

Original Article

***Effects of Educational Videos to Increase Knowledge, Attitudes, and Sleep Quality of Pregnant Women with Chronic Energy Deficiency***

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**ABSTRACT**

*Lack of knowledge and attitudes is factor in the unresolved problem malnutrition pregnant women. The purpose of this study was to analyze the effectiveness of nutritional education media and sleep quality to increase knowledge and attitudes of chronic energy deficiency pregnant women towards nutrition and sleep quality. The research used is quantitative, while the design uses a combination of research and development and quasi-experimental methods with pre-posttest design controls. The sample was 63 pregnant women who experienced chronic energy deficiency (CED). Sampling technique by means of total sampling. Data analysis showed that knowledge increased significantly after being given the video intervention (mean=57, SD=14.53), the control group was lower, namely mean=9.1, SD=20.24, attitudes increased in the intervention group (mean=65.0, SD=20.47), control group (mean=2.96, SD=20.56), sleep quality in the intervention group increased with an average mean=0.68, SD=1.69, control group mean=0.000, SD=0.894. The p-value of the Mann-Whitney test results for the variables of knowledge, attitudes, and sleep quality is  $0.000 < (0.005)$ , this shows that there are differences in knowledge and attitudes before and after the educational animated video. In Conclusions, education using animated videos on nutrition and sleep quality is effective in improving the nutritional status of pregnant women. These results imply the need for educational media designs with more attractive models and innovations with more intensive promotion methods. It is hoped that future research can examine more deeply the relationship between other factors that influence chronic energy deficiency in pregnant women, such as sleep patterns and family support.*

**Keywords: Educational Videos, Knowledge, Attitudes, Sleep Quality, Pregnant Women.**

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**INTRODUCTION**

Malnutrition or chronic energy deficiency problems (CED) in women have an impact on adverse pregnancy outcomes including maternal death, complications of childbirth, premature birth, and intrauterine

growth retardation.<sup>1,2,3</sup> Indonesia ranks fourth after India with a prevalence of 35.5%. The results of the Indonesian Ministry of Health's Basic Health Research in 2018 showed that the prevalence of chronic energy deficiency problems (CED) in pregnant women (aged 15-49 years) was still quite high, namely 17.3%.

The target percentage of chronic energy deficiency pregnant women can decrease by 1.5% annually.<sup>4</sup> The city of Ternate, North Maluku province is part of the Indonesian region with chronic energy deficiency problems (CED) in pregnant women as much as 24.0%. Data on 34 provinces in Indonesia showed that the North Maluku region had not yet reached the target for achieving the lowest CED pregnant women (9.7%).<sup>5</sup> Meanwhile, data from the Kalamata Health Center in Ternate city in 2022, which was the research location, showed that out of 316 pregnant women who came to check their pregnancies, 63 pregnant women, or 19.9% experienced CED. Chronic energy deficiency (CED) is a nutritional problem caused by insufficient food intake for a long time. Pregnant women with CED generally can result in disruption of fetal growth and development such as the occurrence of stunting, and brain and metabolic defects which result in infectious diseases in adulthood.<sup>6,7</sup>

Methods that maximize referral systems and optimize education through various delivery methods, from digital modes to traditional face-to-face nutrition education in pregnancy classes and community-based health services, are essential for responsible health professionals to play a central role in the provision of nutrition education prenatal.<sup>8</sup> Video education provides significant evidence of increasing knowledge of patients of various age groups and disease groups.<sup>9</sup> Videos can be given for a certain period so that they can change attitudes, behavior, and healthy living habits.<sup>10</sup> The Indonesian government, especially the North Maluku province from 2020 to 2024, is targeting improving the quality of health services as a promotive and preventive effort through innovative use of educational media technology.<sup>5</sup>

