ISSN 1695-6141
Revista electrónica trimestral de Enfermería
Nº 73
Enero 2024
www.um.es/eglobal/

ORIGINALES

Tomato (lycopersicon esculentum) cookies as an intervention for handling anaemia in pregnant women

Galletas de tomate (lycopersicon esculentum) como intervención para el manejo de la anemia en mujeres embarazadas

Fadlilah[1]
Palifiana Dheska Arthyka[1]
Dewi Devillya Puspita[1]
Khadijah Siti[1]

[1] Universitas Respati Yogyakarta. Indonesia. sitifadlilah@respati.ac.id

https://doi.org/10.6018/eglobal.572161

Received: 31/05/2023
Accepted: 14/08/2023

ABSTRACT:

Primary Goal: This study aims to determine the effect of tomato cookies on the iron levels of pregnant women in certain areas in Indonesia.
Methods: This study used a quasi-experimental pretest and posttest control group design. A sample of 102 people with the same number per group was taken using simple random sampling. Tomato biscuits were given five pieces (@20 grams) every day/for seven days. Iron levels were measured during the pretest and posttest. Observation sheets, standard operating procedures, and haemoglobin levels based on laboratory tests were used. In comparison, data Analysis using Paired T-Test and Independent T-Test.
Results: The majority of respondents were aged 20-35 years (90.4%), third trimester (58.1%), and multigravida (83.9%). The control group showed no significant difference between pretest and posttest haemoglobin levels (p=0.317). There was an increase in the Hb level of pregnant women after giving tomato Cookies as much as 1.77 g/dL with p=0.011. There was a significant difference in haemoglobin levels between the control and intervention groups (p=0.025).
Conclusions: The provision of tomato cookies effectively increases the Hb levels of pregnant women. This intervention can be an alternative for preventing and treating anaemia in pregnant women. Pregnant women can consume tomato cookies together with the consumption of iron tablets.

Keywords: Anaemia; Haemoglobin; Lycopersicon esculentum; pregnancy.

RESUMEN:

Objetivo: Este estudio tiene como objetivo determinar el efecto de las galletas de tomate en los niveles de hierro de las mujeres embarazadas en ciertas áreas de Indonesia.
Métodos: Este estudio utilizó un diseño de grupo de control cuasi-experimental antes y después de la prueba. Se tomó una muestra de 102 personas con igual número por grupo mediante muestreo aleatorio simple. Se dieron cinco piezas de galletas de tomate (@20 gramos) todos los días/durante siete días. Los niveles de hierro se midieron antes y después de la prueba. Se utilizaron hojas de

observación, procedimientos operativos estándar y niveles de hemoglobina basados en pruebas de laboratorio. Análisis de datos usando la prueba T pareada y la prueba T independiente.
Resultados: La mayoría de los encuestados tenían entre 20 y 35 años (90,4 %), tercer trimestre (58,1 %) y multigrávida (83,9 %). El grupo de control no mostró diferencias significativas entre los niveles de hemoglobina antes y después de la prueba (p = 0,317). Hubo un aumento en el nivel de Hb de las mujeres embarazadas después de dar galletas de tomate hasta 1,77 g/dL con p=0,011. Hubo una diferencia significativa en los niveles de hemoglobina entre los grupos de control y de intervención (p=0,025).
Conclusiones: La provisión de galletas de tomate aumenta efectivamente los niveles de Hb de las mujeres embarazadas. Esta intervención puede ser una alternativa para la prevención y tratamiento de la anemia en mujeres embarazadas. Las mujeres embarazadas pueden consumir galletas de tomate junto con el consumo de tabletas de hierro.

Palabras clave: Anemia; Hemoglobina; Lycopersicon esculentum; embarazo.

INTRODUCTION

Anaemia in pregnant women is one of the causes of disturbances in mother and baby. The number of anaemia in pregnant women has increased in low and middle-income countries by 56%[1]. The incidence of anaemia in pregnant women is highest in Sub-Saharan Africa (SSA) (57%) and the lowest in South America (24.1%). Southeast Asia occupies the second position with cases of anaemia in pregnant women (48%). The incidence of anaemia in pregnant women in Indonesia in 2019 was 44.2%[2]. Anaemia occurs when the pregnant women's haemoglobin (Hb) level is <11 g/dL and can occur in any trimester[3]. Iron deficiency anaemia occurs when low Hb levels are caused by tissues that produce red blood cells unable to maintain normal levels. A lack of iron intake usually causes this condition[4].

