverted personality. The level of emotional intelligence is set to be less than 0.65. Ethical approval was given from the Health Polytechnic Ethics Committee of the Ministry of Health in Yogyakarta No. 128.01.01.002.002. 480/2017. Subject was given an explanation of the aim, risks and procedures of the study and signed an informed consent as an agreement before the study was conducted. The description of recruitment flow is presented in Figure 1.



Results

The randomized controlled trial of vitamin D supplement and reduced academic stress was done for 77 mid-level student. Descriptive statistical results showed that 32% (n=25) mid-level students suffered academic stress (stress score 24-32), 61.8% (n=48) suffered moderate academic stress (stress score 34-52), and 24.0% (n=19) suffered mild academic stress (stress score 24-33). After vitamin D supplement treatment and sunrays exposure, the student's academic stress with severe stress reduced into 1.3%, student with moderate stress 40.3%, student with mild stress 34.8% and normal to 18.6%. The influence of vitamin D administration to academic stress was analyzed by using t-test. The result of normally data test showed that data of academic stress were normally distributed (p-value of academic stress before and after treatment was 0.885 and 0.650 respectively). The main result of the influence of vitamin D administration to academic stress is presented in Table 1.

Table 1. The effect of vitamin D supplement administration to academic stress. Variables: Mean before, Mean after, Difference, P-Value, 95% CI.

Table 2. Subject Characteristics (Types of High Place) Based on Personality Type and Food Consumption. Variables: Personality Type, % of High Place, % of Personality Type, % of Food Consumption.

Table 2 showed that there was a significant difference in personality type and food consumption between the groups. The 39 subjects in the treatment group (vitamin D) and the placebo group were comparable (p-value > 0.05).

The effect of vitamin D on academic stress also being controlled by controlling variables: the personality type, malnutrition status, vitamin D deficiency, and daily intake of source foods: fruits, vegetables, intake, and dairy intake are presented in Table 3.

Table 3. The effect of vitamin D on academic stress after being controlled by variables: the personality type, malnutrition status, vitamin D deficiency, and daily intake of source foods: fruits, vegetables, intake, and dairy intake are presented in Table 3.

Table 3. Effect of vitamin D on academic stress after being controlled by variables: the personality type, malnutrition status, vitamin D deficiency, and daily intake of source foods: fruits, vegetables, intake, and dairy intake are presented in Table 3. Variables: Vitamin D administration, Vitamin D deficiency, Adequate carbohydrate intake, Adequate protein intake, Adequate vegetable and fruit intake, Adequate vegetable intake, Adequate dairy intake.

Table 3 shows that there was a significant effect of vitamin D administration with academic stress after being controlled by personality type, vitamin D deficiency, malnutrition status, daily source intake, vegetable and fruit intake, and dairy intake (p-value < 0.05). Once dose of 400 IU of vitamin D daily during 30 days could reduce academic stress by 0.138 points.

Table 4 shows that there was a significant effect of vitamin D administration with academic stress after being controlled by personality type, vitamin D deficiency, malnutrition status, daily source intake, vegetable and fruit intake, and dairy intake (p-value < 0.05). Once dose of 400 IU of vitamin D daily during 30 days could reduce academic stress by 0.138 points.

Table 4 shows that there was a significant effect of vitamin D administration with academic stress after being controlled by personality type, vitamin D deficiency, malnutrition status, daily source intake, vegetable and fruit intake, and dairy intake (p-value < 0.05). Once dose of 400 IU of vitamin D daily during 30 days could reduce academic stress by 0.138 points.

Table 4 shows that there was a significant effect of vitamin D administration with academic stress after being controlled by personality type, vitamin D deficiency, malnutrition status, daily source intake, vegetable and fruit intake, and dairy intake (p-value < 0.05). Once dose of 400 IU of vitamin D daily during 30 days could reduce academic stress by 0.138 points.

concerned. In this study, to prevent and overcome confounding problem, some approaches had been done including placebo and using restriction. In the data analysis phase, all suspected variables to be included had been analyzed with multi-variable analysis. The opportunity for bias to occur had been anticipated by developing theoretical and conceptual frames from varying sources, so that all variables that might be confounded could be covered and identified properly.

