

## RESEARCH ARTICLE

## Knowledge Level of Midwives before and after an Online Training Participation

Windi Nurdiawan, Setyorini Irianti, Dyah Ayu Puspita, Alfonsus Zeus, Billy Nusa Anggara, Vebri Anita Sinaga, Wulan Ardhana Iswari, Will Hans, Eduward Yacub Prasangka, Fadhilah Zulfa

Department of Obstetrics and Gynecology, Faculty of Medicine, Universitas Padjadjaran/  
Dr. Hasan Sadikin General Hospital, Bandung, Indonesia

### Abstract

Fetal growth restriction is a prevalent pregnancy issue linked to numerous unfavorable postnatal outcomes. Suboptimal uterine-placental perfusion and inadequate fetal feeding are the vital pathophysiologic causes. Midwives play a crucial role in informing pregnant women about vitamin D inadequacy. This paper aims to determine the difference between midwives' prior and post-webinar knowledge levels. It was a cross-sectional study of individuals who participated in a webinar on November 21, 2021. Subjects were selected using a total population sampling approach from all midwives who participated in the webinar and completed pre-and post-tests. The difference between knowledge levels was evaluated using the difference between the pre-test and post-test scores in the general category. There was an increase in the number of participants who successfully answered the five-question component, a decrease in the number of participants who correctly answered the two-question section, and no change in the number of subjects who correctly answered question number one. The average score on the post-test was higher (67.28) than the pre-test (63.10), while the median score was the same at both time points. After attending a webinar, there was an increase in the proportion of subjects with a high level of knowledge (11.4% to 24%) and a drop in the proportion of subjects with a poor level of knowledge (32.3% to 27.1%). In conclusion, there was an improvement in the knowledge level of midwives before and after the webinar participation.

**Keywords:** Fetal growth restriction, knowledge, midwives, vitamin D deficiency, webinar

### Introduction

Fetal growth restriction is a prevalent pregnancy issue that harms postnatal outcomes.<sup>1</sup> Placental insufficiency accounts for five to ten times the lifetime mortality and morbidity of fetal growth restriction, a common pregnancy-related illness.<sup>1</sup> These increase the likelihood that the fetus has metabolic disorders, polycythemia, pulmonary disease, intraventricular hemorrhage, cognitive impairment, and cerebral palsy. All can affect both full-term and premature infants.<sup>2,3</sup>

Maternal, fetal, and placental factors constitute the pathogenesis of fetal growth restriction.<sup>2-4</sup> Nutrition is one of the elements in maternal etiology. There was a correlation between small-for-gestational-age (SGA) baby size and maternal nutrition.<sup>4-6</sup> Previous studies discovered that a deficit in vitamin D was related to SGA in mothers and that moms with higher serum 25(OH)D levels may also be at a moderately increased risk.<sup>7-9</sup>

The occurrence of vitamin D insufficiency in pregnant women is a significant public health concern.<sup>10-14</sup> Vitamin D deficiency increases the risk of preeclampsia, gestational diabetes, preterm labor, and delivery of SGA infants.<sup>10-14</sup> It also increases the inadequate fetal immune system, wheezing and eczema, asthma, rickets in infants, decreased bone density, schizophrenia, and the risk of respiratory infections in infants.<sup>10-15</sup>

Knowledge of vitamin D deficiency is unquestionably essential for prenatal care providers. As the first line of antenatal care for pregnant women in Indonesia, midwives ensure that patients do not suffer from vitamin D deficiency throughout pregnancy. Due to the widespread COVID-19 pandemic in 2020, educational institutions and hospitals rely on e-learning to deliver continuing medical education. E-learning, often known as online learning, is the acquisition of pertinent knowledge and skills through the Internet and other information technologies. Currently,

Received: 21 March 2022; Revised: 28 August 2022; Accepted: 19 December 2022; Published: 31 December 2022