Despite the level of knowledge and the state of good socioeconomic status, there are still pregnant women who still choose food according to their wishes without regard to good nutritional content.<sup>11</sup> A research study at the University of New England described pregnant women who experienced malnutrition or acute malnutrition during the prenatal period as a result of an imbalance in norepinephrine, dopamine, and serotonin levels, causing symptoms such as disturbed sleep patterns, anxiety, and anorexia.<sup>12</sup> This psychological problem affects the weight of pregnant women

thereby increasing the risk of babies born with low weight.<sup>13</sup> Poor sleep quality in pregnant women with socioeconomic status results in complications such as preterm labor, low birth weight, preeclampsia, perinatal death, and spontaneous abortion.<sup>14</sup>

Currently, all sectors, including health, are conducting many experiments using WhatsApp, as a mobile communication tool that is widely used to support video information.<sup>15</sup> Health promotion and education efforts using tablet devices and video content are acceptable and appropriate for pregnant women in urban and rural areas.<sup>16</sup> Therefore, the criteria for nutritional animation video content and sleep quality in this study were short duration, attractive appearance, and easy-to-understand language. The video material contains a combination of the benefits of implementing balanced nutrition and sleep quality in an effort to overcome the problem of chronic energy deficiency (CED).<sup>17</sup> Animated videos on nutrition and sleep quality can be a widely used nutritional education facility, especially in line with the increase in health promotion digital technology programs in Indonesia.<sup>18</sup>

There is no previous research that examines the effect of using animated video education with content combining the impact of nutrition and sleep quality on pregnant women who experience chronic energy deficiency (CED), especially in the Kalamata Health Center area, Ternate city, North Maluku, eastern Indonesia. The city of Ternate is an example of the application of video educational media because the internet infrastructure is well-developed. Educational video animations on nutrition and sleep quality attract the attention of pregnant women, families, and health workers and have been well received. Previous research conducted in the Jambi area of western Indonesia showed that nutritional animation video interventions increased pregnant women's knowledge from 97% to 100%<sup>19</sup> and research at the Bau-Bau Health Center in Central Sulawesi has been shown to increase the knowledge, attitudes, and behavior of pregnant women.<sup>20</sup> However, there are differences between the two studies and this study, namely the media analysis test without a control group and a combination of material between nutrition and sleep quality. Another study explained that knowledge of nutrition and dietary diversity through antenatal care

nutrition education increased in the intervention and control groups, but the knowledge was higher in the intervention group.<sup>15</sup>

The purpose of this education is to analyze the effect of educational interventions on nutrition videos and sleep quality to increase knowledge and attitudes that have an impact on handling the problem of chronic energy deficiency (CED) in the working area of the Ternate city health center as a determining factor in efforts to reduce maternal and child mortality in Indonesia. The integration of educational videos on nutrition and sleep quality is used in digital-literacy-based online maternal and child health (MCH) media applications in the Ministry of Health in eastern Indonesia, North Maluku region.

## **METHOD**

### **Study Design**

The research method is quantitative research, while the research design uses a combination of research and development (R&D) and quasy-experimental methods with pre-test and post-test design controls. This study used non-probability sampling, namely the consecutive sampling technique, which is a sample research design by including all the subjects who came and met the selection criteria sequentially until the required number of subjects was met so that the number of samples related to the needs of researchers could be obtained.<sup>21</sup> Educational media interventions on nutrition videos and sleep quality were designed according to the results of Focus Group Discussion (FGD) in collaboration with the North Maluku regional health office and the City of Ternate among other stakeholders.

The use of video is based on a predetermined schedule, the intervention is divided into three phases for three weeks six (6) times. The intensive phase in the first week is carried out twice through pregnant women classes, and the independent phase in the second week through the WhatsApp messaging application is monitored through the WhatsApp application group. Furthermore, the third phase is called the strengthening phase in the third week through two home visits. The evaluation through the post-test is carried out in the fourth week at the Integrated Healthcare Center. The population in this study used total sampling, namely all pregnant women in their first,

second, and third trimesters experiencing chronic energy deficiency (CED) in the Kalumata Health Center area of Ternate City based on secondary and primary data from October to December 2022. The ethical clearance was obtained from Hasanuddin University with number 13591/UN4.14.1/TP.01.02/2022.

