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Complications of Tuberculosis Packs and Iron Chelators in Patients with Thalassemia Major in Mostafa Khomeini Hospital in 2018-19

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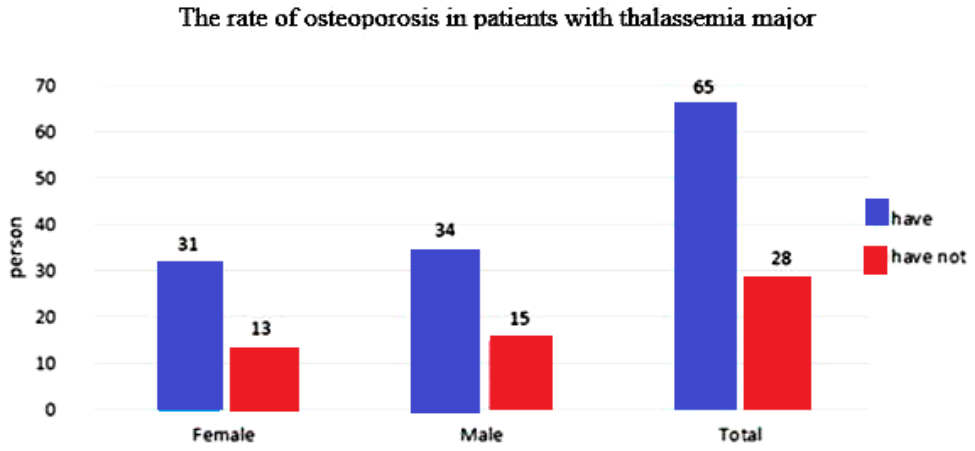
ABSTRACT

Background and Purpose: Thalassemia major (TM) is an inherited hemolytic disease with a high prevalence. Nowadays, no complications have been studied in these patients. Therefore, this study aimed to investigate the complications of tuberculosis packs and iron chelators in patients with TM in Mostafa Khomeini Hospital in 2018-2019.
Methods: This cross-sectional study was performed in Mostafa Khomeini Hospital in 2018-2019. All eligible patients' records and necessary information, including age, sex, and periodic tests (cardiac, liver, bone, and hormonal and infectious examinations), were reviewed and collected using a checklist. Data were analyzed using SPSS22 software with a significance level of 0.05.
Results: Enrolled patients were 93 cases with TM. The incidence of osteopenia and osteoporosis (69.9%) was the most common, and the lowest cases were hypogonadism (35.5%), hypothyroidism (9.7%), heart failure (5.4%), hepatitis C (2.2%), and liver failure. Hepatitis B and HIV were not seen in these patients.
Conclusion: Results demonstrated that the highest rate of complications was related to the bony part of the body structure, which is due to the pathophysiology of the disease. The low rates of heart failure and liver failure were because the patients with this level of complications may not survive for long.

GRAPHICAL ABSTRACT



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Introduction

Thalassemia is a heterogeneous group of inherited hemolytic anemias that share the synthesis of one or more globin polypeptide chains [1]. Patients with thalassemia major (TM) receive regular blood transfusions to prevent the effects of chronic anemia and bone changes. Patients' survival depends on regular blood transfusions, leading to more complications, such as iron overload and transmissible infections [2]. Most patients with TM die between the ages of 24 and 16 years due to an increase in iron load. Iron overload caused by lifelong transfusion-dependent anemias, such as beta-TM, usually results in lethal cardiac toxicity in the second decade of life if not treated by iron chelation. There is no physiological mechanism for excreting the excess iron accumulated from blood transfusions. Unlike hereditary hemochromatosis, venesection is not an option. Therefore, chelation therapy is the only way to remove excess iron.

Nevertheless, it is recommended to monitor patients for such adverse effects regularly. Some adverse effects may occur and require cessation of therapy in up to 30% of patients. Blood is known as the primary source of infectious agents, and blood transfusion can lead to many unwanted diseases, including serious and dangerous infections, such as Human Immunodeficiency Virus (HIV), Hepatitis C Virus (HCV), and hepatitis B virus (HBV) [3]. These effects can be largely avoided if the dosage is adjusted to take account of the degree of iron overload (using the therapeutic index) and if the mean daily dose does not exceed 40 mg/kg.

