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Nutritional Management in Pregnant Patient with Severe Preeclampsia: A Case Study

Nur Sakinah[1*], Zulfiani[2] , Abdullah Tamrin[1]
[1]Department of Nutrition, Health Polytechnic of the Ministry of Health Makassar, Indonesia. [2]Nutrition Installation, Hasanuddin University Hospital, Makassar, South Sulawesi, Indonesia
Email: kinagizi@yahoo.co.id

Preeclampsia is a serious pregnancy complication and a leading cause of maternal mortality, often contributing to preterm birth and low birth weight. This condition increases the risk of edema and nutritional deficiencies, which negatively impact both maternal and fetal health. This descriptive case study aims to evaluate the effectiveness of the Nutrition Care Process (NCP) in improving nutrient intake and clinical outcomes in a pregnant patient with severe preeclampsia. The methodology follows a standardized five step nutrition care process, including screening, assessment, diagnosis, intervention, monitoring and evaluation, with nutritional requirements calculated based on ESPEN (2021) guidelines. Interventions included the DASH and preeclampsia diets with an oral soft consistency, administered gradually from 50% to 100% of energy needs. Monitoring results demonstrated a significant increase in daily intake: energy (47.7% to 95%), protein (54.3% to 123%), fat (50.6% to 110%), and carbohydrates (40.3% to 85.8%). These improvements were accompanied by better food tolerance, reduced edema, and stabilized blood pressure. In conclusion, the structured application of NCP is effective in enhancing nutrient intake and supporting the clinical management of patients with severe preeclampsia. These findings highlight the importance of standardized nutrition therapy as a critical component in reducing the risk of complications in high risk pregnancies.
Keywords: Nutrient intake, preeclampsia, nutrition management

Corresponding Author:
Nur Sakinah
Department of Nutrition, Health Polytechnic of the Ministry of Health Makassar
Makassar
kinagizi@yahoo.co.id

1. Introduction

Preeclampsia is a pregnancy complication characterized by elevated blood pressure after 20 weeks of gestation, which may be accompanied by protein in the urine (proteinuria) or signs of organ damage such as impaired kidney, liver, and brain function [1]. This condition can progress to eclampsia preeclampsia accompanied by seizures and is one of the leading causes of maternal mortality worldwide [2].

Globally, preeclampsia accounts for approximately 14% of all maternal deaths [3]. In Indonesia, preeclampsia and eclampsia are the leading causes of maternal mortality after hemorrhage and infection. According to the 2023 Intercensal Population Survey (SUPAS), the Maternal Mortality Rate (MMR) in Indonesia stands at 189 per 100,000 live births, while the 2030 Sustainable Development Goals (SDGs) target is less than 70 per 100,000 live births [4].

Furthermore, this condition also contributes to 8–10% of preterm birth cases, with one in 250 women in their first pregnancy giving birth before 34 weeks of gestation due to preeclampsia. Infants with low birth weight relative to gestational age are also frequently observed; approximately 20–25% of preterm births and 14–19% of term births from mothers with preeclampsia have birth weights below the 10th percentile for gestational age [5].

Although the exact pathophysiology is not yet fully understood, maternal, paternal, and fetal factors are known to play a significant role in the development of this condition [6]. Various risk factors that have been identified include maternal age over 35 years, obesity, first pregnancy (nulliparity), a history of preeclampsia, and comorbid conditions such as diabetes mellitus and chronic hypertension [7].

In practice, patients with severe preeclampsia often exhibit complex metabolic issues, characterized by persistent hypertension, systemic edema, and complications such as hypoalbuminemia and hypokalemia. Inadequate energy and protein intake during this phase can slow the mother's recovery and impair fetal growth.

Therefore, the implementation of the Standardized Nutrition Care Process (SNCP) through the stages of assessment, diagnosis, intervention, and nutritional monitoring and evaluation is a crucial step. Through an evidence-based nutrition care approach, energy and nutrient requirements can be accurately calculated and tailored to the patient's clinical condition to help control blood pressure and improve nutritional status. Given this urgency, this paper aims to provide an overview of the application of PAGT in pregnant women with severe preeclampsia complicated by hypoalbuminemia and hypokalemia during their hospital stay.