### **Participant and Recruitment**

The design of animated video media to increase the knowledge and attitudes of pregnant women about nutrition and sleep quality in this study was 63 pregnant women who experienced chronic energy deficiency (CED). In carrying out the research activities, all cadres and midwives in the research area were assisted and the division of the intervention and control groups was based on the location of the Integrated Healthcare Center, which was divided into the southern and western the Integrated Healthcare Center for the intervention group with a total of 32 respondents (n=32) and the northern and eastern Integrated Healthcare Center for the control group numbered 31 respondents (n = 31). The intervention group was given animated video education and the control group was given no animated video education. Pregnant women who are not willing to continue the research process are not counted as intervention and control participants.

Measurement of knowledge, attitudes and sleep quality of the control group was carried out twice, namely at the class meeting for pregnant women for the pre-test and the fourth-week post-test at the Integrated Healthcare Center through a questionnaire. For four weeks pregnant women are only given the MCH book from the Kalamata Health Center health worker.

### **Course Content**

Animated video educational material in this study, explaining the types of food that are economical and nutritionally balanced, signs and symptoms, the impact of undernourished pregnant women (LBW and stunting), the benefits of supplementary feeding, how to maintain sleep quality in pregnant women and impact of undernourishment on sleep quality. The content of the video also explains the use of cheap food but in accordance with the principles of balanced nutrition and the benefits of supplementary feeding as a form of

government program to address CED problems. The video also contains the importance of activity and maintaining sleep patterns, in order to improve the quality of sleep for pregnant women in relation to handling CED. This is related to a research study which explained that malnutrition can occur due to someone's ignorance in accessing their food, or choosing foods that are less or not nutritious because of their ignorance. Pregnant women who have knowledge about eating patterns that are good

for consumption will apply them to their daily lives where it becomes their habit to regulate their eating patterns.<sup>22</sup>

The intervention schedule was carried out for four weeks starting with a pre-test through a nutrition questionnaire that had been tested for validation and reliability. Assessment of sleep quality was measured using the PSQI questionnaire.<sup>23</sup> Video interventions with a duration of 5 minutes are carried out twice a week.<sup>20</sup>

No	Activity Stages	Activity		Method	Media/AIDS	Time Allocation
		Fasilitator	Participant			
1	Opening	<ul style="list-style-type: none"> <li>Greet and introduce yourself</li> <li>Convey the aims and objectives of the meeting</li> <li>Presenting today's learning objectives</li> <li>Delivering today's lesson plan.</li> <li>Conducting pre-tests</li> </ul>	<ul style="list-style-type: none"> <li>Listening</li> <li>Answering pre-test questions</li> </ul>	Lecture	Questionnaire	15 minutes
2	Material Presentation	<ul style="list-style-type: none"> <li>Playing an animated video (through the LCD screen), contains about: <ul style="list-style-type: none"> <li>Types of food that are economical for the nutrition of CED pregnant women</li> <li>Signs and symptoms, the impact of malnourished pregnant women (LBW and stunting)</li> <li>Benefits of Supplementary Feeding</li> <li>How to maintain sleep quality in pregnant women</li> <li>The impact of insufficient food intake on sleep quality</li> <li>Provide opportunities for participants to ask questions that are not understood.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Listen</li> <li>Discussion</li> </ul>	Video based learning with mentoring techniques	<ul style="list-style-type: none"> <li>Animation videos, LCD projectors and laptops, video monitoring books</li> </ul>	5 minutes
3	Closing	<ul style="list-style-type: none"> <li>Provide conclusions from the material that has been presented</li> <li>Closing with thanks</li> </ul>	<ul style="list-style-type: none"> <li>Listen</li> </ul>	Lecture		2 minutes

Figure 1. Media Intervention Procedure Video and content.