Therefore, one of the most critical aspects of thalassemia patient management is the early diagnosis and treatment of endocrine dysfunction. Therefore, the study of the frequency of disorders in patients according to their severity and distribution in age groups and sexes will provide a broader perspective to control and care for these patients, which can significantly improve patients' quality of life [4-6].

Unfortunately, the accompanying complications of this disease, which is the most important cause of mortality and disability, have not been extensively studied in all geographical areas of the country. There are currently more than 100 patients with TM in Ilam province who have been treated with cell packs and iron chelators for many years. Moreover, no study has been done on the frequency and distribution of complications, such as heart-related organ failure, liver failure, and pituitary gland. In addition, infections such as HIV are not included in this group of patients, and no information is available regarding the status of sexual distribution, age, and other variables. Hence, it is necessary to conduct studies in this field.

Therefore, this study aimed at evaluating the effects of iron over-injection in TM patients.

Materials and Methods

This cross-sectional study was performed in patients with TM referred to Shahid Mostafa Khomeini Hospital in 2018-2019. Inclusion criteria were TM, desferrioxamine recipient, and consent to review patients' medical history. The exclusion criterion included dissatisfaction with reviewing the history of the disease. All patients with TM treated with PC and iron chelators and who had a medical record were selected using the census method.

After obtaining patients' consent, all records, including age, sex, and periodic examinations (cardiac, liver, bone, and hormonal and infectious examinations), were reviewed for eligible patients. Patients' data and information, including demographic information, and other variables, such as ferritin levels and complications of iron accumulation, were collected using a data collection form. Then, the collected information was used for word summarizing and analysis using SPSS software version 25. According to the research questions, the statistics related to the distribution of variables based on the age and gender of patients were described using the frequency, percentage, and one- and two-dimensional tables, bar charts, and dispersion through the relevant analyses.

Results and Discussion

Male and female patients comprised 49 (52.7%) and 44 (47.3%) subjects. The largest age group was 32-36 years, with 35 (37.6%) individuals of

the total patients. The status of patients in terms of demographic characteristics and some serum factors is shown in Table 1.

Table 1: Demographic characteristics of the study population

Variables	Thalassemia major patients
Average age (years)	28.3±9.5
Average blood ferritin (mg/l)	2038.4±2137.5

According to Figure (a), 47.3% of the sample is female, and the lowest ferritin levels with a possible narrower range belong to the age group of 10-20 years. On the other hand, 52.7% of patients aged 20-40 years are males with a higher range of ferritin levels, which is seen in all age groups.

