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Comparison of POCT and Hematology Analyzer Methods for Hemoglobin Level Examination in Second Trimester Pregnant Women at Tumpang Health Center

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Abstract

Introduction: Hemoglobin is a component of the protein molecule in erythrocyte cells that distributes oxygen (O2) throughout the body. Hemoglobin contains iron which makes blood red. HB levels are a supporting examination that helps establish a diagnosis as a reflection of the body's reaction to a disease and as an indication of the progress of therapy for anemia sufferers and other diseases**. Objective:**To find out the comparison of HB levels using the POCT and Hematology Analzyer methods.**Method***: This type of research is descriptive research with a cross sectional design. The sample collection technique used the Accidental Sampling technique with a sample population of 22 pregnant women in the second trimester at the Tumpang Community Health Center*. **Results***: The results of research on hemoglobin levels using the POCT method and Hematology Analyzer using the dependent T test showed a significant comparison of p value 0.01 (>0.05). The average POCT Hb level result was 1.55 g/dl and the average hematology analyzer Hb level result was 1.82 g/dl. The Hematology Analyzer method is more accurate because the average result obtained is higher than POCT.**Conclusion :***Suggestions for further research can be used Different samples and a larger number of samples require comparative examination of HB levels using other methodssahli, cyanmethemoglobin, and tallquist.*

Keywords:Hemoglobin levels, POCT method, Hematology Analyzer method

1. Introduction

Hemoglobin is a component of the red blood cell protein molecule that functions to distribute oxygen (O2) throughout the body[1]. Hemoglobin contains iron, which gives blood its red color. Hemoglobin levels are an additional diagnostic test that reflects

the body's response to disease and shows progress in treating anemia and other diseases[2].

The risks arising from inaccurate determination of hemoglobin levels can result in errors in diagnosing a disease and affecting treatment methods for patients[3]. According to(Seyra and 2024)As many as 47.40% of pregnant women worldwide suffer from anemia. This figure is higher in developing countries, where 52% of pregnant women suffer from this condition, while in developed countries the prevalence of anemia in pregnant women is 23%. In Indonesia, 37.1% of the total pregnant women suffer from anemia, with a fairly comparable proportion between rural (36.4%) and urban (37.8%) areas. The high prevalence of anemia has a significant impact on the health of the baby and can result in a less than ideal birth weight[4].

Measurement of hemoglobin levels with the POCT method is carried out using a strip test. The advantages of the POCT tool are that the use of instruments is very practical, easy and efficient. The disadvantage of the POCT tool is that the types of examinations that can be examined are limited[5].

Hemoglobin examination can also use the hematology analyzer method. The advantage of the examination is that it can be done quickly and the disadvantage is that it requires periodic checks[6].. Anemia in pregnant women increases the risk of low birth weight, bleeding before and during childbirth, and can even cause death for both mother and child if the pregnant woman experiences severe anemia[7].

Based on the results of research conducted by[8] entitled "Differences in the results of hemoglobin level examinations between the POCT method and the cyantmethemoglobin method in pregnant women", it was found that there was no statistically significant difference between the average results of hemoglobin level examinations using the POCT method of venous blood and the cyantmethemoglobin method of venous blood[9]. Based on the problems above, the researcher is interested in taking the title "Comparison of Hemoglobin Level Examination Using POCT and Hematology Analyzer Methods in Pregnant Women in the Second Trimester at the Tumpang Health Center".

2. Research Methods

The type of research conducted in this study is descriptive research. The purpose of this study was to determine the comparison of

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hemoglobin level examination by POCT and hematology analyzer methods with a Cross Sectional research design. The population in this study were pregnant women in the second trimester who underwent hemoglobin level examinations and the number of samples used by the researcher was 22 samples of pregnant women in the second trimester who underwent hemoglobin level examinations at the Tumpang Health Center. The time of the study was conducted in May 2024. The selection of this sample was based on the inclusion criteria, namely: Pregnant women in the second trimester who underwent hemoglobin level examinations at the Tumpang Health Center and pregnant women who were willing to be respondents in this study. The exclusion criteria were: Pregnant women who were unwilling to check Hb and were unwilling to be respondents. The comparison of the two methods was for the POCT method using a strip test tool and the Hematology Analyzer method using a hematology analyzer tool.

