Utilizing Telenursing to Improve Health Literacy in Pregnant Women with Chronic Energy Deficiency : A Case Study Report

[1a*]Nurul Fadhilah Gani, [1b]Rabiyatul Awaliyah, [1c]Nurhidayah, [1d]Hasnah, [2]Jumrana Annas,[3]Titi Mildawati

[1a-d]Program Studi Profesi Ners, Fakultas Kedokteran dan Ilmu Kesehatan, UIN Alauddin Makassar, Indonesia
[2] Jurusan keperawatan, Universitas Indonesia Timur, Indonesia
[3] Fakultas Sains Dan Teknologi UIN Alaluddin Makassar, Indonesia

A R T I C L E   I N F O

A B S T R A C T

Pregnancy constitutes a component of the broader human reproductive process. A salient issue during pregnancy is chronic energy deficiency (CED), defined as a condition in which an individual manifests nutritional deficiencies (calories and protein) that persist over an extended duration or are characterized as chronic. This condition can lead to various health complications for both mother and fetus, including an increased risk of low birth weight (LBW), miscarriage, premature birth, congenital disorders, small head size in newborns, maternal and infant mortality, difficult labor, postpartum hemorrhage, and cesarean section (CS) delivery due to mother's condition, which often results in a lack of energy to undergo a normal childbirth. The objective of this study is to ascertain the efficacy of telenursing in enhancing health literacy among pregnant women grappling with CED. This article utilizes a case study approach, employing instruments to assess the knowledge level of pregnant women and their nutritional status. The intervention strategy employed to address CED involves some improvement in health literacy through telenursing. The measurement of knowledge level and nutritional monitoring were carried out over a period of 14 days. The findings indicate that clients exhibited an enhancement in knowledge levels following the provision of health literacy and nutrition education. Furthermore, the study found that pregnant women were able to effectively manage their nutritional needs during pregnancy. The efficacy of telenursing in improving health literacy concerning nutritional needs among pregnant women susceptible to CED is substantiated by this study. Thus, it is recommended that frontline health workers consider utilizing telenursing in healthcare services, particularly in providing education and support for pregnant women, as a strategic approach to addressing Chronic Energy Deficiency (CED) during pregnancy.

INTRODUCTION

Maternal health is a fundamental cornerstone for ensuring the future health of both mother and child. Pregnancy is a critical period marked by rapid fetal development, and maternal health conditions significantly influence this process (1,2). In Indonesia, maternal health remains a significant public health concern. Various pregnancy-related complications such as preeclampsia and eclampsia, anemia, gestational diabetes, postpartum hemorrhage, infections, preterm birth, and chronic energy deficiency (CED) are still prevalent (3).

CED is a condition in which a pregnant woman experiences prolonged inadequate energy intake (calories and protein) for at least three months, primarily due to imbalanced dietary consumption. A pregnant woman is classified as having CED if her mid-upper arm circumference (MUAC) measures less than 23.5 cm. The determination of CED status is not limited to MUAC measurement alone but should also include consideration of a history of CED in previous pregnancies, a history of low birth weight deliveries, anthropometric assessments, and laboratory examinations (3). The incidence of CED is often associated with food availability and dietary vulnerability, which are influenced by poverty, low educational attainment, and cultural beliefs or food taboos (4).

According to data from the Central Statistics Agency (Badan Pusat Statistik, BPS) in 2023, the prevalence of CED risk among pregnant women in Indonesia remained high at 17.3% (5). In response, the Ministry of Health (Kementerian Kesehatan, KEMENKES) planned to reduce the CED prevalence among pregnant women, as oficially written in the 2020–2024 National Health Strategic Plan (Rencana Strategis Kemenkes). The goal was to reduce the prevalence to 16% within five years. However, the current prevalence remains at 16.2%, which

indicates that the target has not yet been achieved. Based on the 2018 Basic Health Research report (6), the prevalence of CED in South Sulawesi Province was 13.8%. In 2022, further monitoring in Makassar City recorded 2,996 pregnant women suffering from CED. In 2023, Bontomarannu Public Health Center reported that 88 pregnant women were diagnosed with CED. CED has significant impacts on both maternal and fetal health, including increased risks of low birth weight, miscarriage, preterm birth, maternal mortality, and neonatal death (7). Additionally, CED affects both physical and mental health. Physical consequences include extreme fatigue, reduced strength and endurance, weakened immune function, impaired growth and development, and pregnancy complications. Mental health effects include depression and anxiety, difficulty concentrating, irritability, and decreased quality of life (8).

