

Effectiveness of Multimedia and Education using Lecturing Method on Role of Vitamin D for Health Cadres

Sumartini Dewi,^{1,2} Adityana Sulistyono,¹ Erwin Sumardi,³ Eka Puji Lestari,³ Kevin Sulay Wijaya,³ Paramitha Kusuma,³ Theresia Wahyu,³ Agraini,³ Eldi Sauma,³ Winda Kurniati,³ Francisca Nungki Triandari,³ Shelly Iskandar,³ Tuti Kurnianingsih,³ Veranita Pandia³

¹Immunology Central Study, Faculty of Medicine, Universitas Padjadjaran, Indonesia

²Division of Rheumatology, Department of Internal Medicine, Faculty of Medicine Universitas Padjadjaran/Dr. Hasan Sadikin General Hospital Bandung, Indonesia

³Department of Psychiatry, Faculty of Medicine Universitas Padjadjaran/Dr. Hasan Sadikin General Hospital Bandung, Indonesia

Abstract

Objective: To investigate the differences in the effectiveness of learning methods between multimedia and lecture methods on benefits of vitamin D for health from the perspective of health cadres' knowledge.

Methods: This study was an experimental study with a pre-and post-test design. The knowledge of health cadres was assessed using a questionnaire. The questionnaire was distributed before and after the health cadres received vitamin D education by two different methods. Data analysis was conducted using paired and independent t-test with a significance level of $p < 0.05$.

Results: A total of 59 health cadres participated in this study. Prior to education, the median test score for the multimedia group was 9.45, while the median test score for the lecture group was 82.70. After the education, the multimedia group and the lecture group got a median test score of 10.84. The multimedia method and lecture method significantly increased health cadres' knowledge with p-values of < 0.02 and 0.003 , respectively. There was no difference in the multimedia method's effectiveness compared to the lecture method in increasing the knowledge of health workers about vitamin D's role in health ($p = 0.62$).

Conclusion: The multimedia education method is as effective as the lecture method in increasing health cadres' knowledge about the role of vitamin D in health.

Keywords: Education, lectures, multimedia, vitamin D

pISSN: 2302-1381;
eISSN: 2338-4506;
<http://doi.org/10.15850/ijih.v9n2.2243>
IJHS. 2021;9(2):55-59

Received:
December 19, 2020

Accepted:
September 30, 2021

Introduction

Vitamin D (also known as "calciferol") is a fat-soluble vitamin found naturally in foods and provided as a dietary supplement.¹ Vitamin D can act both as a nutrient and a hormone and it is a quintessential element as a regulator of bodily functions and it has a wide range of

therapeutic efficacies.¹ Many research also shows the importance of vitamin D in assisting the maximal function of muscle contraction and relaxation, its abundance benefit for dental health, renal functions, wound healing and repair, and also in reducing obesity which could lead to metabolic syndrome.² Lack of Vitamin D may result in various defects and diseases such as rickets, osteoporosis, and osteomalacia.²

Vitamin D also has other functions in the body, such as reducing inflammation and modulating cell formation, neuromuscular and immune function, and glucose metabolism.^{1,2,3} Vitamin D influences several

Correspondence:

Indra Wijaya,
Department of Internal Medicine, Faculty of Medicine
Universitas Padjadjaran-Dr. Hasan Sadikin General
Hospital Bandung, Indonesia,
e-mail: indrawijayaipd@gmail.com

genes that code for proteins that control cell proliferation, differentiation, and apoptosis. Vitamin D receptors can be found in many tissues, and some of them transform 25(OH)D to 1,25(OH)₂D. Vitamin D comes in two forms: D₂ (ergocalciferol) and D₃ (cholecalciferol), which differ chemically only in their side-chain structures and are found in foods and dietary supplements. In the small intestine, both forms are well absorbed. Simple passive diffusion and a mechanism involving intestinal membrane carrier proteins are used to absorb nutrients. Vitamin D absorption is facilitated by the presence of fat in the gut, but some vitamin D is absorbed without it. Vitamin D absorption from the gut is unaffected by age or obesity.⁴

