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ORIGINAL ARTICLE

Psychosocial Effects of Iron Chelation on Thalassemia Patients

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ABSTRACT

INTRODUCTION: Hemosiderosis is a serious consequence of transfusions in the treatment of β-thalassemia major. Iron chelation burdens the psychology of patients and due to the complexity and long process can be abandoned as a treatment.

AIM: To study the perceptions and limitations experienced by patients undergoing iron chelation, as well as the psychological effects.

METHODOLOGY: The study was conducted in the Thalassemia Unit of Evangelismos Hospital. The study included patients with β-Thalassemia, who were informed about the purpose of the study and gave signed consent. The research is a qualitative study with semi-structured interviews.

RESULTS: The analysis of 70 patient interviews (32 men - 38 women) showed that the majority of patients (54 participants) are regular in iron chelation therapy, as they find that it improves survival expectancy. Six participants do not comply well with treament, as they feel that it limits them significantly, while the rest try to be regular, as they recognize its benefits. 41 participants have a positive attitude towards treatment, of which 13 state that treatment improves their quality of life, while the remaining 29 have a negative attitude towards treatment. Regarding the existence of a supportive environment, 47 participants state that they have a supportive family environment, while 11 participants state that they hide from the family environment and 12 participants have experienced or are still experiencing the stigma due to the disease.

CONCLUSIONS: It is important to facilitate patients with iron chelation treatments, which do not limit their daily life. Also, the psychological support of patients with thalassemia is important, so that they overcome the obstacles of the disease and live a life with fewer obstacles.

INTRODUCTION

Thalassemia or β-thalassemia is an inherited hemoglobinopathy, which is inherited in an autosomal recessive manner. B-thalassemia is characterized by abnormal production of the hemoglobin b chain, either partially or completely. The absence,

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partial or complete, of the hemoglobin b chains results in the production of erythrocytes, which are more easily destroyed and which do not have the same ability to carry oxygen to the tissues as normal erythrocytes. In these cases, where the normal ratio of hemoglobin (2 a-chains and 2 b-chains) within the red blood cells is disturbed, an excess of a-hemoglobin chains is detected, which further results in the precipitation of this protein and an increase in metabolic stress by producing free radicals, which lead the cell to premature destruction. The result of this catastrophe is the manifestation of anemia with markers of microcellular and subchromic anemia, due to the reduced mean hemoglobin volume (MCV) and the low mean hemoglobin density index (MCH) respectively.[1]

There are two main forms of β-thalassemia, the homozygous and the heterozygous form. However, thanks to the evolution of molecular biology, a variety of mutations have now been identified that can lead to a variety of disease phenotypes, such as the case of intermediate thalassemia where the patient may be asymptomatic or have symptoms of severe anemia, as in case of homozygous β-thalassemia.[2]

Homozygous β-thalassemia, also known as thalassemia major (Cooley disease), in which two abnormal genes for the synthesis of the hemoglobin b-chain are inherited (one from each parent), is characterized by the complete absence of b-hemoglobin chains and from manifestations of severe anemia. Due to insufficient hematopoiesis, secondary erythrocyte nuclei are formed inside the marrow and extramedullary, paravertebral and within the liver and spleen (extramedullary hematopoiesis). However, insufficient hemoglobin production is achieved, and the patient presents with symptoms of severe anemia (e.g. shortness of breath, fatigue, heart failure), as well as bone deformities and hepatosplenomegaly. [3] Heterozygous β-thalassemia, also known as the stigma of thalassemia, carries a pathological gene and is asymptomatic or has a small degree of anemia.[1]

Globally, it is estimated that approximately 1.5% of the population has heterozygous β-thalassemia and 200,000 people are diagnosed with β-thalassemia annually, of which approximately 20,000 are diagnosed with homozygous β-thalassemia. The disease has a higher incidence in the Mediterranean countries, the countries of the Middle East and Southeast Asia, where the incidence of the heterozygous form is estimated to reach 20%. In Cyprus about 15% of the population is a carrier of β-thalassemia, while in Greece it is estimated that 7.4% of the population are carriers of the disease.[4]

