

# Evaluating Thalassemia Awareness in Academic Environments: A Comparative Study among Medical and Non-medical Students

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## Abstract

Thalassemia is a very common hemoglobinopathy that is present worldwide. When one of alpha and beta chains is not present in hemoglobin or is present in lesser amounts it causes thalassemia. 9 million population of Pakistan are carriers of thalassemia. 5% of the world's cases of thalassemia are from Pakistan. This study is designed to check thalassemia awareness among medical and non-medical students. This was a cross-sectional study. 112 students were taken to answer the questionnaire through a non-random sampling technique. Out of the total participants, 57% were female respondents and 43% were male. Similarly, medical students were 58% and non-medical students were 42%. Of these, 81% medical and 57.1% of non-medical students knew that thalassemia is a genetic disorder. 64.5% of medical and 47.8% of non-medical students thought that there was a cure for thalassemia. Medical and non-medical students of 92% and 63.6% respectively, knew that thalassemia is treated with red blood cell exchange. 54.8% medical and 25% non-medical students knew that thalassemia is not contagious. It is concluded that medical students have more awareness of thalassemia than non-medical students. Medical students have more knowledge about the treatment and contagiousness of this disorder.

**Keywords:** thalassemia, Medical students, hemoglobinopathy, blood disorder, Pakistan

Full length article \*Corresponding Author, e-mail: [fareehabashir91@gmail.com](mailto:fareehabashir91@gmail.com) Doi # <https://doi.org/10.62877/13-IJCBS-24-26-20-13>

## 1. Introduction

Thalassemia is a common Haemoglobinopathy that is present worldwide. The origin of this term thalassemia is Greek, thalassa means sea and haima means blood. Hemoglobin is a protein that carries oxygen and is present in red blood cells. Alpha and beta globulin chains are important parts of hemoglobin. When one of these two chains is not present in hemoglobin or is present but in a lesser amount it causes thalassemia which is an inherited disorder [1]. Thalassemia is an autosomal recessive condition; there are two types of thalassemia i.e. alpha thalassemia and beta thalassemia. If there is a mutation or reduction in alpha globulin chain, then the resulting disorder will be alpha thalassemia and in beta thalassemia, mutation or reduction in beta globulin chain of hemoglobin will occur [2]. Alpha thalassemia is most common in Africa, South East Africa, India while beta thalassemia is more common in areas like Mediterranean, Middle East, Southern China, and South Asia [3]. Thalassemia affects 5% of the whole population in the world but not everyone shows symptoms, 1.7% of population is symptomatic. There are about 250 million

carriers of thalassemia in the world. 200,000 to 400,000 babies are born in a year with serious thalassemia disorder. Pakistan has approximately 100,000 cases of thalassemia. This means 5% of total cases of thalassemia in the world are from Pakistan [4].

The classification of alpha thalassemia is: alpha 0 occurs when no normal alpha globin is produced by alpha gene. Alpha + occur when there is reduction in alpha globin. Each haploid genome contains two alpha globulin genes. When one gene is deleted but three genes are present there are no significant abnormalities, and this is a silent carrier state. When two genes are deleted, there is a mild hypochromic anemia. Deletion of three genes results in hypochromic and microcytic anemia. Hydrops fetalis occurs by the deletion of four genes (intrauterine death) [5]. Beta thalassemia also has two types which are major and minor thalassemia. If there is a mutation in autosomal chromosome 11 then beta thalassemia occurs. Mutations in both copies of chromosome 11, result in major thalassemia, and mutation in one copy of this chromosome results in minor thalassemia [6]. The underlying cause of beta-thalassemia is complex in nature. First, as there

are fewer beta chains available for the generation of hemoglobin A, there is a decrease in hemoglobin synthesis leading to anemia and an increase in HbF and HbA<sub>2</sub> [7]. Significant intramedullary hemolysis is caused by insoluble alpha chain inclusions which are formed by relative excess alpha chains. Severe anemia, erythroid hyperplasia, bone marrow enlargement, and extramedullary hematopoiesis are the results of this inefficient erythropoiesis.

Hepcidin production is inhibited by biochemical signals from marrow growth that involve bone morphogenetic protein (BMP) pathway, leading to iron hyperabsorption. Hepatic dysfunction and thrombocytopenia are further consequences of hepatosplenomegaly resulting from extramedullary hematopoiesis and continuous hemolysis [8]. Symptoms of this disorder are hemochromatosis, dyspnea, hemolytic anemia, serious tissue hypoxia, deformities of bone, dark urine, delayed puberty, jaundice, growth problems, cardiomegaly, hepatomegaly, splenomegaly etc. Thalassemia can be treated or managed with blood transfusions, bone marrow transplants and prenatal diagnosis. Carriers are identified by blood analysis and electrophoresis [9]. This disease can be prevented by screening, awareness among public, and genetic counseling. In Pakistan, due to lack of knowledge, lack of awareness, social, psychological and cultural factors, people are at more risk of getting the disease. Due to this country's religious and cultural beliefs, cousin marriages are common. Individuals with similar genetic makeup more likely to have offspring with who have thalassemia [10].

## 2. Methodology

This cross-sectional study was carried out from September 2023 to November 2023 in the University of Lahore. Non-random sampling was chosen. The questionnaire was prepared to check the awareness of thalassemia among medical and non-medical students. It was distributed to 114 medical and non-medical students and was designed in the form of an online survey. The questionnaire consists of some questions about screening and awareness of thalassemia. People who responded were asked for general information such as name, age, sex, education and types, cure, and treatment of thalassemia. It was important to check, how much students knew about the disorder.