**Correspondence:** Windi Nurdiawan, dr., Sp.O.G., M.Kes. Department of Obstetrics and Gynecology, Faculty of Medicine, Universitas Padjadjaran/Dr. Hasan Sadikin General Hospital. Jln. Pasteur No. 38, Bandung 40161, West Java, Indonesia. E-mail: [windi@unpad.ac.id](mailto:windi@unpad.ac.id)

medical schools, teaching hospitals, and other health organizations are rapidly expanding their use of e-learning as a learning method.<sup>16-19</sup>

Webinars are e-learning utilized frequently in continuous learning for health workers.<sup>20</sup> The Merriam-Webster Dictionary describes a webinar as "a live online instructional session during which viewers may submit questions or comments."<sup>21</sup> Webinars are a type of online learning intervention backed by audiovisual software that connects students with the instructor. In addition, the synchronized nature of webinars enables individuals in different regions to exchange questions, suggestions, and comments.<sup>20</sup> Webinars are delivered live, as well as being recorded and saved for later review, reducing barriers to participating in professional development events.<sup>22</sup> This study aims to determine the difference between midwives' prior and post-webinar knowledge levels.

## Methods

A cross-sectional study was conducted on November 21, 2021. Subjects were selected using a total sample approach from all midwives who participated in the webinar and submitted complete pre-and post-test data. There were 370 participants, but only 350 completed pre-test and post-test data. The Health Research Ethic Committee of Dr. Hasan Sadikin General Hospital granted LB.02.01/X.6.5.76/2022.

During a webinar and before administering the pre-and post-tests, informed consent to participate in the study was explained verbally. The webinar participants who participated in this study were to make decisions independently and without interference from any side.

The pre-test and post-test questions consist of eight true-false questions from relevant sources. Each accurate response received a score of 12.5, while each incorrect answer received a score of 0. The comparative analysis of knowledge levels was based on pre-and post-test scores. For example, with scores of 56, 76, and 76, the degrees of knowledge were classified as low, moderate, and high, respectively. A statistical test also evaluated the average and median pre-and post-test scores.

The information was analyzed using IBM SPSS version 21. (IBM Corp, Armonk, USA). A descriptive statistic was used to illustrate the average pre-and post-test scores.

## Results

Table 1 showed the pre-test and post-test answers to each question component. There was an increasing number of participants who answered correctly in the 5 questions component (question number 2, 3, 4, 6, and 7). Meanwhile, a reduced number of participants who answered correctly in 2 questions (question number 5 and 8) and a same number of subjects who answered question number 1 correctly were obtained.

The subjects' pre-test and post-test scores were compared in Table 2 and Table 3. Before attending the training, a range of replies to each question suggested that more than one-third of participants had a poor level of knowledge regarding vitamin D deficiency in pregnant women. In contrast, slightly more than ten percent of participants had a high level of knowledge. After attending the webinar, there was a rise in the proportion of subjects with a high level of knowledge and a decrease in the proportion of subjects with a low level of knowledge. In addition, the average score on the post-test was more significant than the score on the pre-test, while the median score was identical.

## Discussion

The goal of this study was to evaluate the pre- and post-webinar knowledge levels of webinar attendees. The study indicated that the webinar was successful in enhancing midwives' knowledge. Overall, the average post-test score went up, which shows that people now know more about how a lack of vitamin D can cause fetal growth restriction.

Due to poor maternal and fetal outcomes, low vitamin D levels, as measured by 25-hydroxyvitamin D [25(OH)D], continue to be an epidemic during pregnancy. Vitamin D deficiency during pregnancy is also connected with many major placental insufficiency-related problems, including fetal growth restriction. On the other hand, it has been demonstrated that enough vitamin D intake during pregnancy reduces the risk of issues and positively influences the baby's weight. On the other hand, the biological effects of vitamin D on prenatal outcomes have yet to be agreed upon.<sup>23</sup>

The placenta is responsible for most vitamin D metabolism during pregnancy, and adequate placental growth is essential for a healthy