Pregnant women with anaemia show physical symptoms during pregnancy or after delivery. During pregnancy, the mother experiences paleness, shortness of breath, palpitations, fatigue, headaches, and other signs of anaemia. Psychological conditions are also affected; pregnant women experience decreased concentration, decreased performance, and irritability[5, 6]. During and after childbirth, mothers with anaemia are at risk for bleeding, shock, cardiovascular insufficiency, susceptibility to infection, decreased breast milk, and depression. The severity of anaemia directly correlates with maternal death[7-9]. Anaemia in pregnant women also causes disturbances to the fetus and baby's born. Infants are at high risk for low birth weight and premature birth. Lack of iron causes impaired neurophysiological development of infants, placental disorders, increased incidence of infection and fetal death[10, 11].

Anaemia in pregnant women can be prevented by consuming a balanced nutritious diet to meet the body's nutritional needs. Another effort is the consumption of iron tablets during pregnancy. Supplementation of iron tablets is the administration of iron folate in tablet form[12]. The administration of iron begins after nausea and vomiting have disappeared, which is entering the age of 16 weeks of pregnancy; one tablet is consumed for a minimum of 90 days[13]. Iron is a substance that is difficult for the body to absorb. Several nutrients in food can increase iron absorption, one of which is vitamin C[14]. Giving iron and vitamin C supplements increases haemoglobin levels and red blood cell counts more than showing iron or vitamin C alone[15].

One fruit with vitamin C and compounds beneficial for health is tomatoes. Tomatoes contain many valuable substances, of which 180 grams are vitamin C (24.66 mg), iron (0.49 mg), and folic acid (27 mcg)[16]. Pregnant women need folic acid because the

need for folic acid during pregnancy will increase more than usual[17]. Tomatoes can be a complementary therapy to prevent anaemia in combination with iron tablets. Many studies have been conducted on improving iron in pregnant women by giving tomatoes in juice[18-20].

Pregnant women are different from other community groups. Most pregnant women report nausea and vomiting, which reduces the desire to eat. Alternatives to reduce iron deficiency in pregnant women are by conducting food-based interventions on snacks. Previous studies have used tomatoes as juice or consumed directly[18, 19, 21], while studies using tomatoes as cookies have never existed. Tomatoes can be made into a snack food in the form of cookies. Most people like cookies, from toddlers to adults, and cookies are a snack that most people like. As dry food, cookies are classified as not easily damaged and have a relatively long shelf life. Based on the background, iron is vital in preventing anaemia in pregnant women; the researchers intend to research the intervention of tomato (*Lycopersicon esculentum*) cookies in pregnant women.

METHODS

This research used a quasi-experimental one-group pretest and posttest design. The study was conducted in Yogyakarta, Indonesia, in July-December 2021. Giving tomato cookies was the independent variable, and the haemoglobin (Hb) level of pregnant women was the dependent variable. The study population was pregnant women registered as patients at the Pratama Asih Waluyo Jati Clinic, Yogyakarta, Indonesia, from January-June 2021, with as many as 235 people. Determination of the number of samples using the Slovin formula,

$$n = \frac{N}{N\,(d^2) + 1}$$

with details n=number of samples; N=number of the population; d=precision, the researchers used 10%. Based on the calculations, the minimum number of samples is 71 people. The number of respondents who participated in the study was 102 pregnant women divided into two groups. The control group received regular cookies without the addition of tomatoes. In contrast, the intervention group received cookies containing tomatoes. The sampling technique used simple random sampling. Sample selection was based on inclusion criteria: pregnant women in the 2nd or 3rd trimester, age 20-40 years, taking iron tablet supplements, normal nutritional status, no allergies to tomatoes, and willing to be a respondent. The exclusion criteria were respondents who were sick and smoked. Dropout criteria if the mother does not follow the intervention completely. The research instrument used original cookies, tomato cookies, observation sheets, recall sheets on nutritional intake during the intervention, and standard operating procedures for taking venous blood and checking Hb. Observation sheets were used to document the daily intervention and the results of the pretest and posttest Hb examinations. Recall sheet for documentation of respondent's diet during the research process to anticipate bias during the research process. Standard operating procedures for taking venous blood samples were tested for expert validity on two medical surgical nursing experts with a result of 0.85 (fit for use). Standard operating procedures for Hb examination follow those applicable in the laboratory where the analysis is carried out.