## 3. Results and discussion

### 3.1. Results

A total 114 students solved questionnaire. 57% (65) of which were female respondents and 43% (49) were male respondents. The major age group was 21 to 25 years, out of 114 students 64(56%) were of this age group. 58% (67) students were of medical group while non-medical students were 42% (47) as shown in table No.1. 81% medical students and 57.1% of non-medical students knew that thalassemia is a genetic disorder as shown in (figure No.1 & 2). Out of 114 students, 64.5% medical students and 48% of non-medical students thought that there is a cure for thalassemia as shown in (figure No.3 & 4) as well as (Table No.2). 76.9% medical students and only 12% non-medical students knew about the types of thalassemia. 92% of medical students and 63.6% non-medical students observed that thalassemia is treated with red blood cell exchange. Similarly, 76.5% and 41% of medical and non-

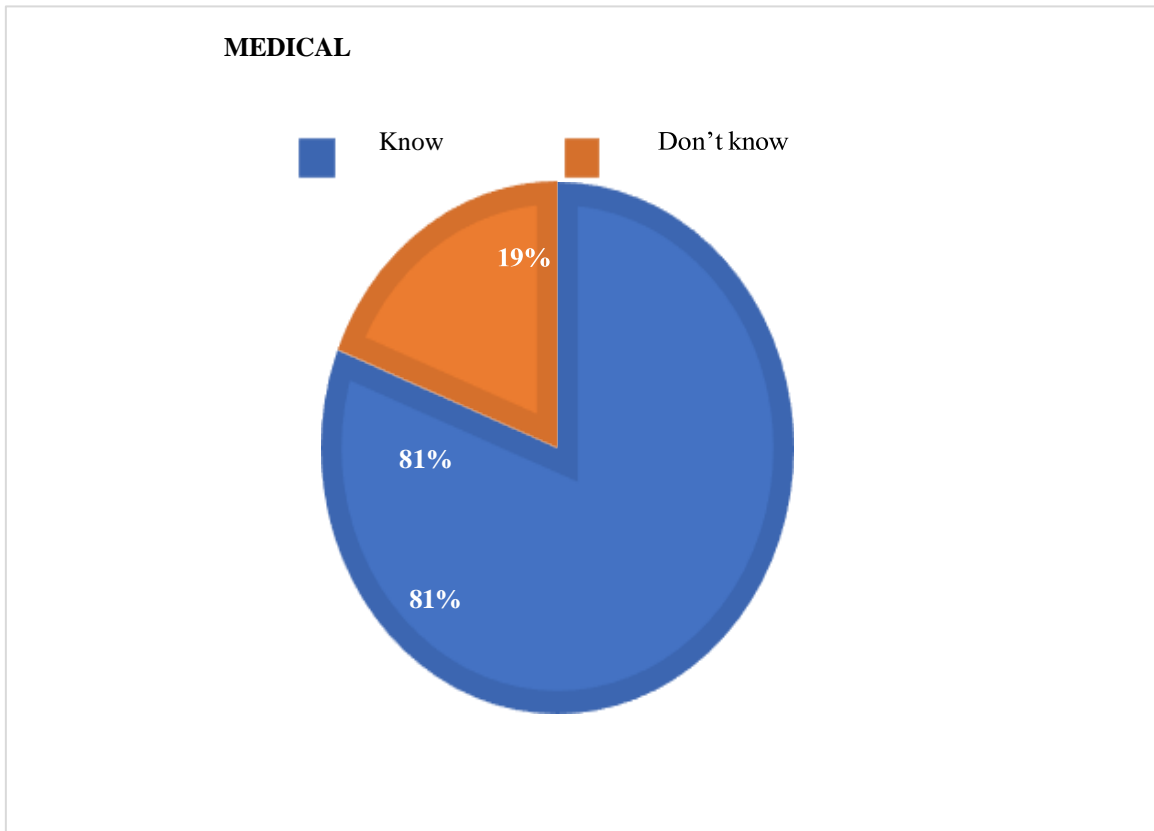
medical students respectively, said it to be true that frequent blood transfusion causes iron overload in blood. Out of whole students' strength, 54.8% of medical and 25% of non-medical students knew that thalassemia is not contagious as all shown in (figure No.5,6,7 & 8) as well as (Table No.2). 43% medical students and 29.5% of non-medical students said it to be true that minor thalassemia may not need treatment as shown in (figure No.9 & 10 and Table No.2). There was a noticeable difference between responses of both groups regarding awareness and knowledge about thalassemia.