#### Data collection and tool development

The nutrition and sleep quality videos

have passed a validation test by material experts and the media based on the National

Professional Certification Agency (BNSP) assessment standards. The test results show the suitability of the material with basic competencies, indicators, research objectives, theoretical review, formulated problems, various levels of respondents' understanding, and images used according to the material. The language used in the video is straightforward, spelling appropriate, and sentence structure accurate. The grammar used in the video is easy for respondents to understand. Selection of sentence vocabulary, the accuracy of words in terms and sentences is consistent. The use of language in video material is necessary because it is a useful tool for stimulating the senses of hearing and sight so that it is easier to receive and understand the messages conveyed by the presenters.<sup>24</sup>

### Nutritional Knowledge and Sleep Quality

Measuring tools for knowledge and attitudes about understanding nutrition and quality based on questionnaire questions that have passed the validation and reliability test stages on different samples with valid statistical test results. Questions about the knowledge test consisted of 10 nutritional question items containing exposure factors to nutrition education media, the definition of effects and symptoms of CED in pregnancy, food variety, balanced nutrition, benefits of local food, and supplementary feeding programs. The question items about attitudes are divided into positive and negative questions. Each question has a good category if the score is >80% of the answers are correct and less if <80% of the answers are correct. Assessment of sleep quality uses a standardized questionnaire, namely the Pittsburgh sleep quality index (PSQI) questionnaire.

### Process Evaluation

In the intervention group after being given video six times within one month. Respondents were given a post test using a

questionnaire. Measuring knowledge with the Guttman scale, point 0 if the answer is wrong and 10 if the answer is right. Attitudes were measured using a Likert scale and divided into positive and negative attitude questions (strongly disagree, disagree, agree and strongly agree). The results of the PSQI questionnaire are scores <5 for good sleep quality and scores >5 for poor sleep quality. Meanwhile, in the control group the evaluation was carried out after four weeks using the same questionnaire and questions as the intervention group.

### Statistical Analysis

Data analysis program is used to process the data. Data processing used univariate analysis to determine the characteristic frequency distribution in the intervention and control groups using the chi-square and Fisher tests and bivariate analysis to see differences in the effectiveness of animated video media on pregnant women's attitudes towards nutrition education and sleep quality between the intervention and control groups between the results the mean (mean) and standard deviation (SD) pre-post test using the Wilcoxon test. The Mann-Whitney test is used as a non-parametric test to measure differences in control variables between the intervention and control groups before and after measurement.

## RESULTS

63 respondents (n = 63) agreed to do this research, as an intervention group and a control group. The intervention group was conducted in the first week at the class meeting for pregnant women, starting with answering the questionnaire (pre-test) and then continuing with a 5-minute video presentation. The study in the control group was conducted separately at different locations and times with the same pre-test questionnaire but without video.

**Table 1. Frequency Distribution Based on the Characteristics of Pregnant Women with CED in the Intervention and Control Groups.**

Characteristics	Intervention (32)		Control (31)		Total		p-value
	n	%	n	%	n	%	
<b>Age of Pregnant</b>							0.006**
No Risk	25	78,1	31	49.2	56	88.9	
At risk	7	21,9	0	0.0	7	11.1	

<b>Gestational Age</b>							0.216*
Trimester I	26	41,3	19	32,3	45	71.4	
Trimester II	4	6,3	8	25,8	12	19,0	
Trimester III	2	3,2	4	41,9	6	9,5	
<b>Parity</b>							0.215*
Primigravida	26	81,3	19	61,3	45	71.4	
Multigravida	4	12,5	8	25,8	12	19.0	
Grandemultigravida	2	6,3	4	12,9	6	9,5	
<b>Education</b>							0.026**
Tall	25	39,7	30	47.6	55	87.3	
Low	7	11.11	1	1.6	8	12.7	
<b>Income</b>							0.009*
≥ UMR	2	6,3	10	67,7	12	19.0	
< UMR	30	93,8	21	32,3	51	81.0	

Descriptive statistics are used to summarize the distribution of socio-demographic characteristics of CED pregnant women according to control variables. The chi square test was conducted to compare the characteristics of the intervention group and the control group. The results of the analysis used fisher\*\* and chi square tests, the results obtained were p values <0.005 for the characteristics of age (p=0.006) and income

(p=0.009), while the results obtained for p values > 0.005 for parity (p=0.215), education (p=0.026) and income (p=0.009). Thus, the characteristic frequency distribution in the intervention and control groups, namely age and income, has no relationship with the incidence of CED in pregnant women, while gestational age, parity and education have no characteristic differences between the control and intervention groups.