Researchers made tomato cookies in a dietetic laboratory, then proximate, Fe and organoleptic tests with a test certificate numbered 006/CMP/10/VI/2021. Making 100 grams of dry cookies requires 100 grams of tomatoes. They were testing tomato cookies twice with an average detail in 100 grams of cookies containing water (18.47%), protein (7.31%), fat (17.88%), carbohydrates (56.05%), energy (408.78 cal), vitamin C (13.89 mg), and Fe (20.70 mg). Cookies for the control group used the same ingredients as the intervention group but did not add tomatoes. According to the group, researchers include all respondents in the chat group on the Whatsapp Messenger application. A Pretest Hb examination was carried out before the intervention was given. Respondents received the intervention of providing tomato cookies for seven days, each day consuming five pieces (@20 grams). Respondents received tomato cookies after the pretest Hb examination and on the fourth day of the intervention. Tomato cookies are consumed one by one starting at 06.00-21.00 with a break every 3 hours. The researcher reminded the time of consuming tomato cookies through a group chat; fill in the observation sheet if you have finished it. Posttest Hb examination was carried out on the 8th day. Hb examination, both pretest and posttest through fasting venous blood sampling, was carried out in the laboratory. Respondents fasted for at least 8 hours before taking blood. The respondent's food consumption is measured every three days using a recall sheet that has been made. The control group received the same treatment as the intervention group; the difference was in the content of cookies.

The researchers explain the purpose, benefits, and process of the research. The researcher also explained what should and should not be done during the research process. Respondents signed informed consent as evidence of agreeing to participate in the study. The researcher also explained that all respondents and their parents had the right to resign if they felt disadvantaged during the research process. The study was conducted after obtaining ethical clearance from the Ethics Commission of Universitas Respati Yogyakarta 141.3/FIKES/PL/VII/2021—univariate data analysis using frequency distribution and numerical data description. The Kolmogorov Smirnov's normality test showed that the data were normally distributed (p>0.05). The pretest-posttest bivariate test used a Paired T-Test and Independent T-Test.

RESULTS

Table 1 Distribution Characteristics of Respondent (n=102)

Variable		∑ (%)	Haemoglobin *Pretest* (gr/dL)		
			Mín-Máx	Mean±SD	*p*[#]
Age (year)	20-35	92 (90.4)	8.12-11.60	11.02±0.70	0.832
	≥ 35	10 (9.6)	8.00-10.50	11.21±0.80	
Pregnancy (Weeks)	13-28	43 (41.9)	8.12-11.12	10.90±0.80	0.012
	28-40	59 (58.1)	8.00-11.60	10.20±0.90	
Parity	Primigravida	16 (16.1)	8.50-11.60	11.02±0.70	0.031
	Multigravida	86 (83.9)	8.00-10.70	10.20±0.90	

∑=Total; %=percentage; Min=Minimal; Max=Maximal; SD=Standard Deviation; p=p-value; [#] Tested using Mann Whitne

Age data are categorized according to the Ministry of Health of the Republic of Indonesia, not at risk (20-35 years) and at-risk (>35 years). Table 1 shows that the majority of respondents belonged to the non-risk gestational age group (90.4%),

multigravida (83.9%), and 28-40 weeks gestation (58.1%). There was a relationship between gestational age and the incidence of anaemia in pregnant women (p=0.012 and p=0.031). In contrast, maternal age during pregnancy was not associated with the incidence of anaemia (p=0.832).

Table 2 Average Nutrition Consumption of Respondents During the Intervention (n=102)

Nutrition	Min	Max	Mean±SD
Energy Intake (kcal)	925.20	1671.60	1312.50±112.67
Protein Intake (gr)	40.10	71.20	48.17±4.93
Lipid Intake (gr)	17.30	28.10	23.45±4.06
Carbohydrate Intake (gr)	191.20	281.40	320.03±25.73
Iron Intake (gr)	9.30	11.50	10.42±0.78
Vitamin C intake (gr)	11.10	15.30	12.43±1.21

gr=gram; kcal= kilocalorie; Min=Minimal; Max=Maximal; SD=Standard Deviation

Table 2 shows that based on interviews using food recall, the average food intake during the intervention was 1312.50 kcal, protein intake 48.17 gr, fat intake 23.45 gr, iron intake 10.42, and vitamin intake 12.43 gr.

