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Comprehensive Clinical Management of Moderate Anemia in Third-Trimester Pregnant Women and Delivery Success at PONED Halong Primary Health Center: A Case Analysis in Balangan Regency, South Kalimantan

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ABSTRACT

Introduction: Anemia in pregnancy remains a health priority in Indonesia due to its contribution to maternal mortality and stunting (1,2). Decreased hemoglobin (Hb) levels below the normal threshold, especially in the third trimester, increases the risk of fatal obstetric complications (3). This case report aims to analyze the comprehensive clinical management of moderate anemia in a third-trimester pregnant woman until delivery at PONED Halong Primary Health Center, Balangan Regency, South Kalimantan (4).

Case: A 22-year-old primigravida (G1P0A0) underwent integrated antenatal care at Halong Primary Health Center . In the first trimester, Hb was normal (13.2 gr/dl) (6). Entering 32-33 weeks of gestation, a drastic Hb decrease to 8.6 gr/dl (moderate anemia) was observed, accompanied by proteinuria +1 and random blood glucose (RBG) of 163 mg/dl (7). Interventions included escalating Iron Supplement Tablets (TTD) to 3x1 tablet per day combined

with Multiple Micronutrient Supplements (MMS) 1x1 tablet per day and Calcium Lactate 2x500 mg per day (8). At 38 weeks gestation, the patient had a spontaneous delivery at the PONED unit (9). The infant weighed 3495 grams, but the mother experienced a second-degree perineal laceration requiring suturing (10).

Discussion: The sharp Hb decline indicates failure of physiological compensation and depletion of maternal iron stores in the third trimester (11). MMS proved superior to standard iron-folate supplementation, reflected in optimal birth weight despite maternal anemia (12). Proteinuria +1 without hypertension likely relates to anemia-induced renal effects or asymptomatic urinary tract infection (13). RBG of 163 mg/dl indicates mild gestational diabetes mellitus, contributing to large birth weight through fetal hyperinsulinemia (14). Active management of the third and fourth stages of labor at PONED was key to preventing massive hemorrhage (15).

Conclusion: Aggressive management of moderate anemia in the third trimester through multidimensional micronutrient supplementation significantly improves delivery outcomes (16). Synergy between early detection in antenatal care and PONED unit preparedness is vital to reduce maternal morbidity (17). Strengthening serial laboratory screening and education on supplement adherence is recommended (18).

Keywords: Moderate Anemia, Third Trimester Pregnancy, MMS, PONED Primary Health Center, Maternal Outcome

INTRODUCTION

Background

Anemia in pregnancy is a persistent and global public health problem, affecting nearly half of all pregnant women worldwide (1). In Indonesia, the prevalence of anemia in pregnant women remains concerning despite various interventions (2). Based on the 2023 Indonesian Health Survey (SKI), the prevalence of anemia in pregnant women was recorded at 27.7%, a decrease from 48.9% in Riskesdas 2018, but this figure remains far above the national target of below 10% (3). This condition pathophysiologically relates to the imbalance between iron availability and the rapidly increasing physiological demands during gestation to support plasma volume expansion, placental tissue formation, and fetal iron requirements .

Balangan Regency, particularly in the working area of Halong Primary Health Center, South Kalimantan, faces unique geographical and socio-economic challenges in maternal health services (6). The incidence of anemia in this region is often related to local nutritional consumption patterns, adherence to supplementation, and the effectiveness of early detection systems at the primary care level (8). Anemia in third-trimester pregnant women is specifically associated with an increased risk of postpartum hemorrhage, which remains the leading cause of maternal death in Indonesia (10). Therefore, the ability of first-level health facilities with PONED status to manage moderate anemia cases is at the forefront of efforts to reduce the Maternal Mortality Rate (MMR) in line with the 2025 National Medium-Term Development Plan (RPJMN) targets (12).

