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Description of Total Protein Levels in Pregnant Women at the Tambelan Sampit Health Center, Pontianak

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Pregnancy is a critical period characterized by the growth and development of the fetus, during which the nutritional needs of the mother, including total protein intake, increase significantly. Total protein in the blood comprises albumin, globulin, and small amounts of other proteins, all essential for maternal and fetal health. This descriptive-analytic study aimed to determine the total protein levels in pregnant women attending the Tambelan Sampit Health Center. The study involved 30 pregnant women, including 9 in the first trimester, 10 in the second trimester, and 11 in the third trimester. Data were collected without generalization analysis to describe the condition of the study population. The highest total protein levels were observed in the first trimester (8.2 g/dL), followed by the third trimester (7.3 g/dL), and the second trimester (7.1 g/dL). In the first trimester, 55.6% of participants had normal protein levels, and 44.4% had abnormal levels. In the second trimester, 80% had normal levels, and 20% had abnormal levels. In the third trimester, 81.9% showed normal levels, and 18.1% had abnormal levels. It can be concluded that most of the pregnant women in this study had total protein levels within the normal range across all trimesters. Further research is recommended to conduct a more in-depth investigation of total protein levels during pregnancy.

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1. INTRODUCTION

Pregnancy is the period of fetal growth and development in the uterus, starting from conception and ending at the onset of labor. During pregnancy, there are anatomical and physiological changes, and in addition to these changes, pregnant women experience discomforts such as fatigue, vaginal discharge, food cravings, frequent urination, and nausea and vomiting (emesis gravidarum), all of which are signs of pregnancy that women will experience. These changes occur due to the imbalance between the hormones progesterone and estrogen, the female hormones present in the body since the onset of pregnancy (Dhilon and Azni, 2018).

During pregnancy, protein is critically needed as an essential nutrient because, in addition to being a fuel source for the body, it also functions as a building and regulating substance. Protein is a source of amino acids that contain carbon (C), hydrogen (H), oxygen (O), and nitrogen (N), elements that are not found in fats or carbohydrates. Protein plays a significant role in pregnancy by forming and repairing tissues in the fetus, such as muscles, bones, eyes, skin, heart, and liver, as well as playing a role in blood formation (Natsir, 2018).

Total protein refers to all types of proteins found in the blood, composed of albumin, globulin, and some other proteins in smaller amounts (Senja, 2020). Total protein examination in pregnant women is important to conduct as part of routine health checks. Pregnant women should pay close attention to the nutritional intake needed for both their bodies and the fetus they are carrying, such as carbohydrates, protein, ions, folic acid, calcium, and a range of vitamins crucial for fetal development. Protein is a nutrient required for growth. The need for protein during pregnancy increases depending on the speed of fetal growth. The daily protein requirement in the first and second trimesters is less than 6 grams, while in the third trimester, it is around 10 grams per day (Winarsih, 2018).

Excessive protein during pregnancy can lead to several effects, including poor fetal development (small fetus), abnormal fetal growth marked by symptoms such as vaginal bleeding, severe abdominal cramps, loss of pregnancy signs, and absence of fetal heartbeats. It can also disrupt organ function and lead to calcium loss (Sholihah, 2016). Excess protein during the first trimester can cause delayed brain development, spinal cord, and other vital organs, including the heart. Protein intake is critical during the first 12 weeks or early trimester to support the development of the baby's organs. If protein is excessive during the second trimester, it may lead to delayed fetal movements, as by this time, the organs and systems have already formed, and hair growth may be delayed. In the third trimester, if the protein intake is high, it can lead to low birth weight (LBW) or fetal growth restriction (Wardhani, 2023).

Protein intake during pregnancy is vital for normal fetal growth. Insufficient protein will hinder proper fetal development, and excess protein may not be beneficial for fetal development. Furthermore, excessive protein in pregnant women can impair kidney function. High protein levels during pregnancy are also associated with increased maternal weight, uncontrolled fetal weight, heightened risk of diabetes and preeclampsia, inhibited fetal growth, increased risk of stillbirth, and complications during delivery (Suryani & Nadia, 2022).

Total protein consists of 60% albumin and 40% globulin in plasma. Proteins make up 50% of the dry weight of cells and play a significant role in the structure and function of the organism. Proteins are formed from one or more polypeptides that contribute to specific identity. Protein is involved in enhancing cell regeneration and maintaining bodily tissues. It also plays a role in metabolic regulation/hormones, biocatalysts, and immune functions/antibodies. Additionally, protein serves as an energy source when carbohydrate

and fat intake do not meet the body's energy needs. The total protein examination can be conducted using venous blood, which is then processed to plasma or serum. The plasma obtained from venous blood contains proteins, electrolytes, hormones, metabolic substances, and coagulation factors. The serum is obtained through centrifugation after 15 minutes of incubation, and it contains glucose, protein, hormones, metabolic substances, and electrolytes, but lacks coagulation factors (Dewi, 2013).