**Table 1 Pre-test and Post-test Answers of Each Question Component**

Number	Questions	Correct Pre-test Answers n=350 (%)	Correct Post-test Answers n=350 (%)
1	Vitamin D has an important role for fetal growth	349 (99.7)	349 (99.7)
2	Impaired fetal growth in utero without congenital defects could not be prevented	285 (81.4)	290 (82.9)
3	Melanin will increase D3 levels in the blood	69 (19.7)	105 (30.0)
4	Fruits are one of the sources of vitamin D	139 (39.7)	164 (46.9)
5	Vitamin D level measurement in pregnant women is necessary	294 (84)	281 (80.3)
6	Vitamin D could only be added through daily vitamin D intake	183 (52.3)	199 (56.9)
7	Antenatal care visits based on the 2020 MCH handbook were at least five times in 1 pregnancy period	143 (40.9)	208 (56.8)
8	The risk of preeclampsia screening in the MCH handbook were not necessary to be filled in by the midwives	305 (87.1)	291 (83.1)

**Table 2 Comparison of Pre-test and a Post-test Scores of Subjects**

Knowledge Level	Pre-test n=350 (%)	Post-test n=350 (%)
Low	113 (32.3)	95 (27.1)
Moderate	197 (56.3)	171 (48.9)
High	40 (11.4)	84 (24.0)

pregnancy. Cytotrophoblast cells are the predominant placental cells that play a significant role during pregnancy.<sup>23</sup>

Increased knowledge of health workers after attending webinars was found in several studies that have been previously conducted.<sup>23-25</sup> The improvement of midwives' knowledge in this study was consistent with another study conducted in Australia that assessed midwives' knowledge at three-time points with the total knowledge score statistically difference in pre to immediate questionnaires and immediate to 6-8

weeks post-workshop/webinar.<sup>24</sup>

As stated in Table 1, question number one, "vitamin D has an important role for fetal growth," there is no improvement after intervention since the score is already high (99.7%). Question two, "impaired fetal growth in utero without congenital defects could not be prevented," show relatively low improvement from 81.4% to 82.9% after intervention because the midwives already had good knowledge before intervention. Question number three, "melanin will increase D3 levels in the blood," showed a relatively high increased score after the intervention, from 19.7% to 30%. Question number four, "fruits are one of the sources of vitamin D," only showed a relatively low increased score from 39.7% to 46.9%. Interestingly, there are decreased scores on question number five about "vitamin D level measurement in pregnant women is necessary," from 84% to 80.3%. The question number six "vitamin D could only be added through daily vitamin D intake," only showed a relatively low

**Table 3 Difference in Knowledge Levels before and after Webinar Participation based on Pre-test and Post-test Total Scores using Descriptive Analysis**

Variables	Median (Min-Max)	Mean±SD
Pre-test score (n=350)	62.5 (25.0-100.0)	63.10±15.31
Post-test score (n=350)	62.5 (25.0-100.0)	67.28±18.67

increased score from 52.3% to 56.9%. Question seven, "antenatal care visits based on the 2020 MCH handbook were at least five times in 1 pregnancy period," showed a relatively high increased score after intervention from 40.9% to 56.8%. There is also a decrease in score in question eight about "the risk of preeclampsia screening in the MCH handbook were not necessary to be filled in by the midwives" from 87.1% to 83.1%.

The webinar also had been studied in comparison with another method of professional development in terms of effectiveness. Compared to group discussion, a webinar was more effective as a training method.<sup>26</sup>

Before the pandemic, the webinar-based educational method was less common than during the pandemic. A study in 2017 from McKinney<sup>27</sup> demonstrated that webinars and similar web-based learning materials in public health were considered firm educational strategy tools. The downside of this method, including initial investment in hardware and software, specific technical support, and technical challenges, may be outweighed for many by greater efficiency and flexibility in scheduling, accessibility of resources, efficiency in costs and time spent on travel, and the support for online learning community development.<sup>21</sup>

A webinar format can be used for education during a pandemic when conventional training is impossible. It may fill the gap created by the suspension of traditional training, especially during the COVID-19 pandemic.<sup>28</sup> Although webinars are not considered a replacement but only a complement to conventional methods.<sup>29</sup>

The lack of a matching technique between the pre-test and post-test groups is a limitation of this study, as it prevents an analytical comparison between the two groups. Further study needs to be done with a control group to increase the study's accuracy. It is intended that midwives' more significant understanding of the association between vitamin D insufficiency and fetal growth restriction will strengthen their role in reducing the incidence of fetal growth restriction by educating pregnant mothers.