Research Objectives

This case report aims to conduct an in-depth analysis of the clinical management process of moderate anemia in a third-trimester pregnant woman at a PONED Primary Health Center (14). The evaluation focuses on the effectiveness of the transition from standard iron-folate supplementation to Multiple Micronutrient Supplements (MMS) in improving the patient's hematological status (14). Additionally, this study aims to examine the relationship between accompanying laboratory findings (proteinuria and elevated RBG) with the patient's clinical profile and the resulting fetal outcomes

(16). Overall, this report intends to document safe delivery management protocols for anemic at-risk mothers in primary facilities (17).

Research Benefits

This case report provides educational benefits for medical personnel (doctors, midwives, and nutritionists) at primary health centers regarding the importance of broader micronutrient interventions and adjusted therapeutic dosages in moderate anemia cases (14). For health program managers in Balangan Regency, this report provides case-based data on the effectiveness of MMS program implementation, which the Ministry of Health has begun introducing to replace conventional Iron Supplement Tablets (TTD) (14). Theoretically, this analysis enriches the literature on maternal compensatory mechanisms against chronic hypoxia due to anemia and its impact on infant birth weight (19).

Hypothesis

The main hypothesis in this case study is that high-dose micronutrient supplementation (combination of TTD and MMS) in the third trimester can prevent complications of postpartum hemorrhage and low birth weight (LBW), even if the mother's hemoglobin levels do not fully return to normal levels at the time of delivery (19). The second hypothesis states that the finding of persistent proteinuria +1 in a patient without hypertension indicates impaired renal adaptation or asymptomatic urinary tract infection that often accompanies moderate to severe anemia (21).

Research Gap

Although TTD administration protocols have been nationally regulated, there remains a research gap regarding why some pregnant women still fall into moderate anemia despite having normal levels monitored in the first trimester (10). Often, the literature focuses only on macro-level prevalence without examining individual longitudinal laboratory dynamics (24). Furthermore, data on the effectiveness of MMS in improving Hb levels in cases of anemia already diagnosed in the third trimester in rural areas of South Kalimantan remains limited, where nutritional challenges and adherence are often major obstacles (4).

Novelty

The novelty of this case report lies in the comprehensive analysis of the patient's laboratory pattern showing anomalies, namely persistent proteinuria +1 since the first trimester without hypertension, as well as elevated RBG in the third trimester correlating with a fairly large infant birth weight (3495 grams) despite the mother experiencing moderate anemia (16,21). This report challenges the general paradigm that anemia always leads to LBW and explores the possibility of mild gestational hyperglycemia as a fetal growth compensatory factor (31). Documentation of MMS use in a primary health center located approximately more than 30 km from the capital of a district in South Kalimantan also provides important insights for national health policy evaluation (37).

CASE REPORT

Patient Identity and History

The subject of this case report is Mrs. R, a 22-year-old female residing in Halong District, Balangan Regency . The patient was registered as a primigravida (first pregnancy, G1P0A0) with no history of previous miscarriage. In terms of socio-economic background, the patient works as a housewife with a high school education, while her husband works as a non-permanent staff member. The patient began checking her pregnancy at UPTD Halong Public Health Center from the first trimester to receive integrated antenatal care.

First Trimester Visit: Early Detection and Baseline Status

On December 30, 2024, the patient visited the primary health center with complaints of missed period for two months . Based on initial physical examination, the patient was conscious (GCS 456) with good general condition. Anthropometric data showed height 156 cm, weight 54.5 kg, and mid-upper arm circumference (MUAC) 24 cm, indicating maternal nutritional status within normal limits (MUAC > 23.5 cm). Blood pressure was stable at 100/70 mmHg, pulse 72 x/minute, and respiration 20 x/minute.