Conclusion: This was a significant effect of vitamin D administration with academic stress. Once dose of 400 IU of vitamin D daily during 30 days could reduce academic stress by 0.138 points. To reduce academic stress, students should consume vitamin D and let their skin exposed to sunrays with ultraviolet.

Recommendation: Each individual should consume vitamin D and let their skin exposed to sunrays with ultraviolet. The Ministry of Health should make a program to promote vitamin D supplementation for students/employees.

Abbreviation: DASS-21: Depression Anxiety and Stress Scale; RCT: Randomized Controlled Trial; RNI: Reference Nutrient Intake; P-FQ: Food Frequency Questionnaire.

Availability of data and material: All data generated or analyzed during this study are included in this published article.

Competing interests: The authors have no competing interests.

Authors' contributions: All authors collaborated in the study. YK, ES, and LF conceptualized the study, outlined the design and supervised data analysis, as well as manuscript writing, collected the data, YK and AF provided on details and led field study. All authors have read and approved the final manuscript.

Acknowledgment: We would like to thank our dearest parents to Director of the Yogyakarta Health Ministry of Health Polytechnic for giving permission and support for this research. The authors would like to thank all participants in this study. Finally, many thanks to the peer reviewers in the Kenana Public Health Journal for providing constructive and insightful feedback to improve the manuscript.

References: 1. Kozicki KJ, Meena KJ, Tamli A. Academic stress and its source among university students. Biomedical & Pharmacology Journal. 2018; 11(1): 511-37.

3. Ranaivosoa MZ. Academic stress among undergraduate student: The case of education faculty at King Fahd University International Interdisciplinary Journal of Education. 2012; 1(2): 12-15.
4. Hoff AM. Stress, academic performance and mental well-being in healthcare training students. International Journal of Nursing Education Scholarship. 2011; 1(1): 1-10.
5. Leoni-Jorge MI, Valcarlos C, Hernandez F. Stress and personality. Enciclopedia. 2011; 2(1): 200-205.
6. Purwati S. Tingkat stres akademik pada mahasiswa reguler angkatan tahun 2010. Indonesia: Ombak; 2010.
7. Rahmawati R, Supriatna I, Nurita A. Analisis faktor yang berpengaruh dengan tingkat stress akademik mahasiswa reguler pondok DDI Kependidikan Cirebon. Pendidikan Kesehatan Indonesia. The Indonesian Journal of Education. 2019; 9(1): 17-24.
8. Rahmawati CE, Dedi YB, Achik BO. Asosiasi between academic stressors, resilience to stress, coping strategies and neuroendocrine disorders among college students. Ethiopian Journal of Health Science. 2013; 23(2): 78-112.
9. Ranaivosoa MZ, Zampieri M, Ranaivosoa F. Academic stress and its effect on academic stress and burnout among medical students in their final year of education. International Journal of Education. 2013; 2(2): 175-181.
10. Kurniawan M, Subandito CT, Subono M, Wahyuniwati HP. Extrovert Personality Type and Psychological Pattern Type of Labor. Kesehatan Masyarakat: Public Health Journal. 2017; 11(1): 17-27.
11. Hidayatullah S. Vitamin D deficiency effects on oxidative stress, inflammation, gene regulation, and aging. Biology. 2019; 8(9): 1-15.
12. Black LL, Jacoby P, Akin RL, Trapp DR, Byrd PR, Hsu EA, Maki TA, Bhatia JL, Gandy NG. Low vitamin D levels are associated with symptoms of depression in young adult males. Arch N Z Psychiatry. 2014; 44: 48-54.
13. Buijols M, Dauterive M, Vitiello A, Antonello G, Ezzano D, Mohr P, Strack S. Vitamin D in anxiety and affective disorders. Psychia. 2016; 1(2): 101-107.
14. Edwards ML, Galla CA, Harvey NC, Cooper C. The global epidemiology of vitamin D status. University of Southampton. 2012.
15. Esmen F, and Budiman B. Status vitamin D di DKI Jakarta pada penduduk usia 2,0-12,9 tahun. Gizi Indonesia. 2016; 36(1): 73-80.
16. Nur E, and Masrifa A. Vitamin D: The "sunshine" vitamin. J Pharmacia Pharmacology. 2012; 3(2): 118-26.
17. Kementerian Kesehatan. Donorpage on the Internet. Pusat Data dan Informasi Kesehatan Jakarta. Data dan informasi penyakit menular di Indonesia. [Updated 2019 October 25]. cited 2019 January 17. Available from: http://www.pusatdata.kemkes.go.id/index/view/1601400003/data-dan-informasi-penyakit-menular-di-indonesia.html
18. Abadi F, Ganiati G, and Rahmawati PR. A systematic review of the role of vitamin D and calcium in premenstrual syndrome. 2019; 2(2): 73-80.
19. Johnson FRB. Vitamin D and the Onset and Course of Depression: Causal Association or Compensatory Response? Psychol Bull. 2013; 139(2): 411-421.
20. Soodan S. Vitamin D and Depression: A systematic review and meta-analysis of epidemiological studies with implications for clinical practice. 2014.
21. Blake DD. Vitamin D metabolism, mechanism of action, and clinical applications. Clin Nutr. 2014; 33(1): 11-19.
22. Austin EP, Madak DZ, Tokur O, O. One Ona. Kemungkinan Role Vitamin D deficiency in depression and mood adjustment disorder. Bulletin of Clinical Psychopharmacology. 2015; 25(1): 1-3.