Based on the data obtained, the researcher identified CED as a key maternal health problem due to its increasing incidence. Therefore, several measures can be taken by healthcare professionals to address this issue, such as encouraging pregnant women to attend at least six antenatal care visits regularly, and promoting participation in health counseling, training sessions, routine check-ups, and so on. One of the direct strategies that can be implemented by healthcare professionals is health education. A particularly relevant intervention is improving health literacy among pregnant women (9).

Efforts to enhance health literacy may include the delivery of health education through various media, such as brochures, pamphlets, posters, the Maternal and Child Health (MCH) handbook, and other materials (10). Previous studies have used methods such as lectures, posters, and digital platforms. However, these interventions are often only evaluated immediately after implementation, and there are lack of follow-up data regarding their long-term effectiveness.

In response to technological advancements, an alternative educational medium is telenursing. Telenursing refers to the practice of providing nursing care remotely through communication technology. Telenursing offers numerous benefits for pregnant women, including easy access to health information, regular consultations without needing to visit healthcare facilities, and ongoing monitoring of health status. It also provides emotional support, nutritional education, and time flexibility for consultations, all of which help prevent complications and enhance family involvement in care. Therefore, telenursing plays a significant role in supporting maternal and fetal health (11). Thus, the aim of this study is to analyze the implementation of telenursing as an effort to improve health literacy among pregnant women.

METHODS

This study employed a case study design. The number of participants consisted of three pregnant women selected through purposive sampling. The inclusion criteria included pregnant women aged between 16 and 40 years who had been diagnosed with CED, having access to WhatsApp via mobile phone, and willing to participate in the study. Data collection began with obtaining informed consent, followed by a comprehensive assessment involving both the client and their family. Additionally, participants were asked six questions to assess their baseline knowledge regarding nutrition during pregnancy.

The intervention was conducted based on evidence-based practice in nursing (EBPN), which involved providing health literacy education and nutritional education tailored to the needs of pregnant women, delivered through a WhatsApp group utilizing the telenursing approach. After the educational sessions, participants were monitored on their daily implementation of a balanced nutritional intake. They were instructed to document and submit daily photos of their meal menus via the WhatsApp group.

At the end of the intervention, an evaluation was conducted to assess participants' knowledge improvement regarding nutritional literacy during pregnancy, as well as their application of balanced nutrition throughout the intervention period. The focus of this case study was to provide nursing care for pregnant women experiencing CED. Instruments used in this study included a maternity nursing assessment form and pre- and post-intervention observation sheets to evaluate changes in nutritional knowledge and monitor nutritional needs fulfillment

RESULT AND DISCUSSION

RESULT

The first client, Mrs. A, is 18 years old with an obstetric status of G1P0A0, gestational age of 22 weeks, MUAC of 19 cm, abdominal circumference of 87 cm, weight and height of 45 kg and 154 cm, respectively. The client reported lower abdominal pain for the past 4 days, expressed anxiety about her first pregnancy, and lacked exposure to information about pregnancy. The second client, Mrs. H, is 25 years old with an obstetric status of G3P2A0, gestational age of 15 weeks, MUAC of 20 cm, abdominal circumference 70 cm, weight and height of 48 kg and 154 cm, respectively. The client reported experiencing nausea and vomiting for a week, expressed fear that her baby will be born with low birth weight, and was less informed about pregnancy. The third client, Mrs. U, is 21 years old with an obstetric status of G3P2A0, gestational age of 10 weeks, MUAC of 20.5 cm, abdominal circumference of 72 cm, weight and height of 46 kg and 153 cm, respectively. The client reported nausea and vomiting for 3 days, lacked of appetite, and was insufficient exposure to information about pregnancy.