Treatment of thalassemia major includes frequent blood transfusions (every 20-30 days) depending on the needs of each patient in combination with daily iron chelation treatment, to avoid the accumulation of excess iron in the body and its toxic effect on vital organs, such as liver, heart and lungs.[1] Splenectomy is an additional therapeutic measure in cases of increased extramedullary hemopoietic lesions and increased need for transfusions, in order to slow down the rate of destruction of red blood cells and reduce the accumulation of iron in the body.[5,6]

Iron chelation is a process that begins in parallel with transfusions with the aim of eliminating toxic iron derivatives and ensuring the necessary amount of iron for the body's needs. Iron chelation treatment is long-term and has the long-term goal of protecting the patient from the adverse effects of iron chelation. Subcutaneous desferioxamine administration can be done either by oral treatment or by subcutaneous injection of the treatment. The drug for subcutaneous infusion is deferoxamine. However, multiple and continuous multiple desferioxamine injection sites (at least 5 times a week), as well as slow infusion, are special reasons for the psychological burden of patients. In fact, there are infusion pumps, which due to the noise additionally burden the patient with the feeling of stigma. Iron chelation treatment has many unpleasant outcomes, which are mainly due to the high doses of deferoxamine. Complications include skin reactions at the injection site, hearing and vision problems, skeletal lesions (rickets), lung disease, and susceptibility to Yersinia enterolitica infection.[7]

However, since 2016, deferosirox and deferiprone, chelating iron-binding agents, have been released in tablet form for oral administration, simplifying the subcutaneous desferioxamine administration process, as the pills are administered daily on an empty stomach 30 minutes before meals. Although this form of medication is more user-friendly, as multiple desferioxamine injection sites are avoided, some serious complications such as agranulocytosis, thrombocytopenia and neutropenia are observed in this case as well. [7] Nausea occurs in 3-24% of patients and in 30% of patients there is an increase in liver enzymes (alkaline phosphatase) and in 4.5% arthropathy.[8]

Thalassemia is a systemic disease that requires lifelong treatment from the time of diagnosis. From an early age, the patient follows treatment protocols, which inevitably affect his life and psychology. Frequent blood transfusions, hospitalizations, and iron chelation therapy are painful processes, both physically and psychologically, and affect a person's quality of life. Research shows that patients are not always aware of the importance of iron chelation treatment, which makes them inconsistent in treatment. Iron chelation does not have immediate effects, but it is a long-term treatment. Therefore, the patient may more easily discontinue treatment, as he does not recognize its benefit. Refusal of treatment and the patient's pessimism adversely affect the outcome of the disease. Despite all the alternative therapeutic proposals for iron chelation (subcutaneous infusion, pill), the feeling of commitment from the iron chelation treatment puts a special psychological pressure on the patients.[10]

There are many areas of a patient's life that are adversely affected, both by the disease itself and by multiple iron chelation treatments. Personal life and sexuality, social relationships (stigma and feelings of difference), the workplace (easy fatigue,

frequent need for hospitalization) and psychological burden (feelings of difference, low self-esteem, fear for the future) are the most important areas of affected lives. Studies show that about 70% of patients believe that treatment reduces their freedom, as due to their dependence on frequent treatments, they are not able to function freely. They also feel limited, unable to do what a healthy person does and dependent on treatment, either geographically (need for a transfusion in a hospital) or therapeutically (iron pump, subcutaneous injections). In addition, due to fatigue, many times they cannot perform all the physical activities of a healthy person. At the same time, their state of health is complicated by the complications that may arise due to iron chelation treatment (e.g. hearing, vision problems, skeletal abnormalities, etc.).[11]

The purpose of the study is to assess the perceptions and limitations experienced by patients undergoing iron chelation treatment, as well as the psychological effects of treatment. An additional goal of the present study is to assess whether patients and their environment meet the requirements of a treatment that requires persistence and consistency. Through the testimonies of the patients, an attempt is made to reveal the whole range of aspects of life, which is influenced by both the disease and its therapeutic process. In addition, the categories of problems that arise are analyzed and ways to deal with them are suggested.