**Tabel 2. Average analysis of differences in knowledge and attitudes of pregnant women with pre-test and post-test nutritional animation videos and sleep quality in the intervention and control groups in the Kalumata Health Center Working Area in 2022.**

Variable	Intervention				Control			
	Pre-Test	Post-Test	Δ	p-value	Pre-Test	Post-Test	Δ	p-value
	Mean ± SD	Mean ± SD			Mean ± SD	Mean ± SD		
Knowledge	35.0 ± 11.35	92.81 ± 9.91	57.8 ± 14.53	0.000	22.5 ± 12.37	32.0 ± 12.40	9.41 ± 20.24	0.020
Attitude	31.8 ± 20.23	96.88 ± 5.31	65.0 ± 20.47	0.000	40.2 ± 14.53	43.19 ± 20.07	2.96 ± 20.56	0.540
Sleep Quality	5.38 ± 0.942	4.69 ± 0.965	0.69 ± 1.09	0.002	5.87 ± 0.499	5.87 ± 0.718	0.000 ± 0.894	1.000

\*Wilcoxon Test

Table 2. showed that before the pre-test intervention the average knowledge difference was (Mean=35.0) with a standard deviation (SD)=11.35, then it increased after being given video education the average (mean) was 92.81 with SD=9.91 (post-test) . The results of the p value between pre and post in the intervention group showed a difference, namely a p value of 0.000 <0.005 (α). Meanwhile, in the control group there was no significant difference between the pre and post test results, namely the p value 0.020 > 0.005 (α). Thus, there was a

significant effect on the intervention group before and after being given nutritional animation video education and sleep quality compared to the control group.

Attitudes in the intervention group before the intervention average difference (Mean = 31.8) with SD = 20.23 (pre-test), after the intervention there was an increase in attitude with an average post-test result of 96.88 with SD = 5.31. The results of the statistical test showed that there were differences in the results of the pre and post-test after being given

educational animation videos on nutrition and sleep quality with a p-value of  $0.000 < 0.005$  ( $\alpha$ ). In contrast to the control group, the average difference in knowledge from the pre-test results was 40.2, and the average post-test results were 43.19 with  $SD = 20.07$ . So, there is no significant difference between the pre and post-test results in the control group with a p-value of  $0.540 > 0.005$  ( $\alpha$ ). Therefore, there was a significant change in attitude between the intervention group and the control group after being given video education on nutrition and sleep quality.

The results of sleep quality before the pre-test intervention based on the pSQI questionnaire averaged 5.38 with a standard deviation ( $SD$ ) = 0.942, then sleep quality changed well after being given video education with an average of 4.69 with  $SD = 0.965$  (post-test). The results of the p-value between pre and post-in the intervention group showed a difference, namely a p-value of  $0.002 < 0.005$  ( $\alpha$ ). Meanwhile, in the control group, there was no significant difference between the pre-and post-test results on sleep quality, namely the p-value of  $1,000 > 0.005$  ( $\alpha$ ). Thus, there was a significant effect on sleep quality in the intervention group before and after being given nutritional animation video education and sleep quality in the control group.

Sleep has been defined as a state of the brain that is important for maintaining energy and restoring bodily functions.<sup>25</sup> Sleep quality has a major impact on health<sup>26</sup>, and is considered a leading public health problem.<sup>27</sup> Concept analysis by Qi et al.<sup>28</sup> showed that sleep quality is determined by five components: (1) sleep efficiency, the ratio of total sleep time to total time in bed; (2) sleep disturbances; (3) sleep latency, which is defined as the time it takes to go from being awake to sleeping; (4) sleep duration within 24 hours; (5) and wake time after sleep onset, or in other words, the total wake time from sleep onset to wake up. Good sleep quality is a predictor of overall physical and mental health, well-being, and vitality.<sup>29,30</sup> However, poor sleep quality is determined by negative subjective perceptions of sleep, sleep onset time, short sleep duration, and difficulty combining sleep and daytime activity<sup>31</sup>, which have been associated with psychiatric disorders such as depression, anxiety, and cognitive difficulties, with reduced physical health, premature ageing, and lower work efficiency.<sup>32</sup>