3. Results and Discussiounce

Resoarchrs haveconductda sampleanalysiss of respongents reguardng thecompareson of himmoglobyn levelexamination using thePOCT method and hemathematics analysisrin pregnant womanthisn thesocondition threemester.

B. Instribulleton of Factors Affectedcting Hemoglobyn Levels in Pregnant womanthisn theSeeTri conditionmester

Table1. Frewhatncy of Pregnant womann's Agein theSeeTri conditionmester Based on Consumptionon of Blood-Boosting Tablets

		Tablet Consumptionon			
		No	Yess	Total	theresults of thosewho do not
Age	Youenagers (15-25)	6 (67%)	5 (38%)	11(50%)	
	Adults (26-45)	3 (33%)	8 (62%)	11(50%)	
Total		9(100%)	13(100%)	22(100%)	

Theinstribulleton shows theresultan with frewhatnt consumptionon of blood-boosting tablets in adolescentscent pregnant womann, namely 5 (38%) 5 peopleand in adulthood 8 (62%) namely 8 people. Meanwhile, consumeblood boostng tablets in adolescentscent pregnant womann are6 (67%) namesly 6 peopleand in adult pregnant womann are3 (33%) as many as 3 people.

Table2. Frewhatncy of Pregnant womann's Agein theSeeTri conditionmester Based on
theDurationon of Consumptionon of Blood-Boosting Tablets

		Consumptionon Duration			
		No	1 month	3 months	Total
Age	Youenagers(15-25)	7 (70%)	1 (17%)	3 (50%)	11(50%)
	Adults(26-45)	3 (30%)	5 (83%)	3 (50%)	11(50%)
Total		10(100%)	6(100%)	6(100%)	22(100%)

Theinstribulleton shows theresultans of theDurationon of consumptionon of blood-boosting
tablets by pregnant womann who arenot 7 (70%) 7 people, 1 month as many as 1 (17%) 1
person and 3 months as many as 3 (50%) 3 people.

Table3. Frewhatncy of Pregnant womann's Agein theSeeTri conditionmester Based on
menoodlesa

		Anenoodlesa		
		No	Yess	Total
Age	Youenagers(15-25)	7 (44%)	4 (67%)	11(50%)
	Adults(26-45)	9 (56%)	2 (33%)	11(50%)
Total		16(100%)	6(100%)	22(100%)

Theinstribulleton shows theresultan in
adolescentscent pregnant womann who
arenot menoodlesc as many as 7 (44%) 7
peopleand thosewho areyess as many as 4
.
(67%) 4 people.Whilein adult pregnant
womann who arenot menoodlesc as many as
9 (56%) 9 peopleand thosewho areyess as
many as 2 (33%) 2 people

Table4. Frewhatncy of Pregnant womann's Agein theSeeTri conditionmester Based on meat and
VegetableConsumptionon

		Meat and VegetableConsumptionon		
		No	Yess	Total
Age	Youenagers(15-25)	1 (100%)	10(48%)	11(50%)
	Adults(26-45)	0 (0%)	11(52%)	11(50%)
Total		1 (100%)	21(100%)	22(100%)

Theinstribulleton shows theresults of meat
and vegetableconsumptionon, showng
results for pregnant womann who do not
consumemeat and vegetables, 1 (100%) is 1
person and 10 (48%) are10 people.

Meanwhile, in adulthood, pregnant womann
who did not consumeit were0 (100%) and
thosewho is ind were11 (52%) 11 people.

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Table5. Frewhatncy of Pregnant womann's Agein theSeeTri conditionmester Based on Grain Consumptionon

	Consumptionon of Grains			
		No	Yess	Total
Age	Youenagers(15-25)	5 (83%)	6 (38%)	11(50%)
	Adults(16-45)	1 (17%)	10 (62%)	11(50%)
Total		6(100%)	16(100%)	22(100%)

Instribulleton shows theresultans of grain consumptionon shows againsultan in adolescentscent pregnant womann who do not consumeas many as 5 (83%) 5 peopleand yess as many as 6 (38%) 6 people.Whilein adulthood pregnant womann who do not consumeas many as 1 (17%) 1 person and yes as many as 10 (62%) 10 people.

