International Journal Scientific and Profesional (IJ-ChiProf)
Vol.1 Issue.1 February 2022, pp: 23-29
ISSN: 2829-2618 (Online)

The Role Of Pregnancy Age, Blood Pressure And Vitamin D Deficit On Urine Protein Levels In Pregnant Women: A Study In Rural Population

Eka Dewi Retnosari1, Marlinda2
[1]Ministry of Health, Poltekkes Kemenkes Palembang, Indonesia
[2]Stikes Pringsewu, Lampung, Indonesia
Email: ekadewiretnosari@gmail.com

Article Info

Article history:
Accepted February, 2022
Revised February, 2022
Received 24 Feb 2022

Keywords:
Preeclampsia
Urine Protein
Vitamin D
BMI
Gestational Age

ABSTRACT

Preeclampsia is a potentially dangerous pregnancy complication characterized by high blood pressure and protein levels in the urine that are prone to occur in the third trimester. Urine protein levels have been known as a definite indicator of preeclampsia cases and are also determinants of the severity of preeclampsia experienced by pregnant women. The incidence of preeclampsia accounts for 3-8% of all pregnancies and is the cause of the most maternal deaths in Indonesia. The purpose of this study was to determine the risk factors that contribute to the severity of preeclampsia through urine protein levels in pregnant women. The Method used an Analytical observation design with a crossectional approach to analyze data obtained from 76 pregnant women in Muara Enim Regency, Indonesia, who met the inclusion criteria in this study. The results show a significant association of risky gestational age, blood pressure, and deficiency vitamin D with urine protein levels in pregnant women. At the same time, the age and Body Mass Index (BMI) of pregnant women proved not to be significantly related to the urine proteins of pregnant women. The Conclusion is Prevention and treatment can be done by knowing the predictors that cause the occurrence of urine protein in pregnant women. Education about the detection of risk factors becomes essential to be conveyed by health workers to mothers undergoing pregnancy or entering the second trimester of pregnancy.

Corresponding Author:
Eka Dewi Retnosari,
Health Polytechnic Palembang Ministry of Health, Indonesia,
Jenderal Sudirman Road, KM. 3.5, Number 1365, Next to Ash-Shofa Mosque, Complex Moh.Hoesin Hospital, Sekip Jaya, Kemuning, Palembang City, South Sumatra,30114.
Email: ekadewiretnosari@gmail.com

1. INTRODUCTION

Urine protein levels or proteinuria are essential criteria for predicting preeclampsia and are specific tests to assess the severity of preeclampsia in pregnant women (1)Preeclampsia is defined as the new onset of hypertension (> 140/90 mmHg) and urine protein after 20 weeks of pregnancy (2)Urine protein occurs after damage to the endothelial glomeruli of the kidneys. Urine protein examination becomes essential as a preventive intervention for preeclampsia in pregnant women. The severity of preeclampsia correlates with greater urine protein levels (3)The link between preeclampsia and urine protein was first reported in 1843(4)Currently, urine protein is a hallmark of preeclampsia. Along with new-onset hypertension, total urine protein excretion of more than 300 mg in 24 hours is widely recognized as the clinical definition of preeclampsia (5)Several studies have proven the association of urine protein levels in pregnant women with preeclampsia (6)Symptoms found in pregnant women with severe preeclampsia include swelling, red blood cell damage, decreased platelets, oliguria, increased blood pressure, brain disorders, visual, pulmonary edema, and cyanosis (7)The presence of symptoms in preeclampsia will cause pregnancy and fetal health complications, so prevention as early as possible against preeclampsia becomes very important. An accurate indicator of the presence of preeclampsia should be detected as early as possible. Urine

Vol.1 Issue.1 February 2022, pp: 23-29
ISSN: 2829-2618 (Online)

protein is used as an indicator of preeclampsia and a classification of the severity of preeclampsia experienced by pregnant women (2,8,9); therefore, it is necessary to know what factors are associated with increased urine protein levels in pregnant women.

