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Seroprevalence of HIV Among Multi-transfused Thalassaemia Children in a Tertiary Care Centre, Rawalakot, AJK

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Author`s Contribution

[1,2]Substantial contributions to the conception or design of the work; or the acquisition, [3,4]Active participation in active methodology, [1,2]analysis, or interpretation of data for the work, [2]Drafting the work or revising it critically for important intellectual content

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ABSTRACT

Objective: Children with β-thalassemia major who receive multiple transfusions are consistently at high risk for transfusion-transmitted infection. The study objective was to assess the anti-HIV-1/2 seroprevalence among multi transfusion thalassemic children in a tertiary care centre.

Methodology: This cross-section analysis study was conducted in Pediatrics department, Thalassemia Centre, and Hematology departments of Combined Military Hospital (CMH), Rawalakot, AJK from March 2022 to March 2024. In accordance with the guidelines of the National AIDS Control Programme Pakistan, a total of 125 blood transfusion-dependent β-thalassemia major children, aged 1-15 years and of both genders, were analyzed. Blood was collected from children under aseptic conditions, and serum was separated into Eppendorf tubes and stored at -20°C. Children underwent screening for HIV using a rapid HIV-1/2 antibody test.

Results: The mean age of children was 10.8±5.7 years. Among 125 children, 75 (60%) were male. The age distribution was as follows: 25 children were in age of 1-5 years, 40 children were in age of 6-10 years, and 60 children were in age of 11-15 years. Consanguineous marriages among parents were reported in 100 (80%) children. Among 125 multi-transfused β-thalassemia major children, the anti-HIV-1/2 seroprevalence was 2 (1.6%). HIV seroprevalence was HIV seroprevalence was 2 cases only in the 6-10 years age group.

Conclusion: The study found a low HIV seroprevalence among multi transfusion thalassemic children. The identification of HIV in positive cases highlights the need for improved measures to address the spread of HIV in the region.

Keywords: Blood transfusion, Beta-Thalassaemia, HIV, Seroprevalence

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Introduction

Thalassaemia is the most common single-gene disorder worldwide, affecting the synthesis of haemoglobin chains.[1] It encompasses a group of haemolytic disorders in which almost 1.5% of global population is identified as carriers of β-thalassaemia.[2] Additionally, the number of newborns with thalassaemia ranges from 50,000 to 60,000.[3] It is most prevalent in the Southeast Asia, Mediterranean region, Middle East, and Africa.[4]

In Pakistan, thalassaemia has the highest prevalence among genetic disorders. The carrier form of thalassaemia, also known as thalassaemia minor, affects approximately 5%-7% of the population (8-10 million people). The severe form, thalassaemia major, impacts around 100,000 patients in the country.[5] Unfortunately, this number increases by 5,000 to 9,000 each year.[6]

Managing thalassaemia major primarily involves providing safe, adequate blood transfusions and administering timely iron-chelation therapy. Meeting the treatment needs of children with thalassaemia surpasses the resources provided by the government.[7] As a result, blood transfusion services for thalassaemia patients in Pakistan are fragmented, largely due to the proliferation

of various blood centers. A report estimates that over 600 blood centers are operational in the country, with private organizations being the predominant operators while in the state of AJK, approximately 63 blood banks are functional with only 10 in the public sector.[8] As a result, most thalassaemia patients rely on NGOs, which often have limited resources and inadequate facilities. This presents a significant challenge to the lives of thalassaemia patients, leading to a higher risk of transfusion-transmitted infections (TTIs).

The most critical and potentially fatal TTIs are syphilis, HIV, Hepatitis B, and C.[9] The extent of TTIs is influenced by the prevalence of diseases or infections within the community of blood donors.[10] This study was conducted to assess the anti-HIV-1/2 seroprevalence among multi transfusion thalassaemic children in a tertiary care centre.

Methodology

This cross-section analysis study was conducted in Pediatrics department, Thalassaemia Centre, and Hematology departments of Combined Military Hospital (CMH), Rawalakot, AJK. Samples were collected from 125 β-thalassaemia major children, aged 1-15 years and of both genders, over a two-year period from March 2022 to March 2024. Approval was obtained from the Institution's Ethics Committee. Written informed consent was obtained from the parents or guardians of all participating children during the enrollment process.

All children were getting regular monthly transfusion to maintain haemoglobin levels between 9 and 10 g/dl. Children with other concurrent haemoglobinopathies were excluded from study.