Table6. Resultans of theHb Level study ageng thePOCT and HeMatology Analysisr methods

No	Hb levels	POCT Hb Level	Hb HA level		
		Frewhatncy	Presosee you lateron	Frewhatncy	Presosee you lateron
1	Normal	12	55%	16	73%
2	Low	10	45%	6	27%
3	Tall	0	0%	0	0%
Total		22	100%	22	100%

Table7. Depetherent T-Test Between Compareson of Hb Levels of POCT and HeMatology Analysisr Methods

Piered Samples Test

					95% ConfiwithnceInterval of theInfference				Significance	
		Mean	Std. Devihearton	Std. Error Mean	Lower	Uppr	t	df	One-Siwithdp	Two-Siwithdp
Pier 1	POCT HB Levels - HB Analyzer Levels	-.273	.456	.097	-.475	-.071	-2.806	21	.005	.011

Theresultans of theWithpetherent T Test in theyoust showed that theP-Valuewhat is itss than 0.05, which means that therewas a statesticalli significant compareson between thetwo methods inoxamithisng hemoglobyn levels between thePOCT Method and theHeyMatology Analysisr Method.

Table 8. Results of Hb Level Examination using POCT and Hematology Analyzer methods

Name	HB Results POCT	HB Results HA	Difference
A1	11.6 g/dL	11.3 g/dL	0.3
A2	11.9 g/dL	11.2 g/dL	0.7
A3	11.3 g/dL	11.5 g/dL	0.2
A4	10.9 g/dL	11.2 g/dL	0.3
A5	10.0 g/dL	9.9 g/dL	0.1
A6	9.9g/dL	10.8 g/dL	0.9
A7	11.6 g/dL	11.8 g/dL	0.2
A8	12.2 g/dL	11.5 g/dL	0.7
A9	9.0 g/dL	9.2 g/dL	0.2
A10	12.7g/dL	12.9 g/dL	0.2
A11	12.1 g/dL	12.6 g/dL	0.5
A12	13.1 g/dL	12.8 g/dL	0.3
A13	12.1g/dL	11.9 g/dL	0.2
A14	11.7g/dL	12.0 g/dL	0.3
A15	12.8g/dL	13.6 g/dL	0.8
A16	9.7g/dL	9.6 g/dL	0.1
A17	12.3g/dL	12.5 g/dL	0.2

A18	11.2g/dL	10.9 g/dL	0.3
A19	10.1g/dL	11.0 g/dL	0.9
A20	9.3g/dL	8.8 g/dL	0.5
A21	13.2g/dL	12.7 g/dL	0.5
A22	11.1g/dL	11.4 g/dL	0.3

Accordionng to theWorld Health Organisubstanceon (WHO), normal Hb levels in pregnant womann inffer accordng to thethreemester of gestatenatural age:

First trimester: 11.6 – 13.9 g/dl

Seecondition threemester: 9.7- 14.8 g/dl

Thisrd trimester: 9.5- 15.0 g/dl

Low hemoglobyn levels in pregnant womann can causebleeinng,becausehemoglobythisthe compositionnt of red blood cells that functionon to distributeoxygenn throughout thebody. And rehardng in reduced hemoglobyn wiwill causemenoodlesa. Pregnant womann somethmesoxperiencehefashionluthion, which is an increasin blood volumebut thenumberr of eerythrocytes fromcreass, causeng theblood conditionthon to becomethisnner[10].

From theresultans of other studyes, iths stated that thereithere you arelationship between theinciwithnceof menoodlesain pregnant womanthisn thethisrd trimester and theamount of Feconsumed thornng pregnancy, pregnant womann who consumeat least 90 Fetablets thornng pregnancy can reducetheinciwithnceof menoodlesa[11].. Therefore, theprovidertheon of iRon's tablets is also iimportant for femaleworkrs of productionveageto anticipatetherecreasin hemoglobyn levels[12].

Anenoodlesaiin conditionthon in which thereithere you areducton in red blood cells or a reducton in hemoglobyn, thus reDucing theDadlity to carry oxygenn to supply thenoeds of themotherr's and fetus's vital organs. In pregnancy, a sign of menoodlesaithef thehemoglobyn conceptintroon is lower than 10.50 to 11.00 g/dl[13].