MATERIALS AND METHODS

DESIGN

A primary qualitative research of semi-structured interviews was conducted in order to discuss in depth key issues related to the object of analysis and at the same time to ensure that the patients have the opportunity to express its views and experiences on important points related to iron chelation treatment and quality of life. In the context of this primary survey, participants were asked open-ended questions based on following a pre-arranged interview guide. The interview guide included predefined open-ended questions. At this point, special attention was paid to ensuring and advocating flexibility in the series of questions asked to participants. This flexibility concerns the possibility of adding additional questions and changing the content of the questions to suit the interviewee. The participants developed their thoughts and opinions in depth. The purpose of the interviews was to gather as much information as possible about the personal experiences and views of the participants.

SETTING

The study was conducted in the Thalassemia Unit of Evaggelismos Hospital during the period December 2019 to March 2020.

RECRUITMENT

The study included patients, men and women, with β-thalassemia, who were adults (32 to 63 years old), and were monitored in the Thalassemia Unit of the Hospital. Patients were informed of the purpose of the study and gave their signed consent.

DATA COLLECTION

Sampling was performed during a typical visit of the patient to the Hospital's Thalassemia Unit and demographics and medical history were recorded, including a history of splenectomy and complications. Furthermore, information was collected from the patient's medical record from the laboratory test (hemoglobin S/F percentage) and the type of treatment. There was a brief discussion about the disease and his experience with iron chelation therapy. The interviewer was a trained nurse in the Hospital's Thalassemia Unit. To ensure the anonymity of patients, each participant received a unique code, which corresponded to the initials of the name.

DATA ANALYSIS

The data of the semi-structured interviews were processed by the interviewer and the main topics that emerged from the statements of the participants were analyzed. The protocol of the study was approved by the Scientific Council of the General Hospital of Athens "Evaggelismos".

RESULTS

The study involved 70 patients, 32 men and 38 women, ranging in age from 32 to 63 years. Ten of the patients are teachers, while working at different levels of education. One of them is a physicist, two are kindergarten teachers, one is a literature teacher, three are mathematicians and the other three are primary school teachers. 25 participants are health professionals and specifically they are 8 psychologists, 4 dentists, 2 nurses and 11 doctors. 23 participants stated that they were unemployed and engaged in household chores and finally, 12 participants stated that they work as private employees.

Of the 70 participants, 31 said they had completed basic education, 28 said they had a degree from a Higher Education or Technological Institute, and the remaining 11 said they had a master's or doctoral degree. The majority of patients (95%) who are up to 38 years old have studied, with few exceptions (5%). The majority of patients over the age of 38 completed basic primary or secondary education, while 96% of them said they were unemployed or engaged in household chores. Typical is the statement of a 51-year-old woman, who falls into this category: "*I did not continue school. My parents wanted to keep me at home so that we would not give food for comments in the village. I understood that they were ashamed of me*". Also,

another statement worth mentioning is that of an unemployed 58-year-old man: "*In the big cities, maybe the situation was different because the society is not so small. I grew up in the countryside and felt from a young age being fingerprinted... Of course, I had the support of my family, but when you are targeted by society itself, you feel like you are a social burden*". Another case of a 39-year-old woman, who stated that she was busy with household chores, said "*I am now used to my daily life. I am used to hiding constantly so as not to be marginalized in the village. So, I have to travel frequently to Athens for my treatments. We have ended up wasting more than half our family income on travel for this reason*". Also, all ten teachers said they could not do subcutaneous desferioxamine administration because the pump was making noise. Typically, one of them said "*I have to do the subcutaneous desferioxamine administration at night!*" It is also noteworthy that the vast majority of health professionals (23 out of 25) are regular with iron removal treatment. But a nurse and a psychologist are not very regular.

