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BLOOD STORAGE ANALYSIS OF HEMOGLOBIN ERYTHROCYTE AND PLATELET LEVELS IN WHOLE BLOOD COMPONENTS 0 DAYS 7 DAYS UP TO 15 DAYS AND 30 DAYS AT THE INDONESIAN RED CROSS (PMI) BLOOD DONATION UNIT (UUD) SEMARANG REGENCY

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ABSTRACT

During the storage process, blood will experience changes in blood components such as hemoglobin levels. The longer blood is stored, the more red blood cells will be destroyed because blood that is stored for too long will experience a shift in the oxygen dissociation curve to the left. The aim of this study was to determine the effect of blood storage on the levels of platelets, erythrocytes and hemoglobin in the whole blood component of blood for 0 days, 7 days, 15 days and 30 days at the blood donor unit (UUD) of the Indonesian Red Cross (PMI) Semarang Regency. The type of research used is descriptive research, where this research aims to describe or provide an overview of the effect of storing blood in whole blood components on changes in platelet, erythrocyte and hemoglobin levels in PMI Semarang Regency. The population and research samples are donors in PMI Semarang Regency.Research results Blood storage period of 0 days, 7 days, 15 days and 30 days in , Semarang district shows that there is a significant effect of storing whole blood samples on respondents' platelet levels. and There is no significant difference in sample storage whole blood on the respondents' erythrocyte and hemoglobin levels.

Keywords: Blood,Donor,Hemoglobin

Introduction

Blood transfusion services are health service efforts that utilize human blood as a basic material for humanitarian purposes and not for commercial purposes. Blood is prohibited from being traded under any pretext. Blood transfusion services as a health effort in the context of curing disease and restoring health really require the availability of blood or blood components that are sufficient, safe, easily accessible and affordable to the public. The government is responsible for implementing blood transfusion services that are safe, useful, easily accessible, and in accordance with community needs (Udi Budi Harsiwi, 2018)

UTD PMI Semarang Regency as a hospital partner provides blood bags in sufficient quantities to meet the need for medical procedures, namely safe and quality blood transfusions to support health services. In its implementation, the Hospital Blood Bank (BDRS) submits blood requests to UTD PMI Semarang Regency, which then UTD PMI Semarang Regency will fulfill the request according to the needs of the BDRS (PMI Semarang Regency, 2021).

The storage period of blood for some time will affect the form and value of the components contained in it, including hemoglobin (HB). Research found that changes in hemoglobin levels before storage ranged from 13.6-16.6 gr/dl after 7 days of storage, 15.3-21.4 gr/dl. This is because the blood experiences a shift in oxygen curvature. Too little oxygen bound by hemoglobin is given to the tissue so that lysis occurs which causes high hemoglobin levels.
(Saputro et al., 2021)

Platelets are a blood component that plays a role in the blood clotting process. Platelets will experience lysis after long-term storage. Storage at PMI on average, blood is stored for up to 30 days, after the blood has been stored for that time, lysis of the blood will occur, which is the platelet value (Saragih 2019.)

Research also shows components such as leukocytes and platelets decreases in quantity the longer the blood is stored,then the erythrocytes are found to be swollen due to loss of cell vitality erythrocytes caused by stiffness membrane and loss of membrane lipids Erythrocytic cells are unavoidable on blood storage, cell stiffness erythrocytes trap plasma And this causes levels hemoglobin increases in storage (Rahmah, 2013)

Methods

The type of research used is descriptive research, where this research aims to describe or provide an overview of the effect of storage time on changes in erythrocyte and hemoglobin platelet levels in PMI Semarang Regency. The instruments used in this research were blood bags with CPDA-1 anti-coagulant, blood bank, vacutainer tube, hematology analyzer.