Complications in preeclampsia include placental ablation, intravascular coagulation, intracranial hemorrhage, liver failure, acute kidney failure, and cardiovascular collapse. In the fetus occurs Intra Uterine Retardation Growth (IUGR), Intra Uterine Fetal Death (IUFD), prematurity, and Asphyxia (10). Given the severity of the consequences caused by preeclampsia, it becomes essential to prevent it by educating mothers who will be pregnant and pregnant women in trimesters I and II (5,11,12). Detecting the presence of preeclampsia begins with resuscitating pregnant women of the importance of understanding symptoms, reporting to health workers, and avoiding the cause of preeclampsia. Some factors suspected of causing preeclampsia in pregnant women are obesity, hypertension, gestational diabetes, old age, and diabetes mellitus (1,9). Mekanism occurs preeclampsia in pregnant women, resulting in abnormal blood vessels in the placenta that affect the development of the fetus (13).

Preeclampsia contributes to an extensive presentation of maternal and fetal deaths in Indonesia. Maternal mortality in Indonesia with indicators maternal mortality rate (AKI) is generally reduced in the period 1991-2015 from 390 to 305 per 100,000 live births but failed in achieving the MDGs target that must be completed, which is 102 per 100,000 live births in 2015, where the survey In 2015, maternal mortality was three times that of the MDGs.

(14) This condition becomes an essential fact for health workers to increase educational efforts for pregnant women to minimize the development of predictor factors into preeclampsia.

Muara Enim Regency is one of fifteen districts located in South Sumatra, Indonesia, which has AKI caused by a reasonably high preclude, which is 19 people out of 16,616 live births in 2012. And the cause of preeclampsia ranks second, while in 2014, there were 14 cases, but the main reason was preeclampsia. External factors that cause maternal death are generally due to family delays in making decisions to refer to a complete health facility (15). Urine protein becomes an indicator of preeclampsia in pregnant women, and prevention can be done by knowing the risk factors that cause urine protein. The goal of this study was to find out the risk factors that affect urine protein levels as a predictor of preeclampsia severity.

2. RESEARCH METHOD

The design of this study uses analytical observation with a crossectional approach. The population in the study is all pregnant women who are willing to be the subject of research in hospital and public health centers in Muara Enim Regency from August to October 2021. The sample number in this study was 76 pregnant women. The criteria for inclusion of a single pregnant fetus live a gestational age of 20 - 34 weeks and have a complete medical record since the 1st trimester to exclude complications. Semua pregnant women who do pregnancy examinations in poly obstetrics are carried out filling in identity, parity, The First Day of The Last Menstruation (HPHT), Height, Weight before pregnancy, history of diseases suffered before and during pregnancy, family history of suffering from preeclampsia. Blood pressure tests are performed, and vitamin D collaborates with the laboratory stages of data analysis through editing, coding, data entry, and data cleaning. Dialysis data with one-way ANOVA test technique to determine the relationship of risk factors to urine protein levels of pregnant women.

3. RESULTS AND ANALYSIS

3.1 Characteristics of Participants

Table 1. Characteristics of Pregnant Women

Characteristic	Mean	Median	Range
Age	30,7 (6,05)	31,5	18-41
Gestational Age	29,9 (4,09)	31,0	20-34
IMT	22,8 (3,62)	22,6	16,7 – 33,3
Cystole	134,3 (25,05)	135,0	90-190
Diastole	86,9 (13,95)	90,0	60-110
Vitamin D	19,4 (6,30)	19,2	5,8 – 35,4

In table 1, the average age of pregnant women is 30.7 (6.05) years. The average gestational age is 29.9 (4.09) weeks, the average BMI in pregnant women is 22.8 (3.62) kg/m2, the average systole is 134.3 (25.05) mmHg, the average diastole is 86.9 (13.95) mmHg, and the average hemoglobin level is 19.4 (6.30).

3.2 Protenuria Rate

Table 2. Distribution of Urine Protein Levels of Pregnant Women

Protein	n	%
Protein		
+1	21	55.3
+2	15	39,5
+3	2	5,2
Total	38	100

3.3 Association of risk factors with protenuria levels

Table 3. Factors related to Urine Protein Levels in Pregnant Women

Variable	Anova test		Post hoct test		
	F	**ρ value**	**Protein**	**Protein**	**P value**
Gestational Age	10,106	0,000*	Negative	+1	0,001
				+2	0,000
				+3	0,256
			+1	Negative	0,001
				+2	1,000
				+3	1,000
			+2	Negative	0,000
				+1	1,000
				+3	1,000
			+3	Negative	0,256
				+1	1,000
				+2	1,000
Vitamin D	2,944	0,039*	Negative	+1	0,956
				+2	1,000
				+3	0,049
			+1	Negative	0,956
				+2	1,000
				+3	0,217
			+2	Negative	1,000
				+1	1,000
				+3	0,221
			+3	Negative	0,049
				+1	0,217
				+2	0,221
Systole	142,395	0,000*	Negative	+1	0,000
				+2	0,000
				+3	0,000
			+1	Negative	0,000
				+2	0,000
				+3	0,041
			+2	Negative	0,000
				+1	0,000
				+3	0,041
			+3	Negative	0,000
				+1	0,000
				+2	0,041