Initial laboratory examination showed results detailed in the table below:

Laboratory Parameter (30-12-2024)	Result	Reference Value
Hemoglobin (Hb)	13.2 gr/dl	12 - 16 gr/dl
Random Blood Glucose (RBG)	82 mg/dl	78 - 140 mg/dl

Blood Type	B	-
Infectious Disease Screening (HIV, Syphilis, HBsAg)	Non-reactive	Non-reactive
Urinalysis: Color	Yellow, slightly cloudy	Light yellow/clear
Urinalysis: pH	6.5	4.5 - 8.0
Urinalysis: Protein	+1	Negative

Although initial Hb was normal, proteinuria +1 and slightly cloudy urine were found. At that time, the clinical diagnosis was G1P0A0 with early pregnancy; the patient was advised to have a follow-up ultrasound in 4 weeks . The patient was provided with initial supplementation consisting of folic acid 1x1 mg, TTD 1x1 tablet, and vitamin B6 1x1 tablet to relieve mild nausea.

Preeclampsia Screening and Ultrasound Examination (January 2025)

On January 21, 2025, the patient returned for early pregnancy screening by the primary health center physician. The patient complained of cold symptoms (upper respiratory tract infection) . Physical examination showed weight remained 54.5 kg with blood pressure 102/62 mmHg. First-trimester ultrasound showed a single fetus with Crown-rump Length (CRL) of 3.31 cm, corresponding to a gestational age of 10 weeks 1 day, with an estimated delivery date of August 18, 2025 .

Based on the preeclampsia scoring system applied by the physician, the patient was categorized as not at risk for preeclampsia as she did not meet high-risk criteria or two moderate-risk criteria. The diagnosis at that time was 10-11 weeks pregnancy with upper respiratory tract infection . Management provided included MMS (as supplementation transition) and Cetirizine 1x1 tablet for cold symptoms.

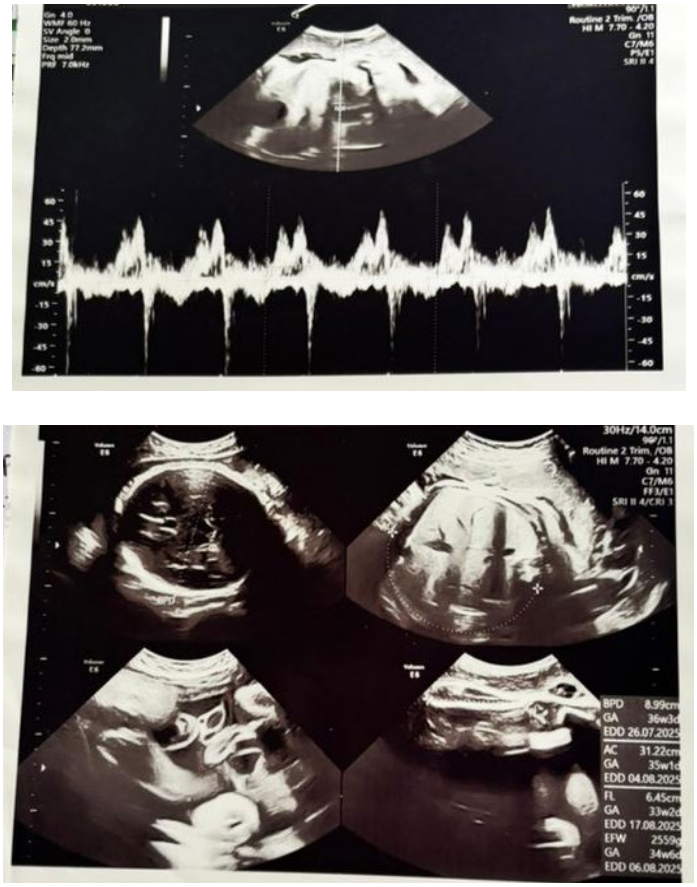

Figure 1. Ultrasound Examination Results

Third Trimester Visit: Onset of Moderate Anemia

On the visit dated June 26, 2025 (gestational age 32-33 weeks), significant changes occurred in the patient's clinical status. Body weight increased to 62 kg (total gain of 7.5 kg from baseline). Blood pressure was recorded at 112/78 mmHg. Physical abdominal examination showed :

- Leopold 1: Uterine fundal height 23 cm
- Leopold 2: Right back
- Leopold 3: Cephalic presentation
- Leopold 4: Not yet engaged
- Fetal heart rate: 140 x/minute

Laboratory results at this visit were very critical:

- **Hb: 8.6 gr/dl** (Moderate Anemia)
- **RBG: 163 mg/dl** (Significantly increased)
- **Proteinuria: +1** (Persistent)

The patient was explained about the risks of moderate anemia and elevated blood sugar, and was advised to be referred to the obstetrics and gynecology polyclinic at Datu Kandang Haji Regional Hospital for further examination and management (31). However, management at the primary health center continued by increasing the TTD dose to 2x1 tablet in addition to MMS 1x1 tablet.