23. Yaghini B, Khosravi A, Baroun D, Rahnman H. The role of ultraviolet B sun exposure in vitamin D status and blood pressure in vitamin D deficient aged. Iran J Geriatr. 2014; 28(1): 1-6.
24. Siskind AP, Dalton JR, and Bendi EDD. Assessing bias: the importance of considering confounding. Evid Based Sport Exerc. 2012; 3(1): 9-12.

This research has a novelty compared to other research because a study on the influence of vitamin D administration had never been done before in Indonesia. The limitation of this research is that the vitamin D consumption was not observed directly, however, in this study, the researcher made a program to ensure that the subjects consume vitamin D or placebo. Another limitation is that the sunrays exposure was only done two times a week in Saturday and Sunday for 15 minutes. This study also did not measure serum 25-(OH) D level.

Confounding is often referred to as a "mixing effect" when the effects of the exposure under study on a given outcome are mixed with the effects of an additional factor (or factors) resulting in a distortion of the true relationship. In a clinical trial, this can happen when the distribution of a known potential factor differs between people being



Re: Konfirmasi Penulis

Dari: Jurnal Kesmas (jurnalkesmas.ui@gmail.com)

Kepada: yuni_kusmiyati@yahoo.co.id

Tanggal: Jumat, 10 Juli 2020 pukul 11.05 WIB

Yth. Ibu Yuni Kusmiyati,

Berikut ini kami kirimkan artikel Ibu tentang Vitamin D yang telah dicek oleh ENAGO (jasa penyuntingan artikel internasional) dan Redaksi Bahasa Jurnal Kesmas. Mohon dicek kembali ada beberapa catatan yang perlu konfirmasi. Kami tunggu hasil koreksi dan revisinya, paling lambat kami terima hari Senin, 13 Juli 2020.

Terima kasih
Redaksi



Dummy Article and Proof Approval Letter

Dari: Jurnal Kesmas (jurnalkesmas.ui@gmail.com)

Kepada: yuni_kusmiyati@yahoo.co.id

Tanggal: Selasa, 18 Agustus 2020 pukul 19.34 WIB

Dear Yuni Kusmiyati,

We kindly attach dummy of article "Vitamin D and Reduced Academic Stress of Health Students" that published in Volume 15 Issue 3 of Kesmas: National Public Health Journal.

Please fill and sign the proof approval letter.

Please do check the dummy and give a confirmation about authors' name, institutions, correspondence author, and all of content of the manuscript. Please confirm or attach such correction to our email no later than 02.00 PM (GMT+7), Thursday, August 20, 2020.

Each author will receive a certificate and link for the full version of the printed journal will be available on the website. Please notify us if you are done with pay the manuscript handling fee so that we can send the certificate. If you want to get the printed journal version, please let us know for further information.

Regards,
Editor in chief
Dewi Susanna