### 3.2. Discussion

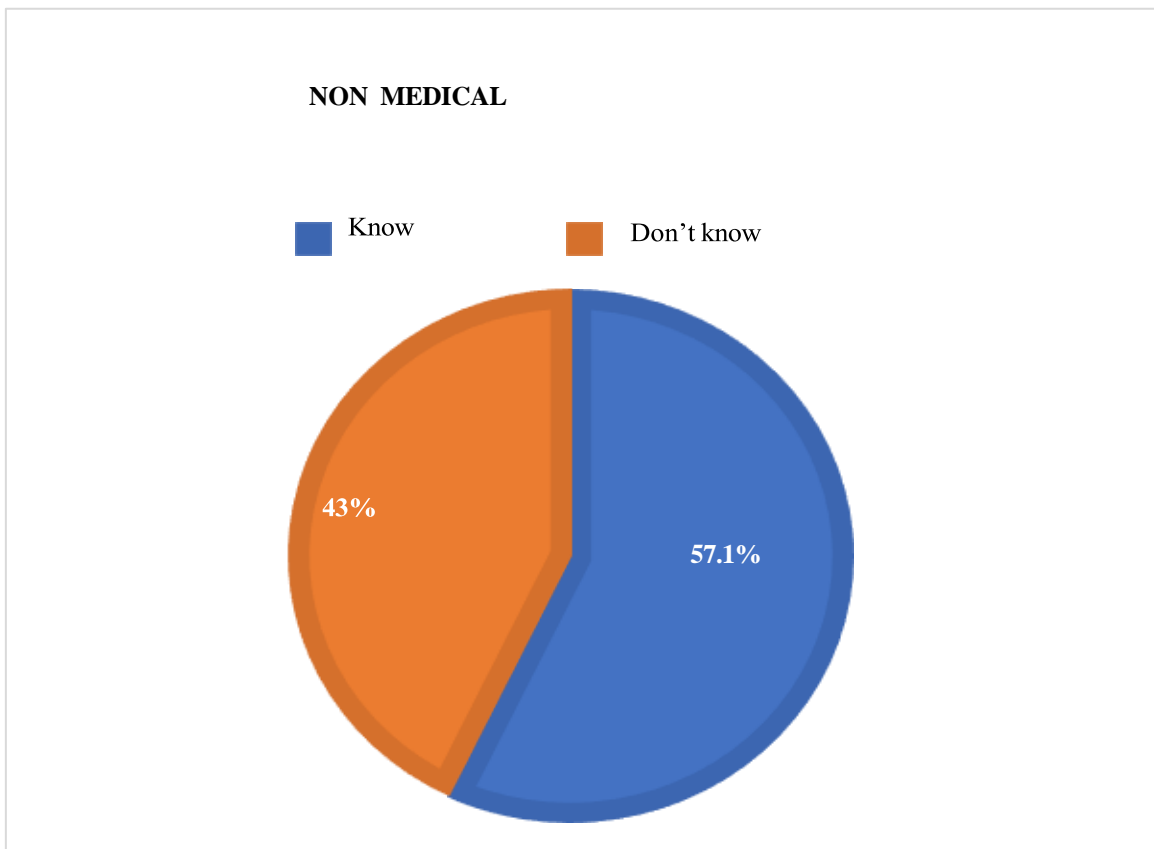
The current study is designed to check the awareness of thalassemia among medical and non-medical students. In Pakistan, people are at more risk of getting disease. In 2022, Rishmitha and her colleagues conducted a study about young women's knowledge of thalassemia and attitudes toward carrier screening [11]. Lal Muhammad et.al also published a study on Parental Knowledge of Beta-Thalassemia among educated and uneducated concerning antenatal screening [12]. In present study, sample size is 114, from which 57% of respondents were females and 43% were males. While in 2015, Murthy C.R and his colleagues conducted a study to assess knowledge, in Malaysia National Thalassemia Prevention Programme, in which the sample size was 300 students, questionnaire filled by 71.6 % female students and 28.4% male respondents [13]. Another study conducted in 2021, to determine awareness, attitude, and knowledge about thalassemia among students of different disciplines, in which 500 sample sizes taken.

In their study, a total of 434(86.8%) had some idea about thalassemia, out of which 188 students was doing MBBS and rest were of other disciplines[14]. In our study, 67 were medical students and 47 were non-medical students. 81% medical students and 57.1% of non-medical students knew about thalassemia. In 2020, M. Bilal and his coworkers were published a study on awareness of the thalassemia, which found that 5 percent of the 131 individuals in the study understood thalassemia well, compared to an average grasp of 20.6% and a bad understanding of 74%[15]. In present study, 64.5% of medical and 47.8% of non-medical students knew that thalassemia is curable. A previous study conducted by Sorowar. M et.al in Bangladesh about thalassemia, in which 24.7% thought that thalassemia is a curable disease[16]. In this research, 76.5% medical 41% of non-medical students said it is true that blood transfusion causes the iron overload in blood.

