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Thalassemia Screening in Reproductive-Age Groups at Unjani Campus

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Thalassemia screening is a crucial step in preventing the birth of infants with thalassemia major. Thalassemia major is a disorder that requires lifelong blood transfusions. Long-term transfusion therapy leads to iron accumulation in various organs, such as the heart, liver, and endocrine glands. Individuals with thalassemia major are born to parents who are both carriers of the thalassemia trait. Carriers do not exhibit any clinical symptoms; therefore, carrier status can usually only be identified through laboratory examinations. This community service activity aimed to increase awareness of early thalassemia detection through laboratory screening among unmarried individuals of reproductive age within the Unjani campus community. The approach employed was a community partnership involving students, lecturers, and administrative staff at Unjani. The examinations included complete blood count analysis and hemoglobin analysis. The activity was conducted from September to October 2025 at the Clinical Pathology Laboratory of the Faculty of Medicine, Unjani. A total of 246 participants were involved, of whom 7 were identified as thalassemia carriers, 1 was diagnosed with thalassemia major, and 2 were found to have Hb E thalassemia. Participants who were identified with thalassemia received special counseling regarding thalassemia screening among close family members and future spouses prior to marriage. Early detection of thalassemia is highly beneficial not only for current health awareness but also for preventing the transmission of genetic disorders to future generations.
Keyword: carrier thalassemia, early detection, thalassemia

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1. Introduction

Thalassemia is a genetic disorder caused by impaired production of globin chains, resulting in abnormal hemoglobin structure and disrupted function. This genetic condition is inherited in both males and females. Thalassemia is classified into two forms: thalassemia major and thalassemia minor. In thalassemia minor, also known as thalassemia carrier, no significant clinical symptoms are observed, and affected individuals can carry out normal daily activities. In contrast, thalassemia major is characterized by severe anemia that requires lifelong regular blood transfusions.[1], [2]

The need for long-term transfusions in thalassemia patients can impose various burdens, including economic, social, and psychological challenges. The side effects of repeated transfusions in individuals with thalassemia major may include iron accumulation in multiple organs, leading to damage, a condition known as hemosiderosis.[3][1]

Thalassemia major occurs when both parents are thalassemia carriers. Marriages between carriers usually take place due to the couple's lack of awareness about their genetic condition. Therefore, conducting thalassemia screening is a crucial measure to prevent the birth of infants with thalassemia.[4]

The birth rate of thalassemia major infants remains very high, reaching 2,500 per year, with the highest prevalence found in West Java. Efforts to reduce this include conducting thalassemia carrier screening among individuals of reproductive age, thereby preventing marriages between carriers. [5], [6]

2. Methods

This community service employed a lecture-based approach accompanied by laboratory examinations. After the laboratory results were obtained, a consultation session was conducted regarding their interpretation. A total of 246 participants were involved, and the program took place from September to October 2025.

The activity began with socialization and participant registration, followed by the provision of general information about thalassemia. In the next stage, participants completed questionnaires on identity, thalassemia knowledge, and family history of thalassemia. Subsequently, participants were given a schedule and signed informed consent forms for venous blood collection.

Venous blood collection was carried out at the Clinical Pathology Laboratory of the Faculty of Medicine, Universitas Jenderal Achmad Yani. The blood samples were used for hematological examination using a hematology analyzer. The parameters assessed included hemoglobin, leukocyte count, platelet count, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration (MCHC). The cut-off values applied in this screening were MCV and MCH, where participants with MCV less than 80 fL and MCH less than 27 pg were indicated as thalassemia carriers.[7] For participants indicated as thalassemia carriers, further examination through hemoglobin analysis was conducted.

3. Result and Discussion

The entire series of thalassemia screening activities proceeded smoothly, and the participants were highly enthusiastic about the program. A total of 246 participants took part, representing several faculties, namely Medicine, Dentistry, Pharmacy, Social and Political Sciences, Health Science and Technology, as well as the Rectorate Office. The characteristics of the participants are presented in Table 1.

Table 1. Characteristics of the participants

Characteristic	(n)	Percentage (%)
Sex		
Male	39	16
Female	207	84
Total	246	100
Occupation		
Lecturer	2	0.8
Non-academic staff	4	1.6
Students	240	97.6
Total	**246**	**100**
Faculties		
Medicine	236	96
Dentistry	2	0.8
Pharmacy	3	1.2
Health Science and Tech	2	0.8
Social and Political Science	1	0.4
Rectorate	2	0.8
Total	**246**	**100**
History of thalassemia in family		
None	94	38.2

Unknown	150	61
Yes	2	0.8

The participant characteristics of the thalassemia screening were predominantly female and mostly students. This is likely because largely of the unmarried reproductive-age population consists of students rather than lecturers or administrative staff. In addition, most participants came from the Faculty of Medicine, which itself is largely dominated by female students.

Medical students constituted the largest group of participants in this activity, which may be attributed to their better understanding of thalassemia compared to students from other faculties. However, this finding warrants attention, as it reflects the lack of uniform awareness regarding the importance of thalassemia screening. In addition, this condition may also be due to limited dissemination of information about the program to other faculties, resulting in the activity not reaching its intended targets.