Follow-up Evaluation and Delivery Preparation

On July 19, 2025 (gestational age 35-36 weeks), the patient returned to check her Hb levels. Body weight increased to 67 kg with BP 110/70 mmHg. Leopold examination showed the head had engaged . Laboratory results showed:

- **Hb: 9.1 gr/dl** (Slight increase but still moderate anemia)
- **Proteinuria: +1**

The supplementation regimen was tightened to MMS 1x1 tablet, TTD 3x1 tablet, and Calcium Lactate 2x500 mg to prepare hematological conditions for delivery.

Delivery Report at PONED Unit (August 2025)

The patient came to PONED Halong Primary Health Center on August 3, 2025, at 11:45 WITA with complaints of increasingly intense abdominal tightening.

Time	Clinical Evaluation	Intervention/Action
11:45	Cervical dilation 2 cm, membranes (+), contractions 2x/10'/30", BP 90/60 mmHg, Moderate Anemia	IV fluids Ringer's Lactate 20 drops/minute, monitor vital signs/fetal heart rate
15:00	Cervical dilation 4-5 cm (active	Advised left lateral position, monitor progress

	phase), cervix thin and soft, contractions 3x/10'/35", BP 100/70 mmHg	
19:10	Spontaneous rupture of membranes (clear), full dilation 10 cm, contractions 5x10'/45", head Hodge 3+	Directed pushing
20:10	Spontaneous vaginal delivery (Female), BW 3495 g, BL 49 cm, APGAR 7/8/9	Active management of third stage
20:25	Placenta fully delivered, second-degree laceration	Suturing (*hecting*) by physician

During the delivery process, the patient's blood pressure tended to be low (90/60 to 100/70 mmHg) in the early stage, but stabilized at 120/80 mmHg during the second stage. The baby was born in healthy condition, indicating that despite maternal anemia, nutritional support during the last trimester was sufficient to support fetal vitality.

DISCUSSION

Hematological Dynamics and Pathophysiology of Anemia in This Case

The case of Mrs. R provides a classic yet extreme illustration of hematological challenges in pregnancy . Hemoglobin levels starting at 13.2 gr/dl (normal) and dropping to 8.6 gr/dl in the third trimester indicate failure to maintain balance between expanding plasma volume and red blood cell mass . Physiologically, in the third trimester, iron requirements peak at up to 7.5 mg per day to support maternal erythropoiesis and fetal growth .

The sharp decline in the patient's Hb levels can be analyzed through several mechanisms (27):

1. **Physiological Hemodilution:** Plasma expansion in normal pregnancy reaches 50%, while red blood cells only increase by 20-30%. This creates "dilutional anemia" that typically

lowers Hb levels by about 1-2 gr/dl. However, a decrease of 4.6 gr/dl in this case indicates severe absolute iron deficiency (27).

2. **Iron Store Depletion:** Although initial Hb was normal, ferritin examination was not performed. It is possible that the patient's iron stores were already low at the beginning of pregnancy, so when the fetus entered the rapid growth phase (28-40 weeks), these stores were depleted and Hb began to fall (23).

3. **High Fetal Demand:** The birth of a baby weighing 3495 grams indicates the fetus had the ability to "extract" nutrients from maternal circulation effectively (28). Placental compensatory mechanisms may have increased iron transfer efficiency despite low maternal iron levels, which ultimately exacerbated the mother's anemic condition (11).