**Table 3. The Effect of Nutrition Animation Video Education and Sleep Quality in Chronic Low Energy Pregnant Women on differences in knowledge and attitudes between Intervention and Control.**

Variable	Intervention $\Delta$	Control $\Delta$	p-value
Knowledge	57.8 ± 14.53	9.41 ± 20.24	0.000
Attitude	65.0 ± 20.47	2.96 ± 20.56	0.000
Sleep Quality	0.68 ± 1.09	0.000 ± 0.894	0.002

*\*Mann Whitney Test*

Tabel 3. obtained an asymp.sig (2-tailed) value of  $0.000 < 0.05$ , it can be concluded that there is a significant difference in knowledge, in the intervention group with an average difference of 57.8 with  $SD = 14.53$  while the control group has an average difference of 9.41 with  $SD = 20.24$ . Attitudes in the intervention group averaged 65.0 with  $SD = 20.47$  and differed in the control group with an average of 0.67 with  $SD = 2.10$ . The results of this study explained that there was an effect of the use of nutritional animation video education and sleep quality on knowledge and attitudes in the intervention group compared to the control group.

The statistical test results showed that there was a significant difference in sleep quality of  $0.002 < 0.05$ , in the intervention group with an average value difference of 0.68 with  $SD = 1.09$  while the control group averaged 0.000 with  $SD = 0.894$ . The results of this study explained that there was an influence of the use of nutritional animation video education and sleep quality on sleep quality in the intervention group compared to the control group.

In this study, the distribution of characteristics consisting of gestational age, parity, and education had no relationship with the occurrence of chronic energy deficiency (CED) in pregnant women. Meanwhile, the age factor ( $p=0.006$ ) and income ( $p=0.009$ ) had a relationship with the occurrence of CED problems in pregnant women. The data obtained differs from research conducted at the Southern Ethiopian Zone Gona Hospital which examined the prevalence of malnutrition and related factors among pregnant women, namely average monthly income, mother's educational

status, nutrition education and counseling, and very low parity. affect the nutritional status of the pregnant woman.<sup>33</sup> The difference is that not all factors can cause CED problems. This is due to the condition of gestational age, number of children, and educational status who are not at risk of experiencing chronic energy deficiency problems (CED). The problem of sleep quality cannot be resolved on average in pregnant women, especially pregnant women who experience chronic energy deficiency. Therefore, the need for health services with strategies to deal with poor sleep quality problems is important for women, especially pregnant women, because they are prone to stress and depression during pregnancy.<sup>34</sup>

Measurement of upper arm circumference (Muac) in early pregnancy is used as an approach to assess pre-pregnancy nutritional status. This is due to the difficulty of obtaining data on body weight before pregnancy so that the mother's Muac measured at the first ANC in the first trimester is considered the closest. In pregnant women who are detected to have CED, efforts that can be made are adding more food portions or more frequently than before pregnancy and getting more rest, as well as carrying out regular antenatal checks, to monitor adequate weight gain. Monitoring of mothers with CED can be done by monitoring weight gain by weighing their weight every month. The ideal weight gain during pregnancy is 10-12 kg, with a distribution of 1 kg in the first trimester, 3 kg in the second trimester, and 6 kg in the third trimester.<sup>35</sup>

The results of this study describe the use of video education can have a significant effect on increasing knowledge, attitudes, and quality of sleep in the assessment before and after the intervention of pregnant women who experience chronic energy deficiency at the Kalumata Health Center, Ternate City.

## CONCLUSION

There was a significant effect on the effects of nutritional video educational media and sleep quality in the intervention group of pregnant women who experienced chronic energy deficiency, compared to the control group, which did not have educational video interventions, only maternal and child health book guides from midwives, which is the

standard health service program in Indonesia. The results of this study are proof that nutritional animation video education and sleep quality are feasible and implemented in the work area of the Ternate City Health Center. It is hoped that future research can examine more deeply the relationship between other factors that influence chronic energy deficiency in pregnant women, such as sleep patterns and family support

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## CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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