Most patients (41 out of 70) recognize that they would not live without treatment and state that it is necessary to follow the treatment protocols, which they recognize as important for their lives. Thus, 41 participants have a positive attitude towards treatment, of which 13 state that it improves their quality of life. These participants show the need for confidence in treatment and a positive attitude towards life. Six participants are not regular with subcutaneous desferioxamine administration treatment, as they feel it limits them significantly, while the rest try to be regular, as they recognize its benefits.

About 30% (23 out of 70 participants) hide the disease either from children or society at large, as they feel disadvantaged and stigmatized, namely 11 women and 7 men report incidents in which they received derogatory comments from the social environment. The following expressions are typically mentioned: "*You are like a supermarket product that you buy from the shelf and it is defective*", "*He told me: You are very sick, and he left me. You are not for a family, my girl...*","*I do not write the drugs in the booklet, so that they do not appear In the village and they are making fun of us*".

It is also observed that out of the total 19 participants who hide their disease from their children and the fact that they are receiving treatment, 6 are women and the remaining 13 are men. Of the 19, 4 are teachers, 12 are health professionals, 2 are unemployed and the latter is a private employee. Typical is the statement of a health professional that "*Children do not know that I have thalassemia because they must have the ideology that the father is strong and fearless*". Another health professional also stated that "*My son does not know that I have thalassemia. He sees the pills and I tell him that I have a problem with my waist. He does not need to know...*". One teacher said: "*I feel that if my daughter finds out about my illness she will feel inferior to the other children at school and I do not want to be ashamed of her father*". All 13 men mentioned the loss of manhood and the male role model they want to have in their family. The 6 women mainly mentioned social outcry as a reason for hiding their illness. Typically, one female teacher said, "*It is psychologically exhausting to have to hide constantly so as not to be socially stigmatized and then put your family in a difficult position. So far, I can do it, but I do not know how much longer I can endure. I confess I cannot accept that this is my daily life*". At this point, the statement of the male private employee is also remarkable: "*I hide it from my work and my colleagues. I do not want to risk creating problems in my workplace, but I see that this is inevitable in the end, as due to the frequency of treatment, I have to be absent for several hours... I do not hide that I am afraid of losing my job*". Some patients also reported cessation of personal intercourse (separation) after the start or during treatments. Regarding the existence of a supportive environment, 47 participants state that they have a supportive family environment.

Regarding the type of iron chelation, it seems that the current treatment by injection was particularly difficult as a method and time consuming, while iron chelation with tablets is preferred and increases the quality of life of patients. Most study participants have tried subcutaneous desferioxamine administration and at this stage either combine it with a tablet or take an iron-only tablet. Regarding the disadvantages of subcutaneous desferioxamine administration, it is reported that the preparation of the pump is tedious, it is inconvenient to use it outside the home, it is a treatment that stigmatizes the patient because he carries a pump in his body, reduces the quality of life. Tablets for iron chelation have reduced these technical difficulties as well as the risk of stigmatization.

DISCUSSION

The study shows that the psychological effects are great with depression threatening the patients. This emphasizes the need for psychological support (counseling, psychotherapy, treatment), so that patients can cope with the chronicity of the disease, but also in dealing with the feeling of diversity and disadvantage they feel. Although, there is an important limitation of the current study, which is the absence of the use of a standardized quality of life or anxiety/depression questionnaire and the choice of an open interview instead.

It seems that the psychological condition of patients receiving treatment with transfusions and iron chelation is particularly burdensome. Their dependence on chronic treatment, but also the serious complications of thalassemia itself, create a complex psychosynthesis, which is burdened by the treatment regimens themselves as processes. Patients often have a bad psychological state and feel physical fatigue due to anemia and psychologically due to their living conditions. It is a fact that in most cases the diagnosis is made from a very

young age. As a result, the child's psychosynthesis is greatly affected during the sensitive process of development. At the same time, the psychology of parents is affected, who are often possessed by a sense of guilt due to the inherited nature of the disease.[1] Other times, they become overprotective of the sick child. Thus, the family balances are disturbed and the child-patient relationship with the family environment, but also the messages he receives from and to his parents are complicated.