Analysis of MMS (Multiple Micronutrient Supplements) Use

In this case, the patient received a transition from iron-folate supplementation to MMS from the first trimester (14). MMS is formulated based on UNIMMAP containing 15 essential micronutrients (18). The use of MMS in mothers with moderate anemia provides several important clinical implications (14):

- **Superiority to IFA:** Research in various regions of Indonesia shows that MMS is 13% more effective in preventing LBW compared to single iron-folate supplements (IFA) (14). This explains why the infant's birth weight in this case was very optimal (3495 gr) despite the mother's inadequate hematological condition (15).

- **Role of Vitamin C and Zinc:** The Vitamin C content in MMS helps reduce ferric ions to ferrous ions, which is crucial for absorption in the duodenum . Additionally, zinc supports linear growth and fetal immune function (14).

- **Acceptability and Adherence:** One of the challenges of conventional TTD is side effects such as nausea and a strong metallic taste (14). MMS is often reported to have better acceptability, although some pregnant women find its color less appealing (14). In Mrs. R's

case, escalation of TTD to 3x1 tablets was performed to catch up on Hb levels, which is a standard protocol for moderate anemia (25).

Clinical Significance of Random Blood Glucose (RBG) 163 mg/dl

One of the most interesting findings in this case was the increase in RBG levels to 163 mg/dl in the third trimester (7). Based on national guidelines, RBG values above 140 mg/dl in pregnant women require further evaluation for Gestational Diabetes Mellitus (GDM) (31).

- **Correlation with Infant Weight:** Maternal hyperglycemia causes glucose to cross the placenta via facilitated diffusion (31). The fetus exposed to high glucose levels will produce excessive insulin (fetal hyperinsulinemia). Insulin acts as a major growth hormone for the fetus, explaining the birth weight of Mrs. R's baby at 3495 grams (above average despite maternal anemia) (16).

- **Long-term Implications:** Mothers with gestational hyperglycemia have a high risk of developing Type 2 Diabetes later in life, while the baby is at risk for obesity and metabolic disorders (31). This case demonstrates the importance of integrating GDM screening for pregnant women diagnosed with anemia, as both can occur simultaneously but produce opposing effects on fetal physical growth parameters (anemia inhibits, diabetes stimulates growth) (16,32).

Analysis of Persistent Proteinuria Without Hypertension

Proteinuria +1 was found in Mrs. R persistently from the first visit until delivery, yet the patient's blood pressure remained low/normal (90/60 - 110/70 mmHg) (21). This condition challenges standard preeclampsia diagnostic criteria that require the presence of hypertension (33). Clinical interpretations for proteinuria in this case include (21):

1. **Renal Effects of Anemia:** Severe anemia causes decreased oxygen-carrying capacity to all organs, including the kidneys (17). Hypoxia in the renal tubules can cause mild proteinuria due to impaired protein reabsorption (22).

2. **Urinary Tract Infection (UTI):** Initial urinalysis results showing "slightly cloudy" urine strengthen the suspicion of asymptomatic UTI (34). Bacteriuria can cause inflammation of the urinary tract wall that triggers protein leakage into the urine (35).

3. **Chronic Proteinuria:** Because it was found before 20 weeks of gestation, this condition is categorized as chronic proteinuria that may have existed before pregnancy, possibly related to minor glomerular abnormalities (36).

Delivery Management and Perineal Laceration Complications

Mrs. R's delivery was performed at PONED Halong Primary Health Center, which is operationally ready to handle basic emergencies (37).

- **Hemodynamic Stability:** Blood pressure of 90/60 mmHg at the onset of labor is a warning sign in anemic mothers (38). Low blood pressure can reduce uteroplacental perfusion. The use of Ringer's Lactate (RL) intravenous fluids was very appropriate to maintain circulating volume (37).

- **Risk of Postpartum Hemorrhage:** Mothers with moderate anemia (Hb 9.1 gr/dl) have a high risk of uterine atony because the uterine muscle (myometrium) lacks oxygen to contract effectively (uterine inertia) (11). The success of active management of the third stage in this patient prevented fatal massive hemorrhage (38).