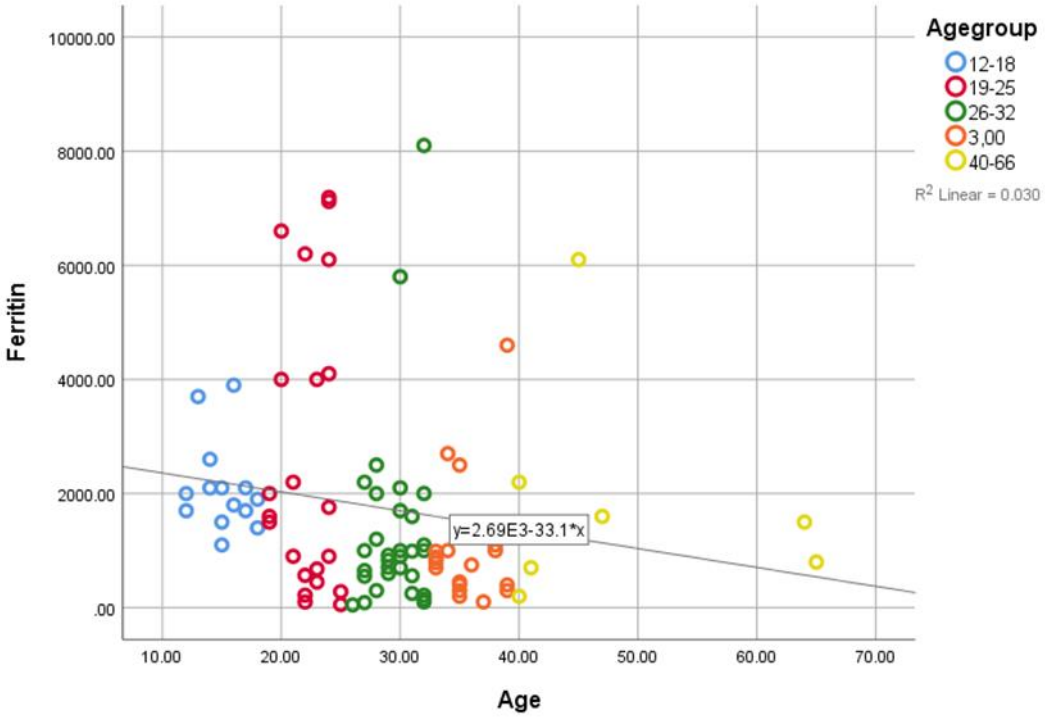

Figure 1: (a) Grouped scatter of FERRITIN(Ng/Ml)+LEVEL by Age group

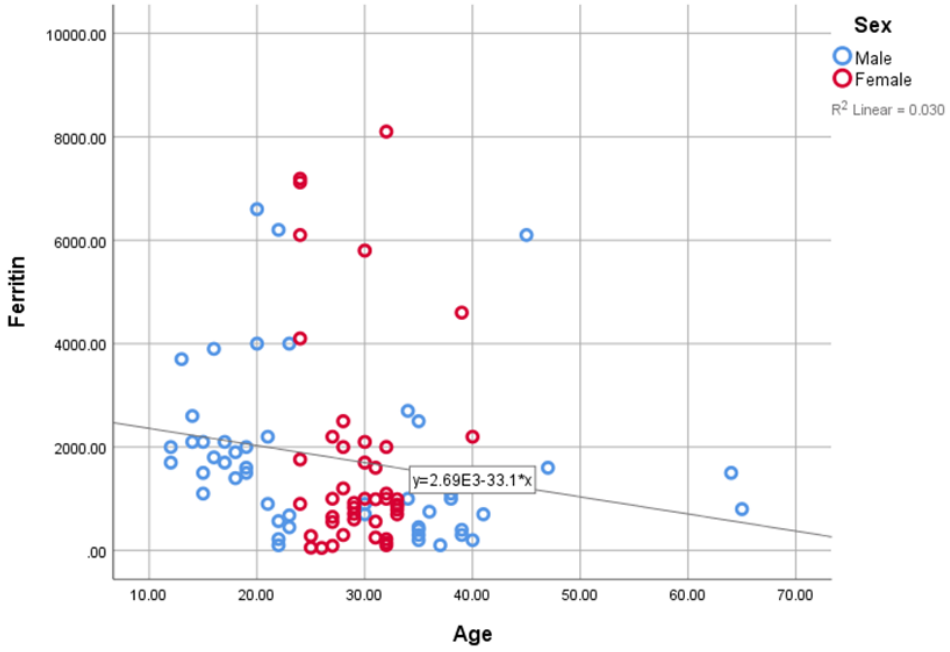

Figure 1 (b): Grouped scatter of FERRITIN (Ng/Ml)+LEVEL by GENDER

seven (77.8%) out of nine patients with hyperthyroidism are 20-40 years old.

In this study, the incidence of osteoporosis and osteopenia was similarly 69.9% (65 patients), 31 (70.5%), and 34 (69.4%) in females and males, respectively.

Overall, hypothyroidism was observed in six (13.6%) out of 44 women and three (6.1%) out of 49 male patients with TM, and hypothyroidism was present in nine (9.7%) out of 93 patients with TM. Women with TM were twice as likely as men to develop hypothyroidism.