2. Literature Review and Problem Statement

Preeclampsia is defined as a hypertensive disorder occurring after 20 weeks of gestation, characterized by blood pressure ≥140/90 mmHg accompanied by proteinuria or target organ damage. Its pathogenesis involves systemic endothelial dysfunction resulting from an imbalance in angiogenic factors (sFlt-1 and PlGF), which increases capillary leakage and causes peripheral edema and pulmonary edema [9].

Hypoalbuminemia in preeclampsia is generally caused by increased vascular permeability and protein loss through urine, which leads to a decrease in plasma oncotic pressure and exacerbates edema [8]. The hypokalemia associated with this condition can increase the risk of arrhythmias and muscle weakness, thus requiring careful and structured electrolyte correction [9].

Several studies indicate that a standardized Nutrition Care Process (NCP) is effective in improving nutritional intake in hospitalized patients with complex clinical conditions. A study by Tang et al. [10] demonstrated that LILA is a valid indicator of nutritional status in adult patients in clinical conditions where direct measurement of weight-for-height is not feasible. Meanwhile, the ESPEN (2021) recommendations [11] emphasize the importance of gradual energy administration to prevent refeeding syndrome, particularly in patients with very low intake prior to intervention. There is a research gap regarding the comprehensive application of NCP in cases of severe preeclampsia accompanied by dual metabolic complications (hypoalbuminemia and hypokalemia) in Indonesia; therefore, this case study is important to provide an evidence-based practical overview.

3. Method

This study is a descriptive case study conducted in the obstetrics and gynecology (OB/GYN) ward of Hasanuddin University Teaching Hospital in Makassar in October 2025. The subject was a 33-year-old pregnant woman diagnosed with severe preeclampsia, hypoalbuminemia, and hypokalemia who was hospitalized from October 15 to 19, 2025.

Data were collected using five components of a standardized nutritional assessment: (1) personal and health history data, (2) anthropometric data (height, pre-pregnancy weight, mid-upper arm circumference), (3) biochemical data from medical records, (4) nutrition focused physical/clinical data through direct observation and medical records, and (5) dietary intake data via a 24-hour food recall and daily consumption

records. Nutritional requirements were calculated using the Brocca formula with activity and stress factors according to ESPEN recommendations (2021), with protein at 1.5 g/kgBBI/day based on Grill et al. (2009). Dietary interventions were provided in the form of the DASH diet and a preeclampsia diet with soft consistency administered orally, starting at 50% of energy requirements on the first through third days, then increased to 100% on the third and fourth days.

Data Analysis, Nutrient intake analysis was performed quantitatively by converting the patient's food consumption using the Indonesian Food Composition Table (TKPI). In addition, the research samples are clearly presented, including the amount of data used, the origin or source of the data, and the specific parameters that are the focus of the analysis. Each sample is identified based on its characteristics so that its relevance and suitability for use in the research can be accounted for. Monitoring data are presented systematically through tables and graphs to illustrate intake trends and clinical stability from day 1 to day 5 of the intervention.

4. Results

Patient Characteristics and History

The patient, Mrs. MAP, a 33-year-old woman of Makassar ethnicity. The patient was in her second pregnancy, first live birth, and had no history of miscarriage, with a gestational age of 32 weeks (third trimester). Her previous delivery was by cesarean section. Prior to admission, the patient complained of shortness of breath and a cough with yellow phlegm. The patient has a history of severe preeclampsia in her first pregnancy and asthma since birth. Regarding her social history, the patient's husband works as a construction laborer and is a current smoker, and the family's economic status is classified as lower-middle class. Antenatal care (ANC) examinations during the pregnancy were conducted only twice, at the Pataraja Community Health Center and Dodi Sartojo General Hospital.