Vol.1 Issue.1 February 2022, pp: 23-29
ISSN: 2829-2618 (Online)

In table 3, there was a significant difference in gestational age, systole pressure, diastole pressure, and vitamin D levels of urine protein levels in pregnant women ($\rho<0.05$) while in the age and BMI variables, there was no significant difference in urine protein levels in pregnant women ($\rho>0.05$). The results of the post hoct test on important associated gestational age variables were gestational age in the harmful levels group and +1,+2 levels. The post hoct tests on variable vitamin D obtained different significant groups are negative group and +3 group. The post hoct tests on systole variables obtained by influential groups are negative, +1, +2, and +3. While in the post hoc test, important diastole-related variables were opposing groups with +1, +2, and 3+.

3.4 Analysis

Preeclampsia is a condition of increased blood pressure in pregnant women and becomes the leading cause of maternal and fetal death (3). Preeclampsia is a systemic vascular disorder characterized by new-onset hypertension and urine protein after 20 weeks of pregnancy. The incidence of preeclampsia accounts for 3-8% of all pregnancies, seriously affecting the health of both mother and baby (4,16)). Pregnant women with preeclampsia indicate the presence of dysfunction of the organ system, leading to various adverse pregnancy outcomes, such as retinopathy, impaired kidney function, premature birth, fetal growth restriction (FGR), and others. Indicators that describe the severity of preeclampsia are from the results of examinations where there is a protein in the urine of pregnant women (2,4,17–19). Loss of negative charge on the kidneys, allowing a gap in the epithelial layer of the kidney for the passage of negative-charged proteins, so that increased levels of protein in the blood illustrate the severity of damage and damage to kidney function during pregnancy. So preeclampsia risk factors need to be explored further.

a. Gestational Age

Gestational age is a factor that can cause the mother to suffer from preeclampsia. Gestational age is divided into three trimesters: the first trimester of gestation 0 to 13 weeks, the second trimester 14 to 28 weeks, and the third trimester 29 to 40 weeks. Considered vulnerable to severe preeclampsia is the gestational age of the third trimester, but it does not rule out the possibility at the age below (20). Many studies have proven that increased sensitivity to vasopressor ingredients in hypertension in pregnancy has occurred in the first trimester. Increased sensitivity in pregnancy will be due to increased pressure in twenty weeks of pregnancy, and this is predicted to be the cause of hypertension in pregnancy. The fact that the incidence of preeclampsia increases with the age of pregnancy supports the theory of ischemia of placental implantation regions to explain the various clinical symptoms of preeclampsia (21,22). Another potential cortical mineral, plasma level, deoxycorticosterone (DOC), in plasma increases sharply in the third trimester (21) Early detection becomes important for mothers during pregnancy to prevent the incidence of hyperthermia, which is most effective after pregnancy enters the second trimester. Preeclampsia increases with gestational age, which is most at risk in the third trimester. Pregnant women must regularly check their pregnancy so that preventable risk factors.

b. Blood pressure

Signs and symptoms of preeclampsia usually appear in the relatively late stages of pregnancy (late in the second trimester to early third). (23) Preeclampsia that is not treated immediately will continue in conditions that endanger the mother and fetus. It will cause various communications such as cerebrovascular and cardiovascular, acute kidney failure, disseminated intravascular coagulation, placental solution, and maternal death(8). So that the detection of preeclampsia in early pregnancy becomes an important thing that midwives must educate to pregnant women, this is supported by research (1,2) that states preeclampsia detected before the age of 34 weeks of pregnancy with proper preeclampsia management can improve the prognosis of pregnancy and the fetus conceived. (24) In confirming the presence of hypertension, blood pressure should be measured at least twice four hours apart using an appropriately sized cuff and a validated device for use in women with preeclampsia (25). Blood pressure and proteinuria become very high and cause symptoms of final organ damage, which further results in restriction of fetal growth (8). Many studies provide that the difficulty of hypertension causes an increase in fetal, neonatal, and maternal risk (26). Mothers with a history of hypertension before pregnancy have trouble with preeclampsia, so urine protein measurements should be done immediately.