Results and Discussion

Research on Whole Blood Shelf Life of 0 and 5 Days on Hemoglobin Levels in the Blood Donor Unit (UDD) of the Indonesian Red Cross (PMI) Semarang Regency which was carried out on March 23 and 27 2021 at the Regional Health Laboratory of Semarang Regency, using 10 whole blood samples from UDD PMI Semarang Regency. From this research the following results were obtained

Table 1 Characteristics of Respondents Based on Gender and Age

No	Variabel	Frekuensi	Presentasi
1	**Sex**		
	Man	4	40%
	Woman	6	60%
	Total	**10**	**100 %**
2	**Age (Year)**		
	17-25	2	20%
	26-35	4	40%
	36-45	4	40%
	Total	**10**	**100%**

Source: Primary data, 2022

Based on table (4), it shows that the majority of respondents in this study were female at 60% and aged 26-35 years and male aged between 36-45 years at 40%.

1. Results of examination of hemoglobin levels in whole breast samples stored for 0, 7, 15, 30 days.

No	Responden	0 (Day)	7 (Day)	15 (Day)	30 (Day)
1	Sample 1	12,3	11,8	11,9	11,8
2	Sample 2	9,7	9,4	9,6	9,5
3	Sample 3	13,9	13,8	13,9	14,3
4	Sample 4	9,3	9,2	8,9	8,8
5	Sample 5	11,2	11,5	10,6	10,8
6	Sample 6	12,0	12,3	11,6	11,9
7	Sample 7	10,3	10,7	9,9	10,2
8	Sample 8	12,8	12,9	12,4	12,5
9	Sample 9	13,2	13,1	13,0	12,8
10	Sample10	10,9	10,8	11,0	10,6
Average		**11,56**	**11,55**	**11,28**	**11,32**

Source: Primary data, 2022.

Table (4.2) shows the results of hemoglobin levels in respondents in the 0 day period, the average result was 11.56 mg/dl, 7 days of storage the result was 11.55 mg/dl, on the 15th day the result was 11.28 mg. /dl, and on day 30 the results were 11.32 mg/dl.h

Stored blood for several days will experience shift of the oxygen dissociation curve to left direction. Oxygen is strongly bound to hemoglobin and too little yang given to the network. Because cells many erythrocytes are lysed in the blood levels will increase hemoglobin

The research carried out showed that there is no significant difference in the shelf life of blood over several days, the changes that occur during storage process,because during the process PRC storage occurs a series biochemical, biomechanical and reaction changes immunological influences Viability and function of internal hemoglobin transports oxygen from the lungs to network, the change is known as storage lesions.(Hanifah et al., 2022)

This is different from research conducted by Nelma (2023) showing that there was a difference during the storage period in blood hemoglobin levels in the whole blood component of blood before and after being stored for one week where hemoglobin levels increased Nelma et al., 2023).

The same research shows that storage of blood bags affects hemoglobin levels in whole blood components. The longer the blood is stored, the more cells there are red blood is destroyed and the number of cells decreases viable red blood. Blood that is stored for too long will experiencing a shift in the oxygen dissociation curve towards left. Oxygen is strongly bound to hemoglobin and too little is given to the network, so Many erythrocyte cells have lysed, possibly blood stored will experience an increase in levels hemoglobin.(Rahmah, 2013)

2. Results of examination of erythrocyte levels in whole blood samples stored for 0, 7, 15, 30 days.

No	Respondent	0 (Day)	7 (Day)	15 (Day)	30 (Day)
1	Sample 1	4,35	4,23	4,29	4,21
2	Sample 2	3,92	3,83	3,92	3,81
3	Sample 3	4,75	4,73	4,80	4,94
4	Sample 4	4,05	3,93	4,22	4,15
5	Sample 5	4,14	4,60	4,11	4,07
6	Sample 6	4,23	4,39	4,26	4,21
7	Sample 7	3,86	3,98	3,76	3,78
8	Sample 8	4,48	4,56	4,53	4,44
9	Sample 9	4,49	4,56	4,61	4,20
10	Sample10	3,96	3,93	4,01	3,86
Average		**4,22**	**4,27**	**4,25**	**4,17**

Source: Primary data, 2022.

Table (4.3) shows the results of erythrocyte levels in respondents in 0 days, the average result was 4.22 million/microliter, 7 days storage.

During blood storage will experience changes blood components, especially erythrocytes will undergo a change in shape which is quite meaningful over time blood storage time. Blood effect blood storage will make many erythrocytes die immediately After blood transfusion there was a decrease in blood transfusion (Amalia & Sari, 2019).