Nutrition Assessment

Anthropometric assessment showed the patient's height at 154 cm with an actual weight of 70 kg. Pre-pregnancy weight was estimated at 60.7 kg based on a calculated weight gain of 9.3 kg during pregnancy, following Hytten (1991) in Williams Obstetrics. The pre-pregnancy body mass index (BMI) was 26 kg/m², indicating an overweight nutritional status prior to pregnancy. Upper arm circumference (UAC) was measured at 27 cm with a UAC percentile of 97.47%, indicating good nutritional status based on WHO NCS standards. UAC measurements were taken twice before and after the intervention and showed no significant changes. Repeat measurements of weight and height could not be performed due to the patient's clinical condition, which did not permit it during the course of care.

Clinical and Physical Assesment

At the initial assessment, the patient was alert and oriented with a GCS of E4M5V6. Blood pressure was recorded at 170/90 mmHg, pulse rate at 86 beats per minute, respiratory rate at 20 breaths per minute, body temperature at 36.5°C, and oxygen saturation at 99%. The patient reported nausea, dizziness, and decreased appetite since the beginning of pregnancy, accompanied by edema in the lower extremities and anemic conjunctiva. During the four-day intervention, blood pressure showed significant fluctuations: it rose to 203/110 mmHg on the first day of intervention, then gradually decreased to 148/98 mmHg on the second day and reached a low of 137/75 mmHg on the third day. However, on the fourth day, it rose again to 179/110 mmHg, coinciding with an AP chest X-ray showing signs of cardiomegaly accompanied by pulmonary edema and bilateral pneumonia, so the patient was referred to the general ward for further evaluation. Nausea improved starting on the third day, shortness of breath resolved by the second day,

appetite improved starting on the second day, and the conjunctiva no longer appeared anemic starting on the third day of intervention.

Biochemical Data

Laboratory test results dated October 15, 2025, revealed several significant abnormalities. A potassium level of 2.5 mmol/L indicated hypokalemia, albumin at 2.2 g/dL indicated hypoalbuminemia, proteinuria 3+, urea 117 mg/dL (elevated), and random blood glucose 60 mg/dL (mild hypoglycemia). Chloride was recorded at 117 mmol/L (elevated), LDH at 263 U/L, urinary bilirubin at 1+, GOT at 17 U/L (normal), GPT at 29 U/L (slightly elevated), hemoglobin at 12.1 g/dL, and platelets at 219,000/µL. Creatinine was 0.8 mg/dL within the normal range, indicating relatively preserved kidney function. On the second day of intervention (October 17, 2025), there was an increase in white blood cell count to 19,930/µL with an absolute neutrophil count of 15,090/µL and a neutrophil percentage of 75.7%, indicating a significant systemic inflammatory response. Hemoglobin decreased slightly to 11.3 g/dL and hematocrit to 34.5%. To address hypokalemia, potassium chloride was administered at 25 mEq/24 hours, and for hypoalbuminemia, 20% human albumin was administered at 100 mL/24 hours per the instructions of the patient's attending physician (DPJP).

Nutrition Diagnosis

Based on the assessment results, three nutritional diagnoses were established. First, NI-2.1: inadequate oral intake related to decreased appetite, as indicated by a 24-hour food recall showing energy intake at 47.69%, protein at 68.43%, fat at 50.64%, and carbohydrates at 40.30% of daily requirements—all below 80% of daily nutritional needs. Second, NC-2.2: Abnormal laboratory values related to nutrition associated with severe preeclampsia, characterized by an albumin level of 2.2 g/dL and a potassium level of 2.5 mmol/L. Third, NB-1.3 was not ready to make dietary changes due to limited interest in applying nutritional information, characterized by the habit of consuming 1–2 packs of instant noodles per day despite having received education from healthcare providers.

Nutrition Intervention

The patient was prescribed the DASH diet and a preeclampsia diet in soft consistency via the oral route, with three main meals and two snacks per day. Energy requirements were calculated using the Mifflin-St. Jeor formula with activity and stress factors, resulting in a total energy requirement of 2,050 kcal/day. Protein requirements were set at 1.5 g/kgBBI/day (72.9 g, 17%), fat at 30% (68.3 g), and carbohydrates at 52% (266 g), with micronutrients including Fe 27 mg, sodium 1,500 mg, and potassium 4,700 mg based on the 2019 Recommended Dietary Allowances (RDA).