Hypogonadism was seen in 33 (35.5%) patients, i.e. 18 (40.9%) females and 15 (30.6%) males. Women with TM were more likely to develop hypogonadism than men.

HIV and HBV were not seen in patients receiving PCs and iron chelators, and the HCV rate was 2.2% (2) in patients with TM, both of whom were females (4.5%).

Osteoporosis and osteopenia with 69.9% (70.5% women and 69.4% men) had the highest distribution, and liver failure, HIV, and HBV were not observed among patients.

The maximum rates of HF in patients with thalassemia were in the age groups of 26-32 and 40-66 years, with a similar rate of 2.2% (2 people). In total, there were five (5.4%) patients with HF.

In the study of hypothyroidism, four (4.3%) patients in the age group of 18-25 years had hypothyroidism, which shows the highest rate, and no cases were seen in the group of 12-18 years. Overall, hypothyroidism was found in nine (9.7%) out of 93 patients with TM.

Hypogonadism was seen in 33 (35.5%) patients, which was uppermost in 13 patients (14%) from the group of 26-22 years, and the lowest rate was similarly recorded in the age groups of 12-18 and 40-66 years with one patient (1.1%).

TM is a worldwide disorder in which people are exposed to various complications and infections due to repeated transfusions of blood and blood products.

Our study showed that the most common complications were osteoporosis and osteopenia. A study showed that a set of factors in patients with TM affected the bone mass of patients over time and possibly the delayed puberty of patients was also influential in this regard [7].

Hypogonadism, hypothyroidism, HF, and HCV infection were the most common complications, respectively, after osteoporosis and osteopenia.

The prevalence of HF, osteoporosis, and osteopenia was higher in males, and hypothyroidism, hypogonadism, and HCV infection were higher in females. The main complications were observed in 26-32 years of age range.

Similar to our study, the prevalence of hypogonadism was reported to be 42.3% in patients with TM in Iran; unlike our study, the prevalence of hypogonadism in males was higher than in females [8]. In another study, a 72% prevalence of hypogonadotropic hypogonadism was evaluated in 29 patients with TM, and puberty was observed in 45% of boys and 39% of girls [7]. This study showed that genetic differences and blood transfusion rates could cause patients' susceptibility to hypogonadism. In a study on transfused complications of blood and blood products in 220 patients with TM, short stature was observed in 39.3% of patients, and hypogonadism in 22.9% of boys and 12.2% of girls [9]. In this study, hypothyroidism was observed in 7.7% of patients, close to our study.

Another study showed that the prevalence of HF was 6.8% in patients with TM, and the prevalence of hypogonadism and hypothyroidism was 5.7% and 10.8%, respectively [10].

In the present study, the prevalence of hepatitis C was 2.2% in patients with TM. In Iran, a 5.7% prevalence of hepatitis C was reported in 147 patients with TM. A study on 1113 patients with TM in Gilan for 10 years showed that the prevalence of HCV infection was 13.6% in beta-TM [11]. In our study, no liver failure, HBV infection, or HIV cases were observed among patients. A study in Egypt showed that the prevalence of HCV and HBV was high in patients with TM.

Conclusions

Our study showed that the examined patients with TM were at higher risk for complications, such as osteopenia, osteoporosis, hypogonadism, hypothyroidism, HF, and hepatitis C, which

should be diagnosed more quickly and treated early, including regular blood intake and iron control, to reduce the incidence of these complications in these patients. To improve these people's lives, it is also possible to control the amount and severity of complications based on the prevalence of the mentioned complications through careful and prospective health planning. Therefore, proper planning and preventive measures can reduce these patients' risk of these complications. It is also necessary to conduct further comprehensive studies to determine the underlying factors of these complications in patients with TM.

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Authors' contributions

All authors contributed toward data analysis, drafting and revising the paper and agreed to responsible for all the aspects of this work.

Conflict of Interest

We have no conflicts of interest to disclose.

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