In addition, the addictive relationship created by the nature of the treatment, even when it comes to pill use, makes the patient feel vulnerable and possessed by the fear of imminent death, as long as he knows that he cannot live without iron chelation therapy.[7] In fact, this dependence on treatment and the realization of the limitations that enter his life due to treatment, but also the complications of the disease itself, create big problems, especially in adolescents. Thus, they adopt a cautious attitude towards life, have low self-esteem, acquire phobias and often cling to the family environment, which can be overprotective.[12] However, as the interviews showed, almost half of the patients admit that they cannot live without iron chelation treatment and are grateful to live thanks to it, which, of course, does not negate the feeling of dependence and forced acceptance of the situation.

Complications from iron therapy occur in only 4.9% of patients receiving treatment.[11] However, it should be noted that even in the treatment of iron-chelated iron tablets, the patient also feels different from normal and unable to assess the therapeutic effect of the use of iron-binding factors, as in the case of subcutaneous desferioxamine preparations.[1] Thus, even in these cases, restraint and consistency in treatment is still of major importance, but also a point of resignation on the part of the patient. Even the latest versions of monotherapy do not alleviate his anxiety and fatigue, which makes him inconsistent. This fact is complicated by the general assumption that the therapeutic results are not immediately and easily perceived by the patient. Thus, patients are constantly stressed, and must show confidence in treatment constantly, even when they do not feel well, as the effectiveness of the drug cannot be immediately perceived by the patient. [1] In contrast, iron complications in case the patient is not consistent with the treatment are quite immediate.

In addition, the influence of the family relationships of the patient with thalassemia as a child is very special, but also in the case that he has his own family and treats his illness from the position of a parent. As mentioned, the diagnosis of thalassemia usually comes at a very young age. Thus, children with thalassemia follow a path of physical and psychological development, through the paths of treatments and hospitals. In addition, since body image plays a very important role in the pediatric patient for the development of his personality, shortness of breath due to underdevelopment and hypogonadism adversely affects young patients, who aggressively and threateningly perceive any deviation, which increases the feeling of stigma and inferiority.[6] To this feeling, of course, is added the impact of the body's irritation, due to the multiple desferioxamine injection sites for the needs of healing.

On the other hand, the thalassemia patient, as a parent, may feel disadvantaged towards his children and may want to hide his problem. It is noted that 19 patients reported hiding their condition, hiding the truth even from their children. In fact, many times the fear of social stigma is so great that the carriers of β-thalassemia hide the truth to such an extent that they deny even the necessary prenatal tests.[13] In addition, as mentioned, parents often feel guilty towards their children due to the inherited nature of the disease.[1] In fact, many parents, due to the fact that they have avoided the antenatal check-up, are burdened by an additional feeling of guilt in the case of stretch marks or the child's illness.[14] The family environment must be able to be a supportive environment, which will absorb the stress but will also benefit the positive vigor of the patient. Unfortunately, however, the semi-learning through the deficient information about the disease and the necessity of the treatment protocols, leads to insufficiency of this field on the part of the family environment, as if the problem is not properly understood, the appropriate support.

Thalassemia major leads to a special phenotype in patients, with bone changes and reduced physical development and physique, which leads to peculiarities in the clinical picture of homozygotes. In addition, it is noteworthy that the continuous multiple desferioxamine injection sites for the application of iron chelation (in the case of the subcutaneous desferioxamine administration), lead to an aggressive-destructive image of the body.[1] This is especially important for adolescence, as it affects the patient's self-esteem, but also the sexuality of the patient, as well as the image he has of his body. All this, composes a profile with reduced self-confidence, which creates reasonable inhibitions in the pursuit of personal relationships. At the same time, the individual can be an easy target for comment, resulting in reduced opportunities for the development of social relationships, stigma and self-stigma.[15]