Indonesia, as a tropical country, is blessed with an abundance of sunlight, which is the primary source for the formation of vitamin D. Unfortunately, many people in the community do not understand the role of vitamin D for health, so education is needed to increase public knowledge. There are various learning education methods. The lecture method is the most popular method of education. However, it requires trained personnel in a specific location and a certain schedule to gather the listener. Therefore, practical, easy, and inexpensive educational methods are needed. Another method that can be used as an alternative is through audio-visual. Audio-visual methods tools can improve speaking skills several times over, more than other methods, which are needed for health cadres.⁵ The advantages of the audio visual method can be listed as follows: 1) the ability to ensure authentic language (what they are communicating effectively); 2) It can help learners to conceptualize ideas and get in-depth thought on the topic; 3) The motions that appeared in videos feature are always being motivational for the students; 4) it can provide the available information or substitute for books when they are not available on a particular topic, and 5) the dramatic reactions can bring historical events and personalities in life. However, audio-visual approaches have some disadvantages, such as the possibility of losing focus, the need for a well-designed presentation or content, and the fact that students could pay more attention to the visuals than the audio.⁶ This study aimed to compare the efficacy of a multimedia presentation versus a lecture on the role of vitamin D for health.

Methods

This study was an experimental study with a pre-and post-test design. This study was a part of the community service program that is supported by Universitas Padjadjaran Internal Grant. This research was approved by the ethics committee of Universitas Padjadjaran with letter number 1506/UN6.KEP/EC/2019. The subjects were health cadres at Puskesmas Margahayu Raya, Margasari Village, Buah Batu District, Bandung City, West Java, Indonesia. The knowledge of health cadres was assessed before and after the health cadres received vitamin D education by two different methods. From 170 health cadres at Puskesmas Margahayu Raya, the samples were selected using the simple random sampling method. The minimum total samples size is at least 30 people. Health cadres who are 18 years old, speak Indonesian, and have not undergone mental health training are eligible to participate.

Uncorrected vision impairment and uncorrected hearing difficulties were the exclusion criteria. Health cadres who met the research criteria were given informed consent and randomly divided into two groups based on the hour of arrival until 09.00 AM on the day of the intervention. Before the intervention was carried out, the cadres of both groups were given the written form that they should fill completely for about 10 minutes. The cadres' knowledge of vitamin D was measured using 15 multiple-choice questions. The questions asked include; the sources of vitamin D, the risk factors for vitamin D deficiency, the properties of vitamin D, the effects of vitamin D deficiency on health, and the benefits of consuming vitamin D. Each of the correct answers gets a score of 1, and the wrong answer has no score. The final score is the total score for the 15 questions. Then the first group was given the information on vitamin D by an internal medicine specialist using the lecture method. The second group was given the information by multimedia method, using educational video.

The cadres' knowledge of vitamin D after the education was measured using the same questions given before the education session. The presentation slides and the education video were developed by the researchers. A t-test with a significance level of 0.05 was used to analyze the data.

Results

The subject consisted of 59 health cadres, with 31 in the lecture method group and 28 in the multimedia group. The table shows the demographic data of the participants.

Data analysis showed no significant difference between the two groups in the respondent's age ($p=0.11$) and education level ($p=0.12$). There was no comparison analysis between the subject's gender because all subjects in the lecture method group were women. Occupations were also not comparable because all respondents in the lecture method group do not have jobs. The normality test using the Shapiro Wilk showed that the scores of the lecture and multimedia groups were not normally distributed. At baseline, the lecture group subjects had a median of 10, a minimum of 4, and a maximum of 14, while the subjects in the multimedia group had a median of 8, a minimum of 2, and a maximum of 12. After education, the lecture group's median was 11, minimum score 5, and maximum 14, and data analysis using the paired t-test showed that these scores increased significantly after education ($p=0.00$). After an education in the multimedia group, the median was 12, the minimum score was 2, and the maximum score was 14, and this value also increased significantly after education ($p=0.00$). An independent t-test comparing the increase

in scores between the two treatment groups at baseline and post-education revealed no significant difference ($p=0.62$).