## Conclusions

There was an increase in the proportion of subjects with a high level of knowledge after attending the training using the online approach. Therefore, health policymakers and educational institutions

should consider increasing online activity to improve the effectiveness of health workers, especially during the COVID-19 outbreak.

## Conflict of Interest

The authors declare that they have no conflict of interest exists in this study.

## Acknowledgment

The authors would like to thank Universitas Padjadjaran for supporting this research under the research fund of the Internal Research Grant.

## References

1. Saw SN, Low JYR, Mattar CNZ, Biswas A, Chen L, Yap CH. Motorizing and optimizing ultrasound strain elastography for detection of intrauterine growth restriction pregnancies. *Ultrasound Med Biol*. 2018;44(3):532–43.
2. Sharma D, Shastri S, Sharma P. Intrauterine growth restriction: antenatal and postnatal aspects. *Clin Med Insights Pediatr*. 2016;10:67–83.
3. Malhotra A, Allison BJ, Castillo-Melendez M, Jenkin G, Polglase GR, Miller SL. Neonatal morbidities of fetal growth restriction: pathophysiology and impact. *Front Endocrinol (Lausanne)*. 2019;10:55.
4. American College of Obstetricians and Gynecologists' Committee on Practice Bulletins—Obstetrics and the Society for Maternal-Fetal Medicine. ACOG Practice Bulletin No. 204: fetal growth restriction. *Obstet Gynecol*. 2019;133(2):e97–109.
5. Englund-Ögge L, Brantsæter AL, Juodakis J, Haugen M, Meltzer HM, Jacobsson B, et al. Associations between maternal dietary patterns and infant birth weight, small and large for gestational age in the Norwegian Mother and Child Cohort Study. *Eur J Clin Nutr*. 2019;73(9):1270–82.
6. Cano-Ibáñez N, Martínez-Galiano JM, Amezcua-Prieto C, Olmedo-Requena R, Bueno-Cavanillas A, Delgado-Rodríguez M. Maternal dietary diversity and risk of small for gestational age newborn: findings from a case-control study. *Clin Nutr*. 2020;39(6):1943–50.
7. Aghajafari F, Nagulesapillai T, Ronksley PE, Tough SC, O'Beirne M, Rabi DM. Association