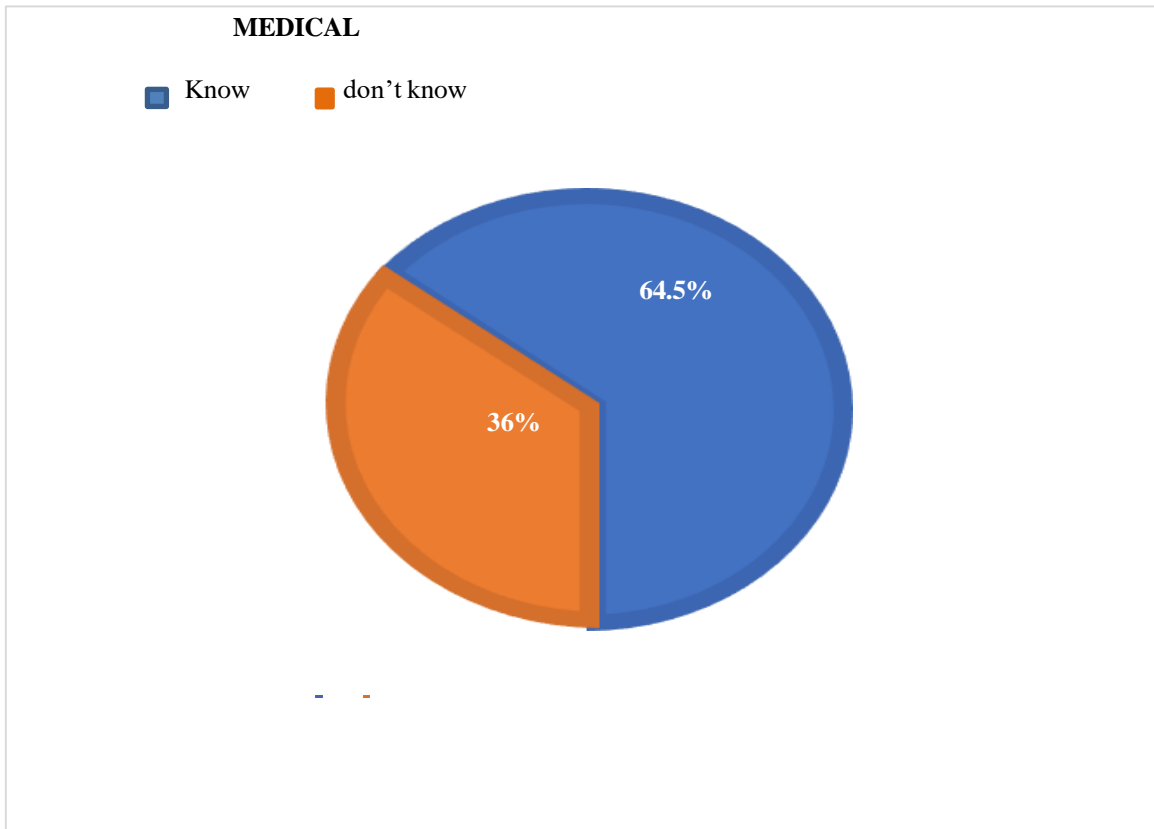
In 2017, Jagdish P and his colleagues designed a study on parental awareness of children with thalassemia, in which he demonstrated that, iron overload, all parents were familiar [17]. While according to Malaysian studies, 16 % of medical and 7.3% of non-medical students knew about it [13]. According to our current study, 54.8% and 25% medical and non-medical students respectively, knew that the thalassemia is not contagious. As in a previous study conducted in Bangladesh, over 50% of participants responded that thalassemia is a contagious disease [16]. Another study observed by Fehmina and her colleagues about Parental awareness about thalassemia in their children, out of 120 subjects, only 15% knew that it is an inherited disorder [18]. In Pakistan, non-medical students have limited knowledge about disease. There is a need to start informational campaigns about thalassemia which includes pre-marital counseling and screening of thalassemia.



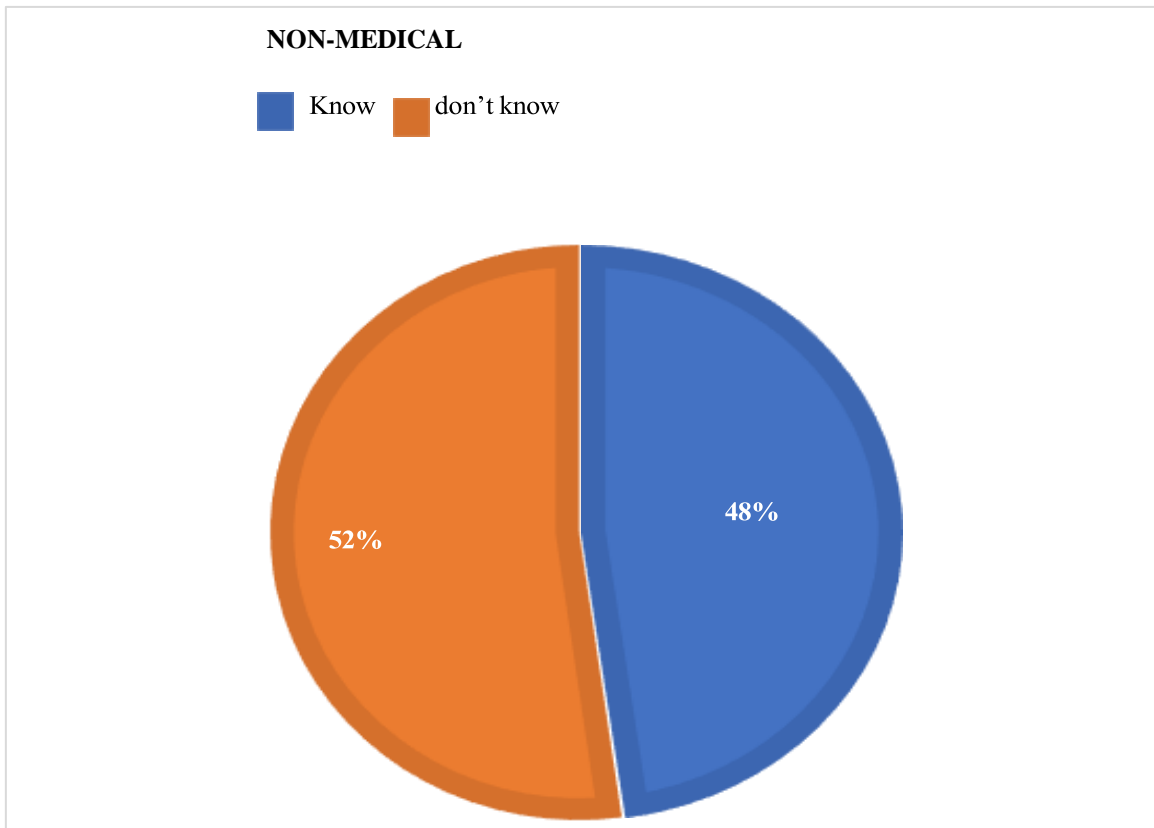
**Figure 1.** Medical students knew about thalassemia