Discussion

This study found that education using a multimedia method is as effective as the lecture method in increasing the knowledge of health cadres about the role of vitamin D in health. Traditional lectures can reduce listening comprehension by causing listeners to lose focus because figures and words are only processed visually in lectures. Another cause for reduced listening comprehension is alignment issues in conventional lectures, where there is a disjunction between figures and words due to the lecturers' poor presentation skills, which is particularly apparent throughout slides. As a result, video clips with synchronized visual and auditory information may improve listening comprehension, especially during interventional procedures.⁷

In this study, there was no difference in the knowledge of the health cadres between multimedia group and lecture. This finding may be due to the slides used in the lecture method being the same as the slides used in the video of the multimedia method, so the health cadres of both groups receive similar visual information. The oral explanation in the video used a manuscript so that it was more

Table Characteristic of Health Cadres

Demographic Profiles	Lecture Method (n=31)		Multimedia Method (n=28)		p-value
	n (%)	Median	n (%)	Median	
Gender					
Male	-		3 (10.71)		
Female	31 (100)		25 (89.29)		
Age		50		49	0.195
Education					0.296
Below or equal to Junior High School	11 (35.48)		9 (32.14)		
Senior High School	13 (41.93)		14 (50.00)		
Undergraduate	7 (22.58)		3 (10.71)		
Post Graduate	-		2 (7.14)		
Employment					
Employee	-		6 (21.43)		
Unemployed	31 (100)		22 (78.57)		

directed and organized. However, because the slides in the lecture are explained by an expert, the messages conveyed are also easier to catch by the audience.

This study finding is in line with other previous studies. Pandia *et al.*⁸ show that teaching materials using video is as effective as traditional lectures in lay health workers. Kobra *et al.*⁹ show no significant difference between nursing students' performance before and after training with the video and lecture methods. A study from Brookfield *et al.* on medical students at the University of Göttingen shows that video and live lectures are equally effective in preparing medical examinations. There are several differences in subjective evaluation; 48% of students prefer hands-on learning, 27% like video lessons, and 25% say they are 'neutral'.¹⁰ A survey conducted by Sarihan *et al.* in the Department of Emergency Medicine's residents shows no difference between traditional lectures to video-supported lectures' efficiency within the training of the Emergency Medicine.¹¹ Ramezaninia *et al.*⁷ showed that toothbrushing education's effectiveness using lecture, video, and the pamphlet is almost the same; However, pamphlets are the most effective educational method.

Several other previous studies found that education using multimedia methods seems to have some advantages. The survey conducted by Rajadell *et al.*¹² on first-year students showed that students felt that learning through video was in line with their training needs and helped them have a clearer view. A study by Ljubojevic *et al.*¹³ shows that the most efficient way is to insert educational video content in the middle of a lecture. McLean's study shows that, on average, 74% of students said that video learning gave them comprehension about material that they missed while attending class.¹⁴ Moazami *et al.*¹⁵ found that virtual learning is more effective than traditional learning.

The subjects of this study were health cadres. Health cadres can carry out education in the community. Health cadres are volunteers selected by the community and have task to

develop the community; in this case, health cadres are also known as health promoters or activists. According to Minister of Health Regulations No. 25 of 2014, health cadres are elected by the community and trained to handle individual or community health problems and work in places related to providing health services in very close relationships with health service delivery places. The health cadres who have been elected are expected to care about health problems in the environment where they live, educate those in their environment about health, and disseminate health science information that they get from health officers or staff.¹⁶

Education in the form of videos can be learned at any time, without being limited by place and time. Educational videos are available 24 hours and can be viewed at any time according to a person's schedule and activity. Educational videos can also be quickly distributed widely through various social media, currently used by most Indonesians from various backgrounds. Park *et al.*¹⁷ show that emotion, motivation, and other affective variables are important not only in designing a multimedia learning environment but also in understanding and investigating learning, opening up new perspectives on the integrative nature of the cognitive learning process.

The limitations of this study was that the people who provide education in lectures and videos are different, which causes different styles in the way the slides were explained. This difference can affect the results of the study. The other limitation is that lectures were not conducted by general practitioners but by an expert, so the results cannot reflect the quality of lectures held in the community.

In conclusion, multimedia and lecture methods of education effectively increase health cadres' knowledge, and multimedia education methods are just as effective as lecture methods in increasing health cadres' knowledge about the role of vitamin D. We suggest that educational videos should be made under supervision of the experts in the field.

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