Knowledge of family history of thalassemia was also a focus of attention in this activity, and it was found that 61% of participants were unaware of such history. This indicates that the majority of participants and their families had never undergone thalassemia screening.[8]

Based on the complete hematological examination of 246 individuals, 20 participants showed suspected thalassemia results. Following hemoglobin analysis, 10 of them were confirmed to have thalassemia. Results of the thalassemia screening are presented in Table 2

Table 2. Result of thalassemia screening

Kriteria	n	%
Normal	236	96
Thalassemia Carrier	7	2.8
HbE thalassemia	2	0.8
Thalassemia Major	1	0.4
Total	246	100

The screening results of 246 individuals revealed that 10 participants (4%) were diagnosed with thalassemia, consisting of 7 thalassemia carriers, 2 HbE thalassemia cases, and 1 thalassemia major case. This information is crucial for participants in preparing for future marriage, as it helps them avoid choosing a partner who is also a thalassemia carrier.[9] All participants who were confirmed as thalassemia carriers through hemoglobin analysis were surprised and did not expect to be carriers, as they had never experienced any symptoms. Similar findings have also been reported elsewhere, where the majority of the population has never undergone screening and is unaware of being thalassemia carriers.[8] Therefore, this community service activity proved to be highly beneficial for the participants as well as for the wider Indonesian community. An example of the hemoglobin analysis result is presented in
Figure 1.

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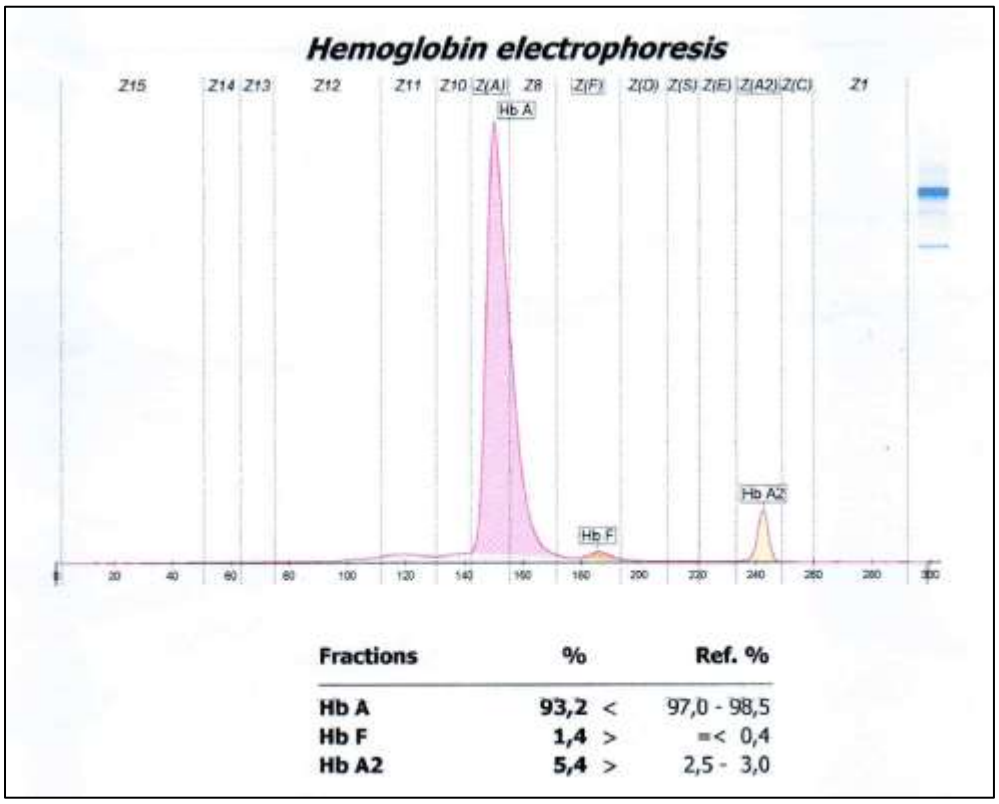

Figure 1. Example of Hemoglobin Analysis of participant

Table 3. Mean hematological parameters and hemoglobin analysis of participants

Parameter	Mean
Hb	10,8 mg/dl
Mean corpuscular volume (MCV)	64,26 fl
Hb Electrophoresis	
HbA	90,21 %
HbA2	4,42 %

The hematological examination and hemoglobin analysis revealed that participants had a mean hemoglobin level of 10.8 mg/dL and a mean corpuscular volume (MCV) of 64.26 fL These values are commonly observed in thalassemia carriers. Hemoglobin analysis or electrophoresis further showed a decreased HbA level (90.21%), which was lower than that of individuals without thalassemia, while HbA2 was elevated (4.42%), higher than in non-thalassemia individuals. Such findings are attributable to abnormalities in the globin chain, and therefore it is not surprising that thalassemia carriers present with reduced Hb, MCV, and HbA, accompanied by increased HbA2.[10]

4. Conclusion

The thalassemia screening activity conducted within the campus of Universitas Jenderal Achmad Yani was highly beneficial. This activity demonstrated the university's commitment to supporting the government program aimed at reducing the incidence of thalassemia major. For the participants, it also provided additional knowledge regarding the importance of thalassemia screening in preventing the birth of babies with thalassemia major. It is expected that such activities can be carried out routinely and with broader coverage to benefit the entire Indonesian community

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