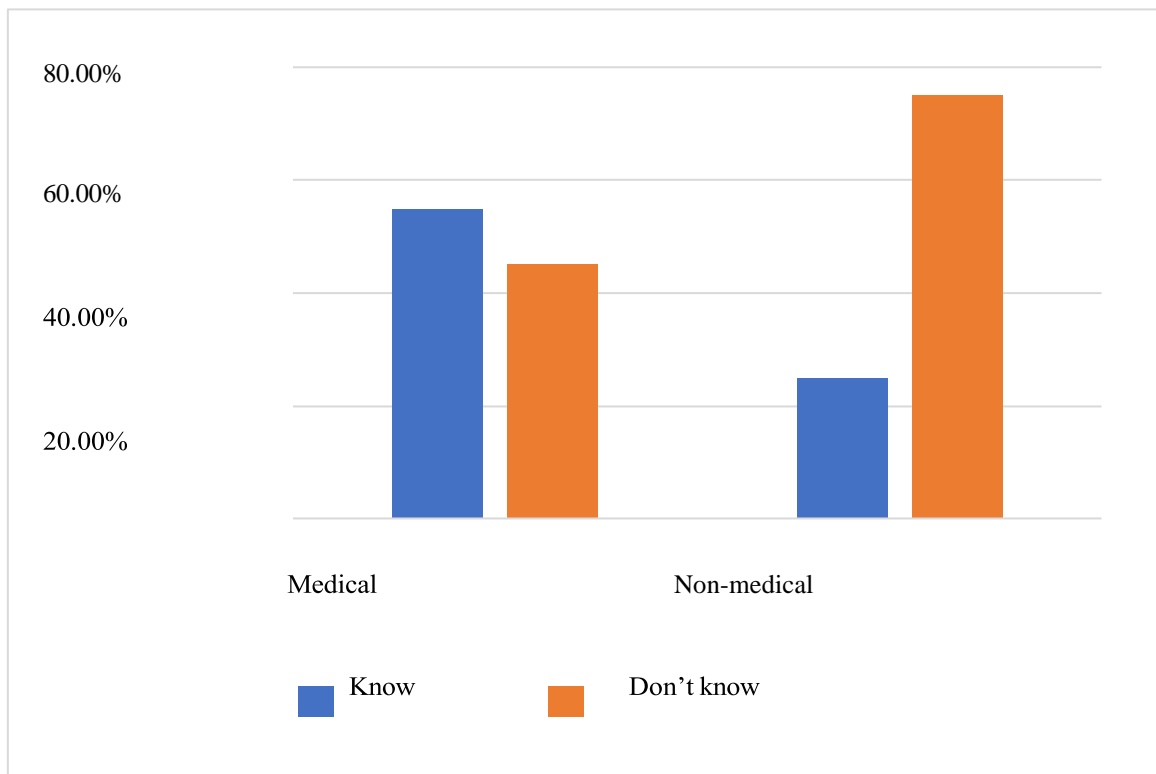
**Figure 2.** Non-medical students knew about thalassemia



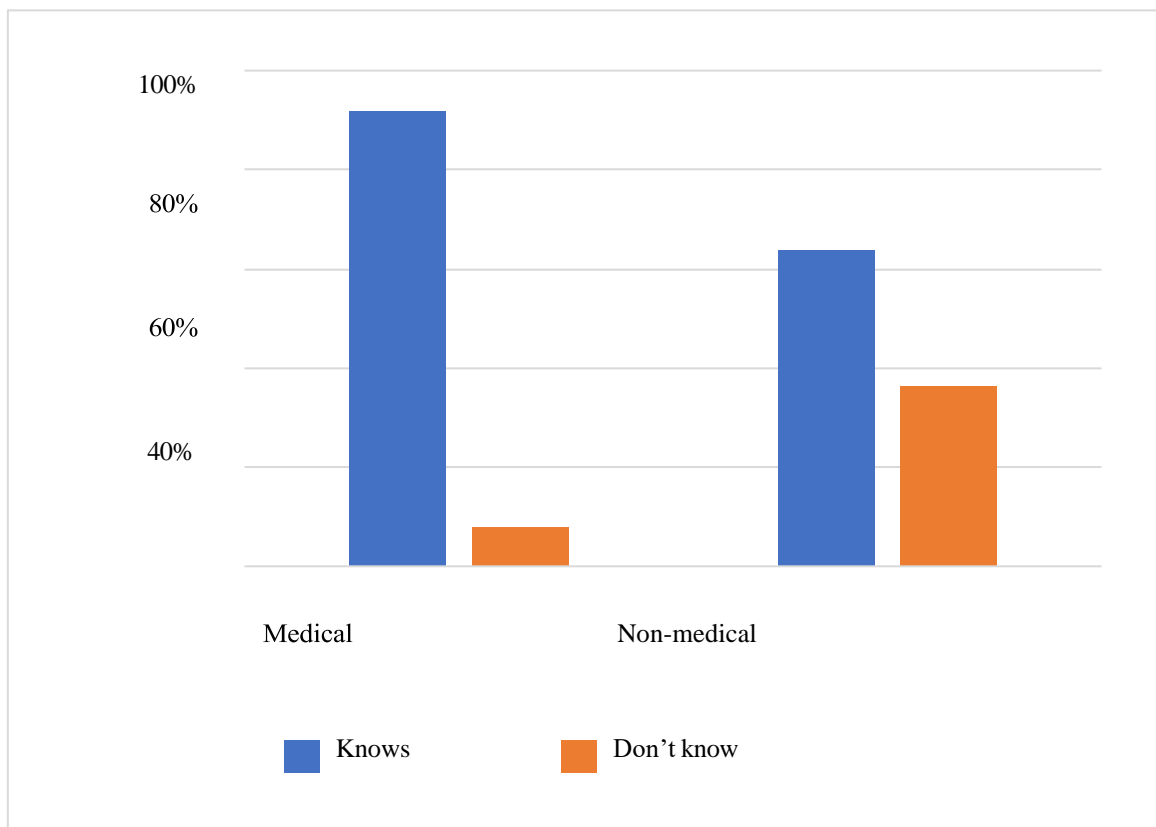
**Figure 3.** Graph shows Percentage of Medical students about cure of thalassemia