c. Vitamin D deficit

This study found that lower vitamin D was significantly associated with urine protein levels in pregnant women with a value of 0.039. Vitamin D, especially D3, serves as a nutrient, endocrine hormone, and medical

immune. The lack of vitamin D can cause immune disorders (27). The blood supply improves the mother's body, inhibiting fetal growth. The need for vitamin D in pregnant women describes their immunity during pregnancy. Research. Pregnant women with vitamin D deficiency are more at risk of developing preeclampsia, so vitamin D (VDR) is one of the genes involved in preeclampsia and other pregnancy complications (2,28). Detection of vitamin D deficiency must be done before pregnancy to be treated appropriately. However, the Bialy study in 2020 (29), which examined the effectiveness of randomized control trial (RCT), contained in vitamin D pada pregnancy, Vitamin D supplements do not affect preeclampsia.

d. Age of Pregnant Women

This study found that maternal age and BMI status were not significantly related to urine protein, with P-Values gained 0.115 and 0.406, respectively. Some studies are different from the results of this study, where there is evidence that the age of pregnant women affects the incidence of preeclampsia (6,19,30). The age of pregnant women who were participants in this study was an average of 30 years old, which is the mature age in women's lives, with conditions such as their mothers being exposed to information. Some of them can prevent the risk of urine protein from early pregnancy.

e. Body Time Index

Fox (2019) explained that the index of maternal body time (BMI) is a risk factor for urine protein. According to BMI, more than 35(2) risk of preeclampsia. Changes in hyperleptinemia metabolism in the body of pregnant women who have an overweight or excess body mass index (BMI) cause damage to endothelial dysfunction due to an increase in the ratio of Density Lipoprotein (LDL)c / High-Density Lipoprotein (HDL), which causes an imbalance of the production of vasodilator substances such as prostaline and nitric oxide with vasoconstrictors such as thromboxane and endothelium I so that there will be extensive vasoconstriction and occur. Preeclampsia (13). Pregnant women's BMI in this study was in the range of 16.7 to 33.33, none of which were over-categorized, so could not identify BMI as a risk factor for urine protein in this study.

The results of this study provide basic data on three important factors that mothers should be aware of in preparing for pregnancy so that the pregnancy to be lived healthy. Factors of gestational age, blood pressure and vitamin D deficit are proven to have a significant impact on the incidence of preeclampsia with urinary protein indictor in the blood. Blood pressure factors and vitamin D deficits should be realized from starting to plan a pregnancy and this is in dire need of family support for the husband, family support and the nearest person is the main motivation for someone to perform a healthy behavior(31) Gestational age is a picture that the older the gestational age should be more often checked to prevent the risk of problematic pregnancy. The role of midwives and nurses in educating adolescents and mothers of productive age through proper communication can reduce public health problems including the mother and her fetus(31,32).

4. CONCLUSION

Factors at risk of causing urine protein include the age of pregnancy at stake and the presence of a history of high blood pressure. Deficiency vitamin D. These factors also act as a predictor of the severity of preeclampsia. The higher the mother's gestational age, routine monitoring of blood pressure in pregnant women, especially at the gestational age of more than 20 weeks for early detection of preeclampsia. Women with preeclampsia should be considered to wait for a term pregnancy, considering the severity of preeclampsia is directly proportional to gestational age. Women with low vitamin D levels need to be upbringing before pregnancy. Prevention of preeclampsia can be done by increasing vitamin D levels before and in early pregnancy. Early detection of preeclampsia can improve the exterior of labor, term labor, and prematurity prevention.

ACKNOWLEDGEMENTS (10 PT)

Our thanks to the participants who participated, the hospital and public health center in Muara Enim Regency, and the management of Politekknik Kesehatan Palembang, who have supported the implementation of this research.

REFERENCES

[1] J. Mayrink, M. L. Costa, and J. G. Cecatti, “Preeclampsia in 2018: Revisiting Concepts, Physiopathology, and Prediction,” Sci. World J., vol. 2018, 2018, doi: 10.1155/2018/6268276.