From the assessment data of the three clients, it was found that the three clients generally had the same data and main complaints, namely lack of exposure to information about pregnancy and MUAC measurements below normal. The MUAC size of less than 23.5 cm and lack of exposure to information about nutritional needs can affect appetite, making them prone to experiencing CED. According to research conducted by (Anjelika et al. 2021), it is stated that dietary patterns are one of the factors associated with CED. Two clients (Mrs. H and Mrs. U) also reported having a history of giving birth to low birth weight babies. Mothers with CED status are known to increase the risk of giving birth to low birth weight babies by up to 2.654 times compared to mothers without CED (12). This condition indicates that there is no behavioral change shown by the client because the CED is being experienced again by the client in the current pregnancy.

The nursing implementation for the three clients was carried out from December 7, 2023, to December 13, 2024, by executing the planned interventions, addressing issues such as knowledge deficit, discomfort, nausea, anxiety, and risk of nutritional deficiency. From the diagnosis of knowledge deficit and risk of nutritional deficit, there has been an improvement, where at the beginning of the assessment, the clients stated that they did not know about health literacy and did not know about the nutritional needs of pregnant women. The increase in knowledge was also evidenced by the observation sheet results, where during the pre-test, the clients exhibited limited knowledge and were incorrect in answering five given questions. After the post-test, they were able to answer all the fivequestions correctly. After being given gradual interventions, they showed an increase in knowledge related to health literacy and nutritional needs during pregnancy, thereby addressing the knowledge deficit and preventing nutritional deficits. However, the client must continue to be monitored to maximize the interventions provided.

Table 1. Knowledge Test

Statement	Client 1		Client 2		Client 3	
	Pre	*Post*	*Pre*	*Post*	*Pre*	*'ost*
Mother knows the definition of health literacy	0	1	0	1	0	1
Mother knows the benefits of health literacy	0	1	0	1	0	1
Mother knows where to access health information	0	1	1	1	1	1
Mother knows the types of nutritional needs according to gestational age	0	1	0	1	1	1
Mothers are able to consume foods according to gestational age recommendations including: carbohydrates (rice, corn, cassava), proteins (egg, tofu, tempeh), folic acid (chicken, fish, meat), vitamins (vegetables and fruits), iron (green vegetables), calcium (milk).	0	1	0	1	0	1
Total	0	5	1	5	2	5

Table 2. A Recap of 6-day Nutrient Monitoring Results.

Food Source	Nutritional Monitoring Implementation																	
	Client 1						Client 2						Client 3					
Carbohydrates (rice, corn, cassava)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Proteins (egg, tofu, tempeh)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Folic acid (fish, chicken, meat)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Vitamins (fruits)	✓	x	✓	✓	✓	✓	x	x	✓	✓	✓	✓	x	✓	x	✓	✓	✓
Iron (green vegetables)	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	✓	✓	✓	✓
Calcium (milk)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Based on the table above, we can learn the implementation of a nutritious healthy menu with complete nutrition during pregnancy by all the three clients. From the table, it is observed that they implemented the recommendations given every day. Other information obtained is that the progress shown bbyall the clients is very good. As a proof of their improvement, they are getting better at implementing a nutritious menu from day to day until the last day of intervention. This development shows the effect of the intervention.

According to the self-care theory proposed by Dorothea Orem, one type of self-care is the fulfillment of food or nutrition needs, including during pregnancy (13). This self-care theory can be applied to help pregnant women with CED achieve independence in meeting nutritional needs and improve the health of mothers and babies. When connected with the results of the assessment, it can be concluded that the clients have not been able to carry out self-care to the fullest and independently because the mother's condition of experiencing CED is still recurring. They have not been able to apply balanced nutrition in pregnancy so that they experience CED. Nutritional status can be improved through good intake, while good intake can be improved through good knowledge of the concept of balanced nutrition in pregnancy.

Based on the data from the three clients, the authors established two nursing problems, namely nutritional deficits related to psychological factors and knowledge deficits related to lack of exposure to information. To overcome these problems, two nursing plans were also made, namely education and nutritional assistance through telenursing. One of the efforts made to overcome the problem of CED in pregnant women is to conduct health education including education to increase health literacy about nutrition in pregnancy, which is accompanied by regular nutritional monitoring. After the intervention, the results of the three clients showed that there was an increase in knowledge about nutritional needs during pregnancy and they were able to follow the recommendations for food consumed every day as evidenced by photos of food menus. However, one client (Mrs.U) did not send a photo of the food menu on the WhatsApp group but she mentioned the food menu consumed via telephone via a voice call on WhatsApp.