Table 1. Changes in Patients' Nutrient Intake Before and During the Intervention

Nutrient	Requirement	Before Intervention	Intervention Day 1	Intervention Day 2	Intervention Day 3	Intervention Day 4
Energy (kcal)	2050	977 (47,7%)	Fasting	1102 (53,8%)	1054 (51,4%)	1935 (94,4%)
Protein (g)	72,9	49,9 (68,4%)	Fasting	66,0 (90,5%)	82,7 (113,4%)	90,1 (123,5%)
Fat (g)	68,3	34,6 (50,6%)	Fasting	33,1 (48,5%)	31,1 (45,5%)	75,2 (110,0%)
Carbohydrates (g)	287	115,7 (40,3%)	Fasting	137,8 (48,0%)	226,3 (78,8%)	228,2 (79,5%)
Fe (mg)	27	6,0 (22,2%)	Fasting	12,7 (47,1%)	16,8 (62,2%)	18,9 (70,0%)

Nutrient	Requirement	Before Intervention	Intervention Day 1	Intervention Day 2	Intervention Day 3	Intervention Day 4
Sodium (mg)	1500	105 (7,0%)	Fasting	104,7 (7,0%)	275,7 (18,4%)	631,7 (42,1%)
Potassium (mg)	4700	338 (7,2%)	Fasting	630,4 (13,4%)	2329 (49,6%)	2182 (46,4%)

Discussion

A gradual increase in protein intake from 49.9 g to 90.1 g per day aligns with the ESPEN (2021) recommendations, which emphasize the importance of adequate protein intake to support albumin synthesis, improve plasma oncotic pressure, and reduce edema in preeclampsia patients with hypoalbuminemia [12]. Although the administration of 20% human albumin also contributes to improved protein status, the study by Vazquez Rodriguez et al. states that exogenous albumin does not significantly increase plasma colloid osmotic pressure in severe preeclampsia [13], so meeting protein needs through oral intake remains the top priority. Fat intake, increased to 75.2 g by the fourth day primarily from unsaturated fatty acid sources plays a role in supporting hormone synthesis and cellular membrane integrity [14]. Gradually increasing carbohydrate intake to 228.2 g is essential to ensure a sustained energy supply for the pregnant woman and fetus, while also supporting glycemic control [15] .

Potassium intake, which was very low prior to intervention (338 mg, 7.2% of requirements), was corrected through a combination of increased oral intake and intravenous potassium chloride supplementation at 25 mEq/24 hours, resulting in potassium intake reaching 2,329 mg by the third day. Research by Yılmaz et al. indicates that a high sodium-to-potassium ratio in urine may increase the risk of preeclampsia and related complications [15]. Sodium restriction according to the DASH diet principles (<1,500 mg/day) was also implemented to aid in blood pressure control during the intervention [16]. At the end of the intervention period, the nutritional diagnosis NI-2.1 (inadequate oral intake) was resolved, with energy intake reaching 94.4% and protein intake 123.5% of daily requirements. Meanwhile, diagnoses NC-2.2 and NB-1.3 remained established because metabolic disturbances had not been fully corrected and changes in eating behavior required more time.

5. Conclusion

The implementation of the Standardized Nutritional Care Process (PAGT) in pregnant women with severe preeclampsia, hypoalbuminemia, and hypokalemia over a four-day intervention period was proven effective in gradually increasing macronutrient intake: energy from 47.7% to 95%, protein from 68.4% to 123%, fat from 50.6% to 110%, and carbohydrates from 40.3% to 79.5% of daily requirements.

The patients' clinical condition showed improvement in the form of stabilized blood pressure, reduced edema, improved conjunctival appearance, and increased appetite. Although anthropometric nutritional status did not undergo significant changes due to the short duration of the intervention, the combination of the DASH diet and the preeclampsia diet administered gradually, along with albumin and potassium correction, was shown to support clinical recovery. Further research with a longer duration and a larger sample size is needed to strengthen the evidence of PAGT's effectiveness in cases of preeclampsia with dual metabolic complications.

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