- between maternal serum 25-hydroxyvitamin D level and pregnancy and neonatal outcomes: systematic review and meta-analysis of observational studies. *BMJ*. 2013;346:f1169.
8. Tian Y, Ye Y, Zhang Y, Dou L, Dou Y, Zhao P, et al. Maternal serum 25-hydroxyvitamin D concentrations during pregnancy and infant birthweight for gestational age: a three-cohort study. *Pediatr Allergy Immunol*. 2021;32(8):1637–45.
  9. Jensen ME, Camargo CA Jr, Harvey SM, Gibson PG, Murphy VE. Serum 25 hydroxyvitamin D levels during pregnancy in women with asthma: associations with maternal characteristics and adverse maternal and neonatal outcomes. *Nutrients*. 2020;12(10):2978.
  10. Hong-Bi S, Yin X, Xiaowu Y, Ying W, Yang X, Ting C, et al. High prevalence of vitamin D deficiency in pregnant women and its relationship with adverse pregnancy outcomes in Guizhou, China. *J Int Med Res*. 2018;46(11):4500-5.
  11. Pereira-Santos M, Queiroz Carvalho G, David Couto R, Barbosa Dos Santos D, MarluCIA Oliveira A. Vitamin D deficiency and associated factors among pregnant women of a sunny city in Northeast of Brazil. *Clin Nutr ESPEN*. 2018;23:240–4.
  12. Yang C, Jing W, Ge S, Sun W. Vitamin D status and vitamin D deficiency risk factors among pregnancy of Shanghai in China. *BMC Pregnancy Childbirth*. 2021;21(1):431.
  13. Emmerson AJB, Dockery KE, Mughal MZ, Roberts SA, Tower CL, Berry JL. Vitamin D status of white pregnant women and infants at birth and 4 months in North West England: a cohort study. *Matern Child Nutr*. 2018;14(1):e12453.
  14. Dawodu A, Akinbi H. Vitamin D nutrition in pregnancy: current opinion. *Int J Womens Health*. 2013;5:333–43.
  15. Schöttker B, Ball D, Gellert C, Brenner H. Serum 25-hydroxyvitamin D levels and overall mortality. A systematic review and meta-analysis of prospective cohort studies. *Ageing Res Rev*. 2013;12(2):708–18.
  16. Ruiz JG, Mintzer MJ, Leipzig RM. The impact of e-learning in medical education. *Acad Med*. 2006;81(3):207–12.
  17. Huynh R. The role of e-learning in medical education. *Acad Med*. 2017;92(4):430.
  18. Frehywot S, Vovides Y, Talib Z, Mikhail N, Ross H, Wohltjen H, et al. E-learning in medical education in resource constrained low- and middle-income countries. *Hum Resour Health*. 2013;11:4.
  19. George PP, Papachristou N, Belisario JM, Wang W, Wark PA, Cotic Z, et al. Online eLearning for undergraduates in health professions: a systematic review of the impact on knowledge, skills, attitudes and satisfaction. *J Glob Health*. 2014;4(1):010406.
  20. Gegenfurtner A, Zitt A, Ebner C. Evaluating webinar-based training: a mixed methods study of trainee reactions toward digital web conferencing. *Int J Train Dev*. 2020;24(1):5–21.
  21. Black AT, Clauson M, Fraser S. Evaluation of a webinar-based education strategy to engage nurses and support practice. *J Nurses Prof Dev*. 2013;29(5):249–54.
  22. Cunningham M, Elmer R, Rüegg T, Kagelmann C, Rickli A, Binhammer P. Integrating webinars to enhance curriculum implementation: AMEE Guide No. 136. *Med Teach*. 2021;43(4):372–9.
  23. Rana R, Kumawat D, Sahay P, Gour N, Patel S, Samanta R, et al. Perception among ophthalmologists about webinars as a method of continued medical education during COVID-19 pandemic. *Indian J Ophthalmol*. 2021;69(4):951–7.
  24. Othman SME, Steen M, Fleet JA, Jayasekara R. Healthy eating in pregnancy, education for midwives: a pre-post intervention study. *Eur J Midwifery*. 2020;4:20.
  25. Serebrakian AT, Ortiz R, Christensen JM, Pickrell BB, Irwin TJ, Karinja SJ, et al. Webinar during COVID-19 improves knowledge of changes to the plastic surgery residency application process. *Plast Reconstr Surg Glob Open*. 2020;8(10):e3247.
  26. Rahmati R, Khadivzadeh T, Esmaily H. Comparison of the effect of two training methods (webinar and group discussion) on improving the attitude and performance of health workers in providing counseling with fertility promotion approach. *J Edu Health Promot*. 2020;9:280.
  27. McKinney WP. Assessing the evidence for the educational efficacy of webinars and related internet-based instruction. *Pedagogy Health Promot*. 2017;3(15):47S–51S.
  28. Hosseini SMR, Mahmodi MA, Mirhaghi A. Evaluation of the impact of webinar

training in comparison to conventional training on COVID-19 risk perception in emergency medical technicians. *Mod Care J.* 2021;18(2):e116139.

29. Ismail II, Abdelkarim A, Al-Hashel JY.

Physicians' attitude towards webinars and online education amid COVID-19 pandemic: when less is more. *PLoS One.* 2021;16(4):e0250241.