[2] R. Fox, J. Kitt, P. Leeson, C. Y. L. Aye, and A. J. Lewandowski, “Preeclampsia: Risk factors, diagnosis, management, and the cardiovascular impact on the offspring,” J. Clin. Med., vol. 8, no. 10, pp. 1–21, 2019, doi: 10.3390/jcm8101625.

[3] A. Taravati and F. Tohidi, "Comprehensive analysis of oxidative stress markers and antioxidants status in preeclampsia," Taiwan. J. Obstet. Gynecol., vol. 57, no. 6, pp. 779–790, 2018, doi: 10.1016/j.tjog.2018.10.002.
[4] D. I. Chiarello et al., Oxidative stress: Normal pregnancy versus preeclampsia, vol. 1866, no. 2. Elsevier B.V, 2020.
[5] D. C. Cornelius, "Preeclampsia: From inflammation to immunoregulation," Clin. Med. Insights Blood Disord., vol. 11, 2018, doi: 10.1177/1179545X17752325.
[6] M. E. Rizki, "HUBUNGAN USIA DENGAN KEJADIAN PREEKLAMPSIA PADA IBU BERSALIN DI RSUD WONOSARI," Territ. E Caracter. Da Popul. Adscrita Da Equipe Saúde Da Família 905, vol. 3, no. 2, pp. 1–46, 2014, [Online]. Available: http://journal.stainkudus.ac.id/index.php/equilibrium/article/view/1268/1127.
[7] L. Duley, S. Meher, K. E. Hunter, A. L. Seidler, and L. M. Askie, "Antiplatelet agents for preventing pre-eclampsia and its complications," Cochrane Database Syst. Rev., vol. 2019, no. 10, 2019, doi: 10.1002/14651858.CD004659.pub3.
[8] J. Choudhary, V. Garg, and A. Bansal, "USAGE OF PROTEIN / CREATININE RATIO IN SPOT URINE SPECIMEN FOR EARLY IDENTIFICATION OF PRE- ECLAMPSIA," Int J Cur Res Rev, vol. 06, no. March, pp. 9–13, 2014.
[9] N. Bhadarka, K. Poddar, and S. Joshi, "Utilization of urine protein/creatinine ratio in pregnancy for diagnosis of preeclampsia," Int. J. Reprod. Contraception, Obstet. Gynecol., vol. 7, no. 9, p. 3646, 2018, doi: 10.18203/2320-1770.ijrcog20183769.
[10] R. Ghamrawi, A. G. Kattah, and V. D. Garovic, "Isolated Proteinuria of Pregnancy: A Call for Action," Kidney Int. Reports, vol. 4, no. 6, pp. 766–768, 2019, doi: 10.1016/j.ekir.2019.04.012.
[11] . Sudarman, H. M. M. Tendean, and F. W. Wagey, "Faktor-Faktor yang Berhubungan dengan Terjadinya Preeklampsia," e-CliniC, vol. 9, no. 1, pp. 68–80, 2021, doi: 10.35790/ecl.v9i1.31960.
[12] K. Laine, G. Murzakanova, K. B. Sole, A. D. Pay, S. Heradstveit, and S. Raïsänen, "Prevalence and risk of pre-eclampsia and gestational hypertension in twin pregnancies: A population-based register study," BMJ Open, vol. 9, no. 7, pp. 1–8, 2019, doi: 10.1136/bmjopen-2019-029908.
[13] G. Pome, I. Kusumawaty, Yunike, and L. R. Septiana, "Overview of the Implementation of Health Care Education in Diabetes Mellitus Patients with Diet Nonconformity," Proc. First Int. Conf. Heal. Soc. Sci. Technol. (ICoHSST 2020), vol. 521, no. ICoHSST 2020, pp. 68–72, 2021, doi: 10.2991/assehr.k.210415.016.
[14] Noya Ravindra, HUBUNGAN INDEKS MASSA TUBUH (IMT) DENGAN KEJADIAN PREEKLAMPSI RINGAN DI WILAYAH KERJA PUSKESMAS GANDUSARI- BLITAR. 2018.
[15] G. Prabhakara, Health Statistics (Health Information System). 2010.
[16] Kementrian Kesehatan, "Profil Kesehatan," p. 100, 2016.
[17] D. Mannaerts et al., "Oxidative stress in healthy pregnancy and preeclampsia is linked to chronic inflammation, iron status and vascular function," PLoS One, vol. 13, no. 9, pp. 1–14, 2018, doi: 10.1371/journal.pone.0202919.
[18] F. Abbasalizadeth, S. Abbasalizadeh, and N. Rashtchizadeh, "Early diagnosis of preeclampsia by 8 and 12 h urine protein," J. Med. Sci., vol. 7, no. 4, pp. 551–557, 2007, doi: 10.3923/jms.2007.551.557.
[19] P. Chaemsaithong, D. S. Sahota, and L. C. Poon, "First trimester preeclampsia screening and prediction," Am. J. Obstet. Gynecol., vol. 226, no. 2, pp. S1071-S1097.e2, 2022, doi: 10.1016/j.ajog.2020.07.020.
[20] B. Thilaganathan and E. Kalafat, "Cardiovascular system in preeclampsia and beyond," Hypertension, vol. 73, no. 3, pp. 522–531, 2019, doi: 10.1161/HYPERTENSIONAHA.118.11191.
[21] S. Fogacci et al., "Vitamin D supplementation and incident preeclampsia: A systematic review and meta-analysis of randomized clinical trials," Clin. Nutr., vol. 39, no. 6, pp. 1742–1752, 2020, doi: 10.1016/j.clnu.2019.08.015.
[22] Marniarti, N. Rahmi, and K. Djokosujono, "Analisis Hubungan Usia, Status Gravida dan Usia Kehamilan dengan Pre- Eklampsia pada Ibu Hamil di Rumah Sakit Umum dr . Zaionel Abidin Provinsi Aceh Tahun," J. Healthc. Technol. Med., vol. 2, no. 1, pp. 99–109, 2016, [Online]. Available: http://jurnal.uui.ac.id/index.php/JHTM/article/view/353.
[23] Maiti and Bidinger, "Nursing-Care-Plans-Guidelines-Individualizing-e9," J. Chem. Inf. Model., vol. 53, no. 9, pp. 1689–1699, 2014.
[24] F. Abbasalizadeh, "Early Diagnosis of Preeclampsia by 8 and 12 h Urine Protein," J. Med. Sci., vol. 7, no. 4, p. 8, 2007, doi: 10.3923/jms.2007.551.557.
[25] P. Von et al., "Evidence-based management for preeclampsia," Front. Biosci., vol. 12, no. may 2007, pp. 2876–2889, 2007.