- **Second-Degree Perineal Laceration:** This birth canal tear involves the vaginal mucosa and perineal muscles (39). Risk factors in this case were the fairly large infant weight (3495 gr) and first pregnancy (primipara) where perineal tissues tend to be stiffer (40). Suturing was performed with local anesthesia, which is a standard procedure at PONED facilities (42).

- **Wound Healing and Anemia:** Hemoglobin levels are directly related to oxygen distribution to peripheral tissues for wound healing (43). Mothers with anemia have a higher risk of suture wound infection and slower healing compared to normal mothers (44). Therefore, postpartum care must include education on high-protein nutrition (such as consumption of snakehead fish) to accelerate fibrinolysis and wound closure (45).

Health Service Perspective in Balangan

The successful management of Mrs. R at Halong Primary Health Center reflects the quality of primary health services in Balangan Regency (6). Halong Inpatient Primary Health Center, established since 1984, has transformed into a PONED unit capable of providing 24-hour services (37). With free service policies for BPJS users and neat, standardized uniforms, public trust in public facilities has increased, so anemia risk detection can be performed earlier through integrated ANC programs (37). Stunting prevention efforts in Balangan are also integrated through the provision of micronutrient supplementation during pregnancy, as seen in this case (7).

Summary of Mrs. R's Case Management	Clinical Implementation
Early Detection	Hb 13.2 (Normal) to 8.6 (Moderate Anemia)
Pharmacological Intervention	MMS 1x1, TTD escalated up to 3x1, Calcium 2x500mg
Laboratory Monitoring	RBG 163 mg/dl, Persistent Proteinuria +1
Delivery Outcomes	Spontaneous, Infant 3495 gr, Second-degree laceration
Follow-up	Wound suturing, continue TTD postpartum

CONCLUSION AND RECOMMENDATIONS

Conclusion

The clinical management of Mrs. R at PONED Halong Primary Health Center demonstrates that a proactive approach to moderate anemia in the third trimester is crucial for ensuring the safety of both mother and baby . Although there was a significant decrease in hemoglobin levels from the first to third trimester, intervention in the form of multiple micronutrient supplementation (MMS and high-dose TTD) proved capable of supporting fetal growth to achieve optimal birth weight (3495 grams), while also preparing the mother for delivery (14,15).

This case also highlights the importance of critical interpretation of non-hematological laboratory findings (7). Persistent proteinuria +1 without hypertension was most likely a secondary effect of chronic anemia or asymptomatic UTI, while elevated RBG of 163 mg/dl contributed to the

large infant weight through fetal hyperinsulinemia mechanism (21,31). The success of spontaneous delivery at the PONED unit without massive hemorrhage complications proves that standardized first-level health facilities are capable of managing high-risk cases through strict monitoring and timely interventions (37,38).

Recommendations

1. **Strengthening Micronutrient Screening:** It is recommended that Primary Health Centers perform hemoglobin level examinations more routinely each trimester, not only at the first visit and 28 weeks of gestation, especially for pregnant women showing symptoms of weakness or proteinuria (7,25).
2. **Integrated Nutritional Management:** Education on dietary patterns should not be limited to TTD administration, but also education on food combinations that enhance iron absorption (such as vitamin C from fruits) and avoiding absorption inhibitors (such as tea and coffee when consuming supplements) (5,14).
3. **GDM Protocol at Primary Health Centers:** Given the high RBG levels in this case, primary health centers need to tighten Gestational Diabetes Mellitus screening protocols through OGTT for all pregnant women with RBG > 140 mg/dl to prevent the risk of macrosomia and long-term metabolic complications (31,32).
4. **Special Postpartum Care:** For mothers who deliver with anemic status, postpartum visits should be conducted more intensively to monitor perineal wound healing and ensure adherence to TTD consumption for at least 42 days or even 4-6 months postpartum to restore maternal iron stores (43,44).
5. **Utilization of Local Ingredients:** Encourage consumption of local animal protein such as snakehead fish and chicken liver in the Balangan region as sources of heme iron that are more easily absorbed by the body to support the effectiveness of chemical supplements (45,46).

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