Nutrition education has been proved to be an effective intervention for pregnant women's health literacy that has been making an impact in overcoming CED. It was found that nutrition education can help pregnant women with severity to improve nutritional intake, achieve optimal nutritional status, and improve maternal and infant health. In addition, nutrition education needs to be an important part of the antenatal care program to prevent and overcome CED in pregnancy. Nutrition education should be provided by competent health workers and tailored to the needs and conditions of pregnant women (10). In addition, nutrition monitoring is one of the important steps in addressing CED in pregnant women (14). Nutrition monitoring can help identify pregnant women with CED earlier and provide appropriate interventions to prevent complications. Nutrition education intervention is one of the important strategies to improve the health of pregnant women with CED (15). Nutrition education can help pregnant women with CED to meet their nutritional needs properly, so as to support optimal fetal growth and development and overcome pregnancy complications. With nutrition education, pregnant women are expected to increase energy and protein intake, choose nutritious foods, and improve eating habits.

Similar research also states that by providing proper nutrition education to pregnant women who experience CED, they are able to make healthy and nutritious food choices so that they can undergo a healthy pregnancy and give birth to a healthy and strong baby. In addition, the benefits of nutrition education for pregnant women include increasing knowledge and understanding of the importance of nutrition, increasing protein nutrient intake, improving eating habits, and improving quality of life of mothers and babies(16).

Education through telenursing can also help overcome CED in pregnancy. Telenursing also helps clients and families to actively participate in care, especially self-management for chronic diseases. Telenursing is a form of telehealth service that harnesses communication technology to provide information and support to patients. In the context of pregnancy, telenursing can overcome limited access to health facilities, especially in areas with geographical or social limitations. Previous studies have shown that telenursing can improve pregnant women's understanding of the importance of adequate nutrition during pregnancy, as well as motivate them to change their diet and health behaviors (17). This system facilitates nurses providing accurate information and support online. Telenursing can increase self-will and increase client awareness in adherence to healthy behaviors related to disease (18).

The telenursing media used is WhatsApp. In this study, the use of WhatsApp as a medium for telenursing communication proved effective as this platform is frequently used by pregnant women and is easily accessible. WhatsApp allows for quick communication, as well as sharing visual information in the form of educational posters that are easier to understand. This is in accordance with the findings of a study revealing that the use of social media in health education can increase patient knowledge and compliance with the recommendations given.

Based on several statements from the research results above, the researcher assumes that health education and nutrition education using telenursing with poster media and WhatsApp group is effective for pregnant women suffering from CED. Telenursing will help clients, especially pregnant women, to save costs and make it easier for those who are far away from health service centers to conduct pregnancy checks.

CONCLUSION

Based on the results of the study, it can be concluded that telenursing is an effective tool in improving health literacy of pregnant women, especially related to CED. By utilizing communication technology, pregnant women can access important information on nutritio and prenatal care, and realize danger signs during pregnancy. This approach not only makes it easier for them to get information, but also provides the emotional support needed during pregnancy. In addition, this study emphasizes the importance of active involvement of pregnant women in health management. Through telenursing, pregnant women are encouraged to ask questions and discuss their health problems, which helps to improve their knowledge and understanding. Thus, telenursing serves not only as a source of information, but also as a platform to empower pregnant women to be more proactive in maintaining their health. As a result, this program can significantly contribute to reducing the CED rate and improving maternal and infant health in the community.