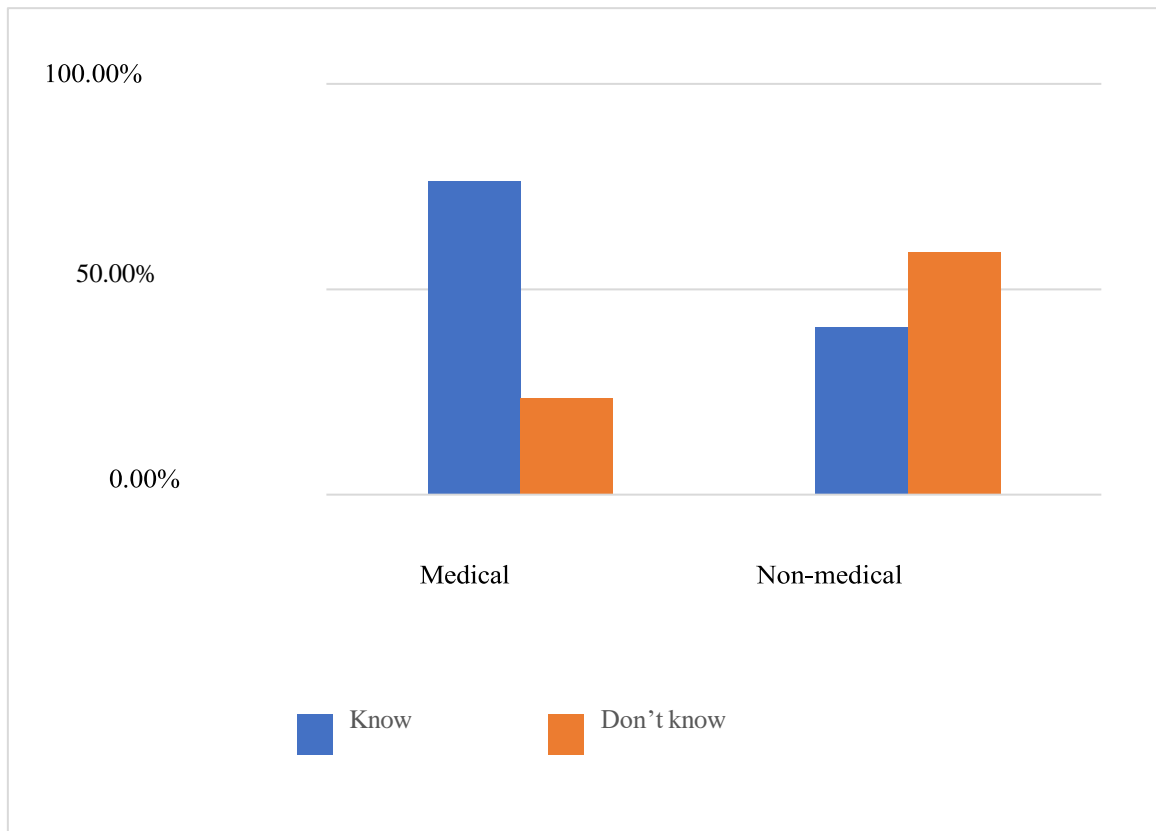
**Figure 4.** Graph shows Percentage of Non-Medical students about cure of thalassemia