The role of EDTA (ethylene diamine tetraacetic acid) as an anticoagulant is to inhibit blood clotting by blocking calcium ionization, which prevents the conversion of prothrombin into thrombin. EDTA is often used in hematology tests as it does not cause shape changes in leukocytes and erythrocytes. The choice of specimen in the preparation stage can influence the results of the total protein examination, where plasma may show increased protein levels compared to serum due to the presence of coagulation factors like fibrinogen (Winda, Jiwanoro, & Khusuma, 2019).

Protein is crucial for maintaining the health of both the pregnant mother and fetus. It not only supports the mother's body but also ensures that the cells in the fetus work optimally. This function is fundamental for the proper growth and development of the baby after birth. Protein stimulates the formation of the brain and other organs in the fetus to function properly at birth. Protein also plays a role in the formation and repair of tissues in the fetus, such as muscles, bones, eyes, and heart (Herring et al., 2018).

Pregnant women require more protein than non-pregnant women due to the need for the protein to support both their own bodies and the growing fetus. Protein is also stored for lactation preparation. Pregnant women need about 75 grams of protein daily (Saifuddin, Rachimhadhi, & Wiknjosastro, 2020). The Tambelan Sampit Health Center is located in the Pontianak East District with a working area of 0.412 km², covering 1 sub-district consisting of 8 neighborhoods (RW) and 32 neighborhood units (RT), with a population of 7,686 people from 2,332 families. The population density is 18,746 people/km², with a gender ratio of 98.6%. In 2022, 61.3% of pregnant women visited the health center for their first antenatal care (K1), and 89.7% visited for the fourth antenatal care (K4) (UPT Puskesmas Tambelan Sampit, 2022).

This study on total protein levels in pregnant women at the Tambelan Sampit Health Center is essential because no protein examination has been conducted on pregnant women at this health center in recent years. It is important to perform the total protein examination to assess whether the protein levels are normal or abnormal. This descriptive-analytic study aims to provide an overview of the total protein levels in pregnant women at the Tambelan Sampit Health Center.

2. METHOD

The research method used in this study is descriptive-analytic. Descriptive-analytic is a method that serves to describe or provide an overview of the object being studied through collected data or samples as they are, without performing analysis or drawing conclusions that apply universally (Sugiono, 2013). The population in this study includes all pregnant women at the Tambelan Sampit Health Center in Pontianak. The sample used is the entire population at the Tambelan Sampit Health Center in Pontianak. This study was conducted at the Tambelan Sampit Health Center in Pontianak, from October 2023 to June 2024.

The method for determining the total protein levels used in this study is the Biuret method. The colorimetric determination of total protein is based on the Biuret reaction principle (copper salts in an alkaline medium). Proteins in plasma or serum form a blue complex when mixed with cupric ions in an alkaline environment. The intensity of the blue color is proportional to the protein concentration.

The data analysis for this descriptive-analytic study is presented in the form of tables and graphs. The presentation of the data will be adjusted according to the type of data and the research objectives. Descriptive-analytic methods aim to systematically and factually describe the data presented. Data analysis is the phase where the data is processed and analyzed using specific techniques. Descriptive-analytic analysis uses a series of data to provide an accurate description of what has occurred (Zakariah, Afriani, & Zakariah, 2020). This research has received ethical approval from the Health Research Ethics Commission of the Health Polytechnic of the Pontianak Ministry of Health with Number: 250/KEPK-PK.PKP/V/2024.

3. RESULTS AND DISCUSSION

Based on the research conducted on 30 pregnant women who agreed to sign the informed consent, with 9 participants in the first trimester, 10 in the second trimester, and 11 in the third trimester. The productive age for pregnancy is between 20-35 years old. Women under 20 years of age should delay pregnancy, while women over 35 are advised not to get pregnant again unless they do not yet have children, but should do so under medical supervision.