Table 3 Effect of Tomato Cookies on Haemoglobin Levels of Pregnant Women (n=102)

Haemoglobin (gr/dL)	Control Group				Intervention Group			
	Pretest	Posttest	Δ Mean	p	Pretest	Posttest	Δ Mean	p
Min-Max	8.10-11.80	8.15-11.90	0.06	0.317*	8.00-11.60	10.30-13.70	1.77	0.011*
Mean ±SD	10.91±0.70	10.97±0.90			11,12±0.80	12,89±1.10		
Homogeneity test of Haemoglobin pretest among control-intervention group p=0.424								
The Mean Difference of Haemoglobin posttest between the control and intervention group (*7.0, p*<.025#)								

Min=Minimal; Max=Maximal; SD=Standard Deviation; Δ= Difference posttest-pretest *Tested using *Paired T-Test;* # Tested using *Independent T-Test*

Table 3 shows a slight increase in Hb levels (0.06 g/dL). The analysis showed no difference between pretest and posttest haemoglobin levels in the control group (p=0.317). Table 3 also showed the mean posttest HB levels were higher than the pretest (12.89 gr/dL > 11.12 gr/dL). There was an increase in Hb levels in pregnant women by as much as 1.77 g/dL. Tomato cookies increase Hb levels of pregnant women with anaemia (p=0.011). The homogeneity test between the control and intervention groups showed p=0.424, proving that the data of the two groups were homogeneous. The difference test confirmed a significant difference between the control and intervention groups (p=0.025).

DISCUSSION

The study results found that giving tomato cookies increased the iron of pregnant women. Similar studies have been conducted examining the benefits of tomatoes in preventing anaemia. The results of previous studies stated that tomatoes effectively increased the iron levels of pregnant women[18, 19, 21]. This study differs from previous studies; Fitriani et al. give tomatoes in the form of juice and pregnant women only in the second trimester with the result of increasing haemoglobin up to 2.09 gr/dl[18],

Novyriana and Caesarani use tomato juice in pregnant women in the third trimester where there was an increase of haemoglobin of 1.6 gr/dl[19]. This study used tomatoes in crackers and was given to pregnant women in the second and third trimesters. The sample difference was also found in Siauta and Anita, using a sample of adolescent women and tomato juice administered in combination with iron tablets; the results showed an increase in haemoglobin of 0.69 gr/dl([21]. Previous research demonstrated that giving tomato juice increased haemoglobin by 3.08 g/dl in pregnant women in the third trimester. Providing a tomato intervention in the form of biscuits is an innovation to improve the motivation of mothers to consume them, and, at the same time, they can be stored for a long time. The cookies are a snack much loved by the public, adding the content of tomatoes to meet the vitamin C needs of pregnant women.

Nutritional intake during pregnancy affects the mother's condition, the pregnancy process, and the baby's state. During pregnancy, mothers need 800 mg of iron to supplement maternal erythrocytes (500 mg), growth and development of the fetus, and placenta (300 mg). This condition causes pregnant women to need 2-3 mg of iron/day. Pregnant women's nutritional needs differ from those of non-pregnant women[22]. Iron and folic acid deficiency cause anaemia. In general, pregnant women's iron needs differ for each trimester of pregnancy. In the first trimester, the need for iron is less because pregnant women do not have periods, and the fetus does not need much iron. There is an increase in the demand for iron in the second trimester as the number of red blood cells increases. In the third trimester, red blood cells increase by 35%, so the need for iron also increases. The increased amount of red blood cells to find oxygen for the fetus[23, 24]. Iron absorption can develop in cobalt, inosine, methionine, vitamin C, HCL, succinate and other acidic compounds[25]. Consuming vitamin C is one of the most common ways to increase iron absorption.

Vitamin C increases iron absorption by reducing ferric iron (Fe3+) to ferrous (Fe2+) in the intestine to absorb quickly. The reduction process will be even greater if the pH in the stomach is more acidic[16]. Some pregnant women do not like vitamin C in drugs. So, consuming vitamin C from other sources is a choice; sources of vitamin C can come from fruits. Tomatoes contain vitamin C and other beneficial compounds such as folic acid, minerals, and Fe[26]. Consuming tomatoes directly sometimes cause a decrease in interest for pregnant women, so modifications to other processed ingredients, such as cookies, can be done.