3. Results of examination of platelet levels in whole blood samples stored for 0, 7, 15, 30 days

No	Respondent	0 (day)	7 (day)	15 (day)	30 (day)
1	Sample 1	173	113	70	82
2	Sample 2	134	57	41	30
3	Sample 3	234	112	83	80
4	Sample 4	284	193	62	43
5	Sample 5	154	82	39	86
6	Sample 6	224	121	86	75
7	Sample 7	228	298	68	91
8	Sample 8	143	114	61	62
9	Sample 9	167	94	61	52
10	Sample10	179	82	66	59
Rata-rata		**192**	**126**	**63,7**	**66**

Table (4.4) shows the results of platelet levels in respondents in 0 days, the average result was 192 thousand/microliter, 7 days of storage the result was 126 thousand/microliter, on the 15th day the result was 63.7 thousand/microliter, and on the 30th day the results were 66 thousand/microliter.

Research shows that there is a decrease in platelets during the shelf life caused by chemical processes, namely glycolysis, protein synthesis, PH and glucose levels(Level et al., 2020)

Conclusion

Blood storage period of 0 days, 7 days, 15 days and 30 days in , Semarang district shows that there is a significant effect of storing whole blood samples on respondents' platelet levels. and There is no significant difference in sample storage whole blood on the respondents' erythrocyte and hemoglobin levels.

References

1. Hanifah, A. Y., Putri, D. E., Teknologi, P., Medis, L., Binawan, U., & Cell, P. R. (2022). *PERBEDAAN KADAR HEMOGLOBIN PADA KOMPONEN PRC SIMPAN DENGAN INTERVAL PENYIMPANAN 7 HARI DI BANK DARAH RSUD BUDHI ASIH DIFFERENCES IN HEMOGLOBIN LEVELS IN SAVE PRC COMPONENTS WITH 7 DAY STORAGE INTERVAL*. *4*(June), 31–36.

2. .Level, G., Mentari, D., Pebrina, R., & Si, S. (2020). *PENGARUH WAKTU SIMPAN TERHADAP PERUBAHAN pH , KADAR GLUKOSA , LAKTAT DEHIDROGENASE (LDH), KALSIUM , MEAN PLATELET VOLUME (MVP) SEBAGAI INDIKATOR KUALITAS THROMBOCYTE CONCENTRATE*. *12*(1), 7–15. https://doi.org/10.23917/biomedika.v12i1.8981

3. Penyimpanan, P., Terhadap, D., Pada, H., Whole, K., Donor, D., Dan, S., Disimpan, S., Satu, S., Di, M., & Kota, P. M. I. (2023). *Journal of Indonesian Medical Laboratory and Science*. *4*(1), 70–77.

4. Rahmah, W. N. (2013). *PENGARUH LAMA PENYIMPANAN KANTONG DARAH TERHADAP KADAR HEMOGLOBIN PADA KOMPONEN WHOLE BLOOD DI UNIT DONOR DARAH PMI KOTA PALANGKA RAYA The Effect Storage Of Blood Bags on Hemoglobin Levels In The Unit Donor Darah PMI Palangka Raya*.

5. .Saputro, A. A., Lestari, C. R., Teknologi, J., Medik, L., Kesehatan, F. I., Kudus, M., Biomedis, J. S., & Semarang, U. I. (2021). *Jurnal Analis Laboratorium Medik HEMOGLOBIN PADA KOMPONEN WHOLE BLOOD DARAH DONOR*. *6*(2), 50–56.

6. saragih pesalmen, ida adhayanti, zulfikar lubis, herman hariman. (n.d.). *View of Pengaruh waktu simpan Packed Red Cells (PRC) terhadap perubahan kadar hemoglobin, hematokrit, dan glukosa plasma di RSUP H. Adam Malik, Medan, Indonesia.pdf*.

7. Udi Budi Harsiwi, L. D. D. A. (2018). *TINJAUAN KEGIATAN DONOR DARAH TERHADAP KESEHATAN Udi Budi Harsiwi , 2 Liss Dyah Dewi Arini APIKES Citra Medika Surakarta*. *8*(1).