Table 1. Total Protein Level Test Results for Pregnant Women Based on Maternal Age

Age	Protein Level			Total
	Low <6.0 g/dl	Normal 6.0 – 7.0 g/dl	High >7.0 g/dl	
Low <20 Tahun	0	0	0	0
Productive 20-35 tahun	1	17	6	24
High >35 Tahun	0	5	1	6

Table 1 shows that there were no pregnant women under 20 years old. Among those in the reproductive age group (20-35 years), there were 24 women: 1 had low total protein levels (<6.0 g/dl), 17 had normal levels (6.0-7.0 g/dl), and 6 had high total protein levels (>7.0 g/dl). Meanwhile, for women aged over 35 years, there were 6 participants: 5 had normal protein levels and 1 had high protein levels.

Table 2. Percentage of Total Protein Level Test Results for Pregnant Women Based on Pregnancy Trimester

Trimester	Sample Size	Normal (%)	Abnormal (%)
Trimester I	9 Samples	5 Samples (55.6%)	4 Samples (44.4%)
Trimester II	10 Samples	8 Samples (80%)	2 Samples (20%)
Trimester III	11 Samples	9 Samples (81.9%)	2 Samples (18.1%)

Table 2 shows that the total protein level test results for pregnant women, the findings were as follows: In the first trimester, 55.6% of the pregnant women had normal total protein levels, while 44.4% had abnormal levels. In the second trimester, 80% had normal total protein levels, and 20% had abnormal levels. In the third trimester, 81.9% had normal total protein levels, and 18.1% had abnormal levels. This indicates that while the majority of pregnant women across all trimesters had normal protein levels, a significant proportion also showed abnormal protein levels, suggesting the need for further research on total protein levels during pregnancy.

DISCUSSION

Based on the research conducted on pregnant women, specifically examining total protein levels with a sample size of 30 subjects, the results were as follows: In the first

trimester, 55.6% of pregnant women had normal total protein levels, while 44.4% had abnormal total protein levels. In the second trimester, 80% of pregnant women had normal total protein levels, and 20% had abnormal total protein levels. In the third trimester, 81.9% of pregnant women had normal total protein levels, and 18.1% had abnormal total protein levels.

In general, the study found that no respondents were under 20 years old. Among those over 35 years old, there were 6 people: 5 with normal total protein levels and 1 with high levels. Meanwhile, in the reproductive age group (24 people), there was 1 with low total protein levels, 17 with normal total protein levels, and 6 with high total protein levels. This shows that normal total protein levels are more dominant. Even in the reproductive age group, there are still some women with abnormal total protein levels, which suggests that total protein levels can be low, high, or normal at any age, whether young, older, or within the reproductive age.

Protein needs during the later trimesters are higher compared to the earlier trimesters or earlier months of pregnancy. This is due to the rapid growth of the fetus's organs. An increase in maternal protein levels can also occur due to excessive intake of protein through food to meet the needs of the developing fetus. As the pregnancy progresses, the protein requirement increases because the mother undergoes many physiological and metabolic changes to support the fetus's rapid growth. These changes include an increase in blood plasma volume, increased nutritional needs, and the production of pregnancy hormones (estrogen and progesterone), which affect protein metabolism and lead to increased protein levels in the blood (Soma-Pillay et al., 2016).

During pregnancy, protein is crucial as it is one of the main nutrients supporting fetal development. Protein is needed throughout pregnancy, from the first trimester to the third. In the first 12 weeks, the fetus undergoes significant development, including the formation of the brain, spinal cord, and other vital organs. In the second trimester, protein remains important to support the development of muscles, bones, and increasingly complex organs. In the third trimester, during the final growth phase, including organ maturation, protein plays a vital role in fetal weight gain and preparing the mother's body for childbirth (Ekayanthi, & Suryani, 2019). Total protein testing is an essential examination during pregnancy as part of a comprehensive metabolic panel (CMP). This test can be a key consideration in diagnosing various conditions that may affect protein levels.

This research was conducted over two weeks, starting from sample collection, storage, to testing. Before being tested, the samples were stored in a refrigerator at temperatures between 4-8°C to maintain their stability. Since the sample collection and testing locations were different, the samples were transported using a cool box to maintain their stability and prevent damage. In this study, the samples used should have been serum, but plasma blood was used due to several reasons: first, the sample collection location did not have tubes without anticoagulants, which required the researcher to use EDTA tubes for blood storage; second, due to time constraints, there was not enough time to wait for the blood to clot and become serum, as the health center's service hours ended at 11:00 AM, and the samples had to be separated and placed into the refrigerator before the service hours ended. These reasons led the researcher to choose plasma blood instead of serum for the study.

4. CONCLUSION

It can be concluded that most of the pregnant women in this study had total protein levels within the normal range across all trimesters. Further research is recommended to conduct a more in-depth investigation of total protein levels during pregnancy.

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