The results showed that most respondents, including age, were not at risk. The study results do not follow Dewi and Kuntari, proving a relationship between age and the incidence of anaemia in pregnant women. Pregnant women over 30 years are more likely to experience anaemia due to decreased iron reserves in the body due to the fertilization period[27]. The results of this study indicate that both ages are at risk and are not at risk for anaemia during pregnancy. In line with Aznam and Inayati's research, age was not associated with anaemia in pregnant women. All age groups of mothers can experience anaemia[28].

In addition to maternal age, gestational age is also a factor that causes anaemia. The results show that most respondents are in the third trimester, and statistically, there is a relationship between gestational age and the incidence of anaemia. The study results by Badfar et al. found no association between gestational age and the incidence of pregnancy. The incidence of anaemia is related to the 1st trimester of pregnancy. The previous study subjects used pregnant women in the 1st and 2nd

trimesters[29]. Unlike Hidayati and Andyarini, they found a relationship between gestational age and the incidence of anaemia[30]. In addition, the study results found that the majority were multigravida and were associated with the incidence of anaemia. The number of pregnancies and births is related to iron loss due to maternal iron reserves during pregnancy. The study's results support previous studies that there is a relationship between the number of pregnancies and the incidence of maternal anaemia during pregnancy[30].

Research limitations

This study has several limitations, including during the 7-day intervention process, the researcher was away from the respondent. The method of consuming tomato cookies depends on the honesty of the respondents. Researchers anticipate this through a group chat with all respondents and remind them to finish cookies. Respondents also wrote on the observation sheet in the form of self-reported through the filling link sent by the researcher. Another limitation is the distribution process of cookies due to the COVID-19 pandemic, so they cannot be given daily. Researchers overcome this by providing cookies every three days by ensuring laboratory test results about the time limit for consuming cookies so that the tomato cookies are always safe.

CONCLUSION

The results showed an increase in Hb levels after being given tomato cookies. The study results proved that the administration of tomato cookies effectively increased the Hb level of pregnant women. As the main ingredient for making cookies, tomato is an ingredient in abundant quantities, easy to obtain. The price of tomatoes is also economical; their existence does not know the season. The choice of tomatoes made into cookies is appropriate to make them look more attractive and taste better. Furthermore, community service can be done by making tomato cookies so pregnant women can make them independently.

REFERENCES

1. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, De Onis M, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. The lancet. 2013;382(9890):427-51.
2. World Health Organization W. Prevalence of anemia among pregnant women (%) - Indonesia | Data 2019 [Available from: https://data.worldbank.org/indicator/SH.PRG.ANEM?locations=ID.
3. Murphy J. Haemoglobin Concentrations for the Diagnosis of Anaemia and Assessment of Severity. Vitamin and Mineral Nutrition Information System. Geneva: World Health Organization; 2011. 2002.
4. Miller JL. Iron deficiency anemia: a common and curable disease. Cold Spring Harbor perspectives in medicine. 2013;3(7):a011866.
5. Annamraju H, Pavord S. Anaemia in pregnancy. British Journal of Hospital Medicine. 2016;77(10):584-8.
6. Obstetricians ACo, Gynecologists. Anemia in pregnancy: ACOG practice bulletin, number 233. Obstetrics and gynecology. 2021;138(2):e55-e64.