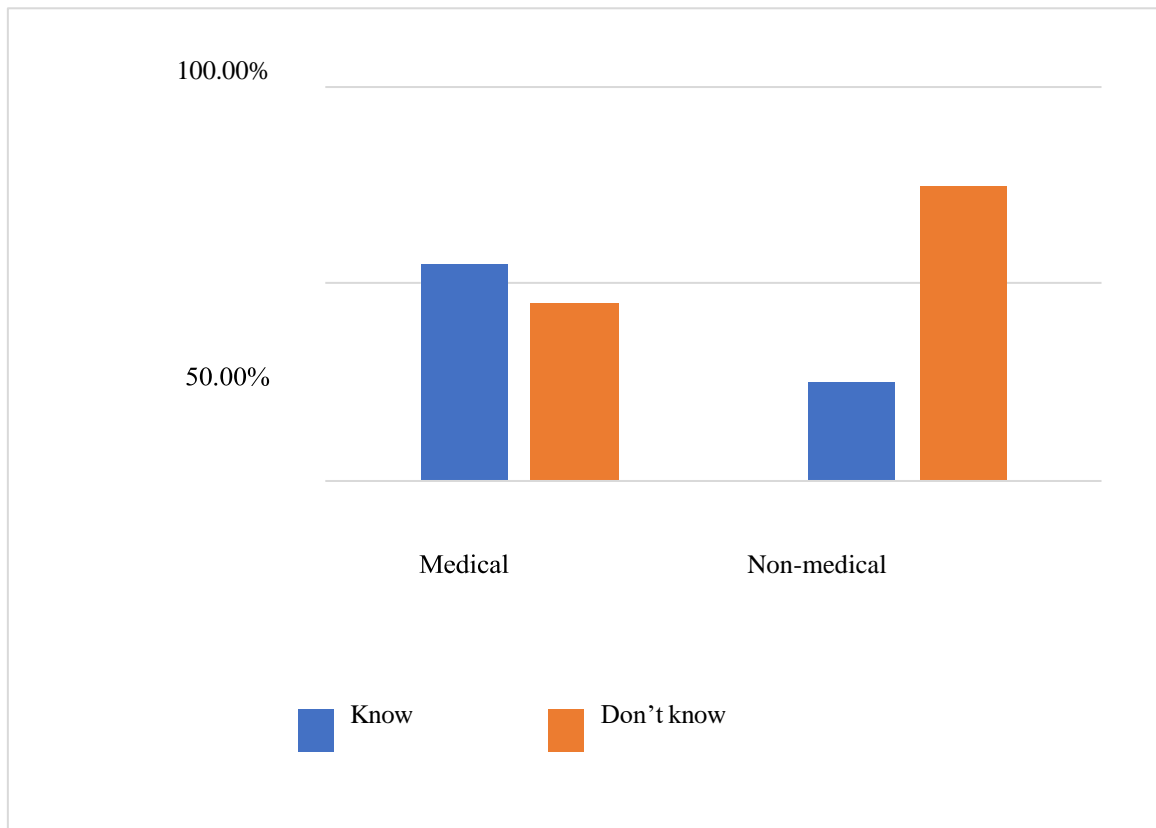
**Figure 5.** Students that know about types of thalassemia



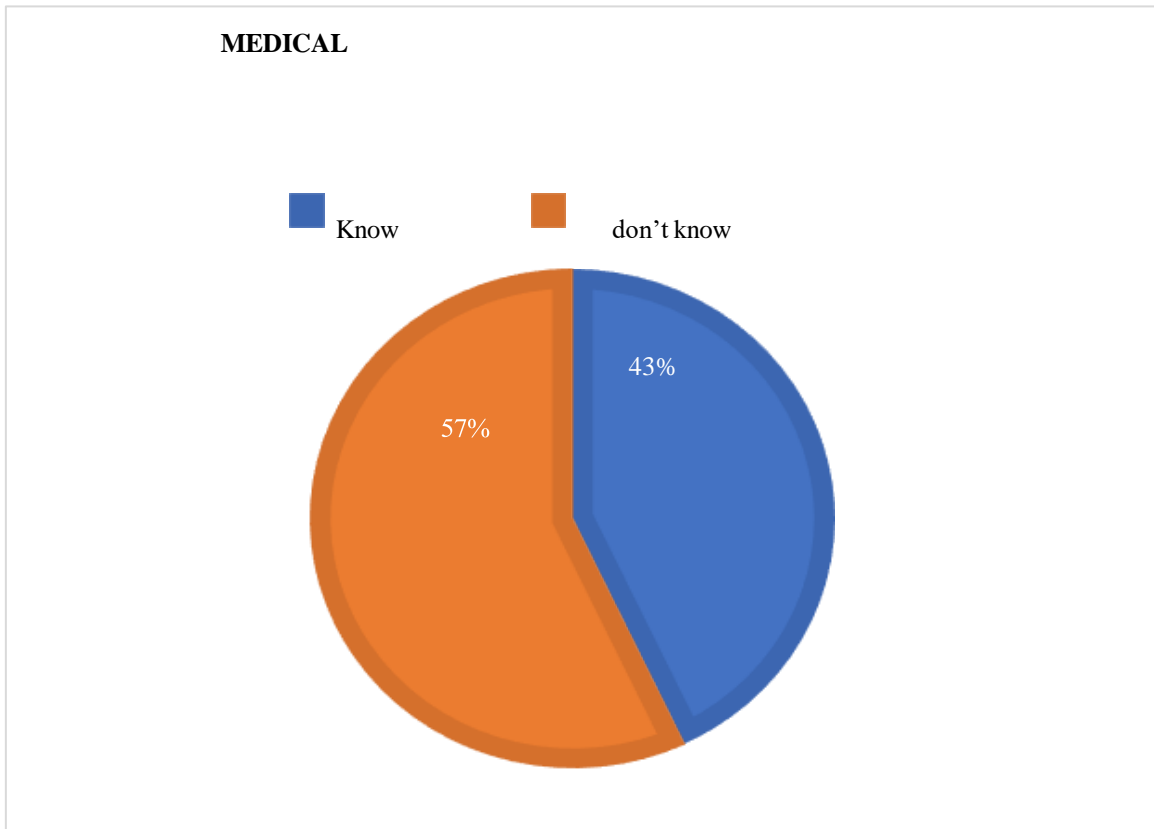
**Figure 6.** Students that know about treatment of thalassemia.