Edifficulties to handleand takeacton on menoodlesa starchents in pregnant womann at theOverlapping Health Center areby first proviinng education to pregnant womann about adequatenutritionthonal itake, including iron and otheriimportant nutrientsents to increashemoglobyn levels.Furthermore, theyou aregiven blood-boosting tablets that must beconsumed for at lelast 9 months beforegnancy with a mithistarget mumt of 90 tablests. Afterr that, routenocheck-ups arescheDulewithvery

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month to monitorvelopments and responges to treATMnt[14].

For pregnant womann, consumewith meat and green vegetables can help meethRon Needs. Green vegetables that pregnant womann should consumeevery day are4 servings or more, such as 2 meinum carrots, 1 bowl of dark green vegetables, 1 bowl of broccolior cookD cauliflowerflowr[15].

Factors affectingcting theevalueon of himmathematics analysisr methods arepoor sampleHomogeneousnoity, iaccuratecalibrotheron and control, and samples with blood clots. Theadvantagess of thePOCT method arethat ithsoeasy to use, can bedoneby nurses and anyone, theamount of blood sampleuseins very small and therethe sults arefast[16].

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Theadvantagesof thehematology analysiss method is that it usesolectronicewhatpment so that therethe sults aremoreobjectctive.(Adolph 2016). Theindisadvantages arethat this tool isoxpensiveand inffcult to mayfloorn, standard reagents areinffcult to obtainn, orderring takeso longme, and it must becalibrotherd routenoly every day at leonce againa day so that thetool can functionon properrly[17].

Theresultans of thepiered Depetherent T Test of hemoglobyn levelexamination using thePOCT and HeMatology Analysisr methods haveap value(theg) of 0.01 (> 0.05) which means that thereitheregnificant compareson of himmoglobyn levelexamination between thePOCT method and theHeyMatology Analysisr. Thecompareson of himmoglobyn levels in pregnant womann againnst thePOCT and HeMatology Analysisr methods is caused when sampleng and thethmeof sampleexamination can affect theresults. While in the examination of the POCT and Hematology Analyzer methods, researchers used venous blood in EDTA tubes, and should have used capillary blood without using anticoagulants so that it could affect the time of taking capillary blood with venous blood vessels, namely when taking capillaries, massage was carried out first so that cell fluid came out mixed with blood so that the blood was thinner than in the veins[18].(Farida Anwari 2023)

Excessive use of anticoagulants such as EDTA can affect the results of hematology examinations, especially using POCT, resulting in a decrease in hematology parameter values and their proper values. This study found a significant comparison between the average hemoglobin levels of the POCT and Hematology Analyzer methods. The average hemoglobin levels of the Hematology Analyzer method were higher than those of the POCT method. The POCT method of hemoglobin level examination uses a simple tool so that the results can be known quickly, but the results

issued are not accurate, while the hematology analyzer method examination uses sophisticated tools, focuses on the accuracy, quality and time of the results so that the results issued are more accurate.

4. Conclusionounce

Based on thewithpetherent T test with SPPS, thep value(theg) was 0.01 (> 0.05), which means that thereitheregnificant compareson of theresultans of thePOCT and HeMatology Analysisr methods of Hb levels in Pregnant womanthisn theSeeTri conditionmester at theOverlapping Health Center. Thecompareson between thetwo methods that is moreaccurateis theHeyMatology Analysisr method becausetheHeyMatology Analysisr method has hiheyr results compared to thePOCT method and is signifisorry for meaningful. TheaveragePOCT method Hb level result is 1.55 g / dl and theaveragehemathematics analysisr method Hb level result is 1.82 g/ dl. In theexamination of himmoglobyn levels with thePOCT method, thehiheyst rethe sult was 13.2 g / dl and thelowest was 9.0 g/dl. With an averageof 22 starchents, thenormal POCT hemoglobynoxamination rewe are sorryre13.48 g / dl and thelow was 9.15 g / dl. In theexamination of himmoglobyn levels using theHeyMatology Analysisr method, thehiheyst rethe sult was 13.6 g/dl and thelowest was 8.8 g/dl. With an averageof 22 starchents, theit's normalmoglobyn levelexamination using theautomaticc analyzer tool was 11.77 g/dl and thelow was 9.2 g/dl.

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