[26] R. Fox, J. Kitt, P. Leeson, C. Y. L. Aye, and A. J. Lewandowski, "Preeclampsia : Risk Factors , Diagnosis , Management , and the Cardiovascular Impact on the O ff spring," J. Clin. Med., pp. 1– 22, 2019.
[27] P. Von et al., "Table of contents 1.," pp. 2876–2889, 2007.
[28] F. Aman and S. Masood, "EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA). Guidance on the scientific requirements for health claims related to the immune system, the gastrointestinal tract and defence against pathogenic microorganisms. Efsa J 2016;14:4369," Pakistan J. Med. Sci., vol. 36, pp. 121–123, 2020.
[29] S. Akbari, B. Khodadadi, S. A. Y. Ahmadi, S. Abbaszadeh, and F. Shahsavar, "Association of vitamin D level and vitamin D deficiency with risk of preeclampsia: A systematic review and updated meta-analysis," Taiwan. J. Obstet. Gynecol., vol. 57, no. 2, pp. 241–247, 2018, doi: 10.1016/j.tjog.2018.02.013.
[30] L. Bialy, T. Fenton, J. Shulhan-Kilroy, D. W. Johnson, D. A. Mcneil, and L. Hartling, "Vitamin D supplementation to improve pregnancy and perinatal outcomes: an overview of 42 systematic reviews," BMJ Open, vol. 10, no. 1, pp. 2–6, 2020, doi: 10.1136/bmjopen-2019-032626.
[31] M. M. Aziz, A. Kulkarni, L. Shah, S. Lashley, and Y. Oyelese, "Physiologic proteinuria in labor and postpartum: The results of the postpartum proteinuria trial (PoPPy)," Pregnancy Hypertens., vol. 13, no. April, pp. 22–24, 2018, doi: 10.1016/j.preghy.2018.04.019.
[32] I. Y. Martini, Sri ; Kusumawaty, "The Burden of a Family in Caring For Members Who Suffer From Mental Disorders," vol. 521, no. ICoHSST 2020, pp. 150–154, 2021.
[33] S. Yunike; Kusmawaty, Ira; Martini, "Mengedukasi orang tua siswa di sekolah alam palembang".