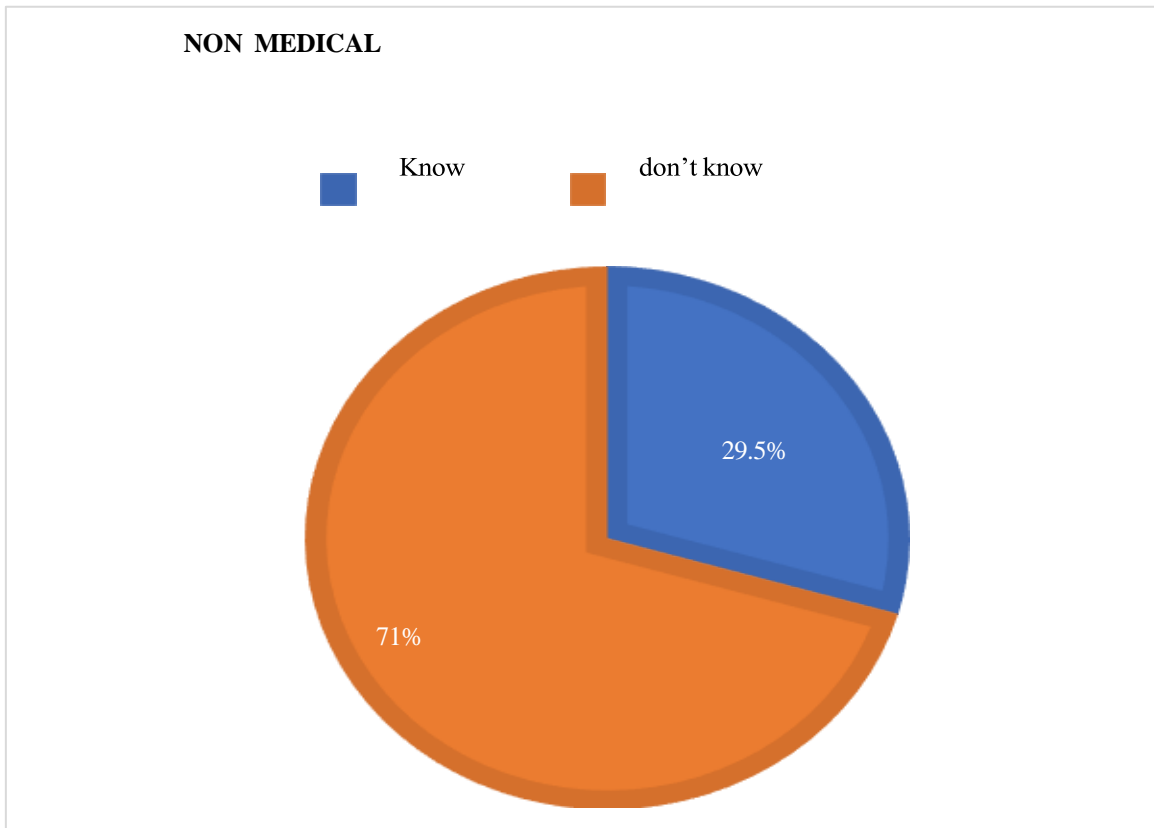
**Figure 7.** Students knew about iron overload in thalassemia



**Figure 8.** Students that knew, thalassemia is contagious



**Figure 9.** Graph showing percentage of medical students that knew about minor thalassemia



**Figure 10.** Graph showing percentage of non-medical students that knew about minor thalassemia

**Table 1.** Number of students

<b>Total number of students</b>	<b>114</b>
<b>Female</b>	57% (65)
<b>Male</b>	43% (49)
<b>Major Age group (21-25)</b>	56% (64)
<b>Medical students</b>	58% (67)
<b>Non-medical students</b>	42% (47)

**Table 2.** Student's Responses

Questions	Medical students	Non-Medical students
<b>genetic disorder</b>	81%	57.1%
<b>Cure for thalassemia</b>	64.5%	48%
<b>types of thalassemia</b>	76.9%	12%
<b>treated with red blood cell exchange</b>	92%	63.6%
<b>blood transfusion cause iron overload</b>	76.5%	41%
<b>not contagious</b>	54.8%	25%
<b>minor thalassemia may not need treatment</b>	43%	29.5%

#### 4. Conclusions

According to this study, medical students have more knowledge, awareness and understanding of thalassemia than the non- medical students. 81% medical and 57.1% of non-medical students knew about thalassemia disorder. The objective of this study is fulfilled which was to check the understanding of this genetic disease among medical and non-medical students. In Pakistan, thalassemia cases are increasing day by day. To overcome this, informational campaigns about thalassemia must be needed. Messages related to public health should be disseminated via both printed and digital media. It is important to prioritize prenatal diagnosis and screening for Thalassemia carriers. The frequency of the deadly disease will eventually decline if all of these precautions are followed.

#### Conflict of interest

The authors reported no conflict of interest and No Funding was obtained.

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