7. Breymann C, Auerbach M. Iron deficiency in gynecology and obstetrics: clinical implications and management. Hematology 2014, the American Society of Hematology Education Program Book. 2017;2017(1):152-9.
8. Vitale SG, Laganà AS, Muscatello MRA, La Rosa VL, Currò V, Pandolfo G, et al. Psychopharmacotherapy in pregnancy and breastfeeding. Obstetrical & gynecological survey. 2016;71(12):721-33.
9. Yılmaz E, Yılmaz Z, Çakmak B, Gültekin İB, Çekmez Y, Mahmutoğlu S, et al. Relationship between anemia and depressive mood in the last trimester of pregnancy. The Journal of Maternal-Fetal & Neonatal Medicine. 2017;30(8):977-82.
10. Mirza FG, Abdul-Kadir R, Breymann C, Fraser IS, Taher A. Impact and management of iron deficiency and iron deficiency anemia in women's health. Expert review of hematology. 2018;11(9):727-36.
11. Moos T, Skjørringe T, Thomsen LL. Iron deficiency and iron treatment in the fetal developing brain–a pilot study introducing an experimental rat model. Reproductive Health. 2018;15(1):117-20.
12. Brannon PM, Taylor CL. Iron supplementation during pregnancy and infancy: uncertainties and implications for research and policy. Nutrients. 2017;9(12):1327.
13. Seu M, Mose JC, Panigoro R, Sahiratmadja E. Anemia prevalence after iron supplementation among pregnant women in midwifes practice of primary health care facilities in Eastern Indonesia. Anemia. 2019;2019.
14. Li N, Zhao G, Wu W, Zhang M, Liu W, Chen Q, et al. The efficacy and safety of vitamin C for iron supplementation in adult patients with iron deficiency anemia: a randomized clinical trial. JAMA network open. 2020;3(11):e2023644-e.
15. Triharini M, Sulistyono A, Adriani M, Hsieh P-L. Perceived Benefits and Intakes of Protein, Vitamin C and Iron in Preventing Anemia among Pregnant Women. Jurnal Ners. 2018;13(2):156-61.
16. Raiola A, Rigano MM, Calafiore R, Frusciante L, Barone A. Enhancing the health-promoting effects of tomato fruit for biofortified food. Mediators of inflammation. 2014;2014.
17. Dessie MA, Zeleke EG, Workie SB, Berihun AW. Folic acid usage and associated factors in the prevention of neural tube defects among pregnant women in Ethiopia: cross-sectional study. BMC pregnancy and childbirth. 2017;17(1):1-8.
18. Fitriani F, Evayanti Y, Isnaini N. Pemberian Jus Tomat Terhadap Kadar Hemoglobin Pada Ibu Hamil Trimester Iii Tahun 2019. J Kebidanan Malahayati. 2020;6(2):230-5.
19. Novyriana E, Caesarani MR, editors. Pemberian Jus Tomat terhadap Peningkatan Kadar Hemoglobin pada Ibu Hamil Trimester III di Puskesmas Bonorowo Kebumen. Prosiding University Research Colloquium; 2019.
20. Lestari SD, Aulya Y, Widowati R. Pengaruh Konsumsi Jus Tomat terhadap Kenaikan Kadar Hemoglobin pada Ibu Hamil Trimester III dengan Anemia di RSUD Ciawi Tahun 2022. Jurnal Akademika Baiturrahim Jambi. 2022;11(1):135-41.
21. Siauta JA, Anita W. Pengaruh Pemberian Tablet Fe dan Jus Tomat Untuk Peningkatan Kadar Hemoglobin Pada Remaja SMK N 1 Mesuji Oki Sumatra Selatan. Journal for Quality in Women's Health. 2020;3(2):117-21.
22. Fisher AL, Nemeth E. Iron homeostasis during pregnancy. The American journal of clinical nutrition. 2017;106(suppl_6):1567S-74S.
23. Di Renzo GC, Spano F, Giardina I, Brillo E, Clerici G, Roura LC. Iron deficiency anemia in pregnancy. Women's Health. 2015;11(6):891-900.
24. Georgieff MK. Iron deficiency in pregnancy. American journal of obstetrics and gynecology. 2020;223(4):516-24.

25. Lestiawati E, Fadlilah S, Krisnanto PD, Umami A. Red Ginger (Zingiber officinale var. rubrum) and Honey Effectively Increase Haemoglobin Levels in Adolescents. International Medical Journal. 2022;29(1).
26. Fadlilah S, Sucipto A, Judha M. Cucumber (Cucumis sativus) and tomato (Solanum lycopersicum) juice effective to reduce blood pressure. GSC Biological and Pharmaceutical Sciences. 2020;10(1):001-8.
27. Yuwitasari R, Nursitiyaroh N, Ermanto B. The Effectiveness of Mung Beans and Katuk Leaves on Increasing Hemoglobin Levels in Maternity at TPMB Rennie Yuwitasari in 2022. International Journal of Health and Pharmaceutical (IJHP). 2023;3(4):493-7.
28. Aznam AE, Inayati L. Relationship Between Age and Parity with Incidences of Anemia in Pregnant Women in Mayangrejo. Jurnal Biometrika Dan Kependudukan. 2021;10(2):130-7.
29. Badfar G, Shohani M, Soleymani A, Azami M. Maternal anemia during pregnancy and small for gestational age: a systematic review and meta-analysis. The Journal of Maternal-Fetal & Neonatal Medicine. 2019;32(10):1728-34.
30. Hidayati I, Andyarini EN. The Relationship Between The Number of Parities and Pregnancy Age with Maternal Anemia. Journal of Health Science and Prevention. 2018;2(1):42-7.

ISSN 1695-6141