During the enrollment process, details such as gender and age were recorded. In accordance with the guidelines of the National AIDS Control Programme Pakistan, samples were taken for the detection of anti-HIV-1/2 antibodies. Blood was collected from children under aseptic conditions, and serum was separated into Eppendorf tubes and stored at -20°C.

HIV screening was conducted using anti-HIV-1/2 rapid test kits (Healgen Scientific Ltd., USA; Lot No. 2208008). Samples that tested reactively with the initial test were further confirmed using two additional HIV test kits. A sample was considered negative for HIV if the initial test was non-reactive. A self-structured form was created to record all study data.

SPSS v 25 was used for data analysis. Descriptive data was presented as frequencies and percentage. Numerical data was displayed as mean and SD. The Fisher's exact test was used to compare study variables between children with HIV and those without. A significant p-value was set at < 0.05.

Results

The study included 125 blood transfusion-dependent children with β-thalassaemia major to analyze HIV seroprevalence. The mean age of children was 10.8±5.7 years. Among 125 children, 75 (60%) were male. The age distribution was as follows: 25 children were in age of 1-5 years, 40 children were in age of 6-10 years, and 60 children were in age of 11-15 years. Consanguineous marriages among parents were reported in 100 (80%) children. Table 1 displays the characteristics of all children.

Among 125 multi-transfused β-thalassaemia major children, the anti-HIV-1/2 seroprevalence was 2 (1.6%). HIV seroprevalence was 2 cases only in the 6-10 years age group. Table 2 presents a comparison of the characteristics of children based on the presence of HIV infection. Gender, residential area, consanguineous marriages of parents, and children's ages did not show a significant association with HIV transmission ($p > 0.05$).

Table 1: Children characteristics, n=125

Variables		Frequency	Percentage
Gender	Male	75	60.0
	Female	50	40.0
Ages (year)	1-5	25	20.0
	6-10	40	32.0
	11-15	60	48.0
Residential area	Urban	37	29.6
	Rural	88	70.4
Consanguineous marriages	Yes	100	80.0
	No	25	20.0

Table 2: Compare the characteristics of children based on the presence of HIV, n=125

Characteristics		HIV transmission		p-value
		Yes	No	
Gender	Male	2	73	.358
	Female	0	50	
Ages (year)	1-5	0	25	.115
	6-10	2	38	
	11-15	0	60	
Residential area	Urban	0	37	.494
	Rural	2	86	
Consanguineous marriages	Yes	2	98	.639
	No	0	25	

Discussion

Patients with β-thalassaemia are considered at risk for HIV transmission due to their need for regular transfusions. However, few studies from Pakistan have accurately assessed the extent of this transmission burden in these patients. In this study, it was noted that 1.6% of children with β-thalassaemia were HIV positive. The prevalence of HIV in this study is similar to findings of Al-Moshary et al, which reported prevalence of HIV 1.4%.[11] Ahmed Kiani et al reported prevalence of HIV 0.5% in β-thalassaemia patients, which is lower than the prevalence observed in this study.[12] Other studies have reported HIV prevalence among β-thalassaemia patients to range from 0.7% to 17%, indicating significant inconsistency due to differences in patient outcomes and the overall prevalence of HIV in general population.[13,14] The World Health Organization (WHO) indicated that 13 countries are unable to test all blood donations for at least one of four major TTIs (syphilis, HIV, HCV, HBV), and 35 countries lacked the necessary TTIs testing kits at the local or national level during the reported period.[15] The comparatively high prevalence of HIV in this study compared to the Al-Moshary and Ahmed Kiani studies may indicate improved testing of blood and blood products for infections in this region.[11,12] However, much work is still needed to reduce the higher prevalence of HIV among β-thalassaemia patients receiving regular transfusion. Developed nations have implemented nucleic acid testing (NAT), a highly sensitive method to reduce the window period for detecting infections.[16] However, this approach is unavailable in majority of the centres in Pakistan due to financial constraints.

Since blood transfusion is a critical intervention for managing β-thalassaemia patients, there is necessary to enhance the quality control of blood testing procedures to ensure the safety of blood products. Most thalassaemia children in this area come from rural regions and receive regular transfusions in peripheral regions through NGOs or private settings. The substandard blood screening procedures used in these settings are a major reason for the prevalence of HIV among these children. Authorities and stakeholders should implement measures to guarantee accurate screening and safety of blood samples to reduce the overall prevalence of HIV.

Conclusion

The study found a low HIV seroprevalence among multi transfusion thalassaemic children. The identification of HIV in positive cases highlights the need for improved measures to address the spread of HIV in the region.

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