ACKNOWLEDGMENT

REFERENCES

1. Sunarto A, Fadlina F, Agusfar AZ, Wahyuni T. Hubungan Kepatuhan Kunjungan Antenatal Care dengan Cara Persalinan di Puskesmas Sukaindah Kabupaten Bekasi. 2025;5(1):77–86.
2. Kolantung PM, Mayulu N, Kundre R. Hubungan Tingkat Pengetahuan Ibu Hamil Tentang Tanda Bahaya Kehamilan Dengan Kepatuhan Melakukan Antenatal Care (Anc) : Systematic Review. J Keperawatan. 2021;9(2):40.
3. Kemenkes RI. Indikator Program Kesehatan Masyarakat dalam RPJMN dan RENSTRA Kementerian Kesehatan 2020-2024. 2020;
4. Sandra C. Penyebab Kejadian Kekurangan Energi Kronis Pada Ibu Hamil Risiko Tinggi Dan Pemanfaatan Antenatal Care Di Wilayah Kerja Puskesmas Jelbuk Jember. J Adm Kesehat Indones. 2018;6(2):136.
5. Kemenkes RI. Profil Kesehatan Indonesia Tahun 2023. 2024. 100 p. Available from: https://kemkes.go.id/id/profil-kesehatan-indonesia-2023

6. Riset Kesehatan Dasar. Lembaga Penelitian Badan Penelitian dan Pengembangan Kesehatan Laporan Provinsi Sulawesi Selatan Riskesdas 2018 [Internet]. Vol. 110, Badan Penelitian Dan Pengembangan Kesehatan. 2018. 129 p. Available from: http://ejournal2.litbang.kemkes.go.id/index.php/lpb/article/view/3658

7. Pertiwi HW, Martini T, Handayani M, Program), S1 S, Stikes K, et al. Hubungan Pemberian Makanan Tambahan (PMT) dengan Perubahan Lingkar Lengan Atas Ibu Hamil Kekurangan Energi Kronik (KEK). J Kebidanan. 2020;XII(1):111–20.

8. Noor MS, Setiawan MI, Putri AO, Lasari H, Qadrinnisa R, et al. Buku Ajar Kekurangan Energi Kronik (KEK).1ˢᵗ Edition.Yogyakarta: CV. Mine Perum; 2021

9. Aminurrohman NF. Hubungan Antara Tingkat Pendidikan, Pengetahuan Gizi, Status Pekerjaan dan Pola Makan dengan Kejadian Kurang Energi Kronik pada Ibu Hamil di Puskesmas Grogol Selatan. 2024;

10. Hapsari YI, Rozi F, Asyifa MNF, Putranegara S, Balqis SP. Edukasi dan Konseling Gizi Kepada Ibu Hamil KEK. J Bina Desa. 2023;4(2):195–203.

11. Pratiwi AS. Risiko Kekurangan Energi Kronis (Kek) Pada Ibu Hamil Di Wilayah Kerja Puskesmas Payung Sekaki Pekanbaru. Ensiklopedia J . 2020;2(2):184–92.

12. Prihatin S. Hubungan antara Kejadian Kekurangan Energi Kronis (KEK) dengan Kejadian Bayi Berat Lahir Rendah (BBLR) di Puskesmas Batunyala. 2023;1–14. Available from: https://www.ncbi.nlm.nih.gov/books/NBK558907/

13. Gani NF, Kadar K, Kaelan C. Health Literacy and Self-Care Management of Pregnant Women at Level 1 Health Service in Makassar. Indones Contemp Nurs J. 2017;1(2):94–100.

14. Pastuty R, KM R, Herawati T. Efektifitas Program Pemberian Makanan Tambahan-Pemulihan Pada Ibu Hamil Kurang Energi Kronik Di Kota Palembang. J Ilmu Kesehat Masy. 2018;9(3):179–88.

15. Hariyani SDF, Hermayanti Y, Yamin A, Lukman M, Solehati T. Gambaran Kebiasaan Pola Makan pada Ibu Hamil dengan Kekurangan Energi Kronis (KEK). J Telenursing. 2024;6(1):534–42.

16. Dwi Fara Y, Anggriani Y, Trisyani K, Crisna O. Gizi Seimbang Pada Ibu Hamil. J Pengabdi Kpd Masy Ungu(ABDI KE UNGU). 2022;4(3):170–4.

17. Gagnon MP, Ngangue P, Payne-Gagnon J, Desmartis M. M-Health adoption by healthcare professionals: A systematic review. J Am Med Informatics Assoc. 2016;23(1):212–20.

18. Boro MFV, Hariyati RTS. Implementasi Telenursing Dalam Praktik Keperawatan : Studi Literatur. Carolus J Nurs. 2020;2(2):161–9.