The association of thalassemia major with mental illness is great. According to research, 50.6% of patients with thalassemia develop psychological disorders with depression affecting 11.6% of patients.[15] In fact, this percentage in children reaches 80%.[16] Pathological manifestations of the psychic sphere include generalized anxiety, depression, psychosomatic problems, and feelings of hopelessness.[17] There are many factors that can lead a thalassemia patient to develop some form of depressive disorder, such as infertility, sexual dysfunction, clinical picture (bone dysplasia), the chronicity of the disease itself and its complications. with treatment complications, multiple hospitalizations, fatigue, decreased self-esteem, stigma, and social dysfunction.[18] Also, the subcutaneous desferioxamine administration process itself is a cause that can

predispose to depressive disorder, as it causes a strong feeling of difference and aggressive perception of the body.[1] This feeling of diversity, combined with decreased self-esteem and the manifestation of phobias and anxieties (social racism, fear for life expectancy, treatment success, vocational rehabilitation), makes it difficult for them to have a smooth integration into society.[19] In fact, this difficulty in integration into society and the smooth functioning as a productive person, can have consequences in the professional sector, with an additional burden on the psychology of the patient with thalassemia.[6] The patient feels disadvantaged about himself, often weak, while stigma and racism often act as a deterrent to work. In fact, when he works, he often has to be absent for the needs of treatment, which creates additional professional problems. In addition, long-term treatments and hospitalizations require a lot of expenses, which further aggravates the feeling of dependence and difference. Through this pressure and the feeling of inferiority, the patient's despair increases, as a result of which he adopts a passive attitude towards life full of vanity. To the spectrum of psychological consequences of these patients are added negative feelings about life and fear of imminent death due to shorter life expectancy and dependence on treatment.[20]

The degree to which a patient experiences anxiety or even depression depends on a number of factors, such as the chronicity of the disease, its severity, the number of complications, the effects on its functionality, sexual dysfunction and frequency need for hospitalization.[21]

There are many biological effects of homogeneous β-thalassemia, which affect the patient's quality of life. More specifically, among the complications of thalassemia are various endocrine abnormalities, such as hypogonadism, hypothyroidism, disorders of calcium metabolism, which lead to a delayed development and which manifests itself more in late childhood, especially in adolescence.[22] This fact, in combination with the abnormalities in the bone formation, create shortness of breath. Dysplasias in bone growth include vertebral epiplasia and flatfoot, for which DFO medication appears to be responsible.[23]

All these compose a phenotype with peculiarities, which in combination with the general fatigue of patients, can affect them and become socially dysfunctional.[24] For this reason, it is very important that these patients are monitored by mental health professionals, so that they receive the necessary counseling and support so that they can bear the consequences of residual development.[25] In addition, mild fatigue, metabolic disorders, gallstones, difficulty absorbing iron, and an increased incidence of thrombosis are observed.[1,26]

The need for specialist counselors and mental health advocates is essential, so that these patients can come to terms with their condition and maintain as much as possible the ability to deal with clinical and social difficulties.[27] As mentioned above, residual physical development is in itself the cause of the need for psychological support of patients.[25] In addition, the multifactorial justification of the psychological burden experienced by the patient, requires an individualized approach to ensure the best possible support.[22]

At the same time, the adaptation to a chronic disease requires a lot of effort on the part of the patient, as his adaptation includes the correct behavior in terms of compliance with medical instructions, the biological adaptation to the peculiarities of the disease and the emotional adaptation. The latter is often the most serious, as it includes the patient's image of himself but also how he interacts in various social relationships.[28] All this composes the difficult environment in which the thalassemia patient will have to live and develop.

It is necessary to frame the person by specialists (doctor, nurse, psychologist, psychiatrist, social worker), who will help him to believe in himself and try harder, maintaining hope and achieving a normal adulthood. In all this, thorough information of both the patient and the familiar environment will help.[1] If the whole community is properly informed and composed of experts who create a supportive environment, it has been shown that the incidence of depression among patients is reduced.

At this point, it has to be mentioned that the patients, due to the chronic disease and their psychological burden, often cause intentional and unintentional word and/or psychological violence to the doctors and they show a toxic behavior towards them. The patients often seek psychiatric support to hematologists treating them for their disease, instead of addressing their problems with social workers, psychologists or psychiatrists. Very often, the patients do not show respect to other thalassemic patients with the same problems and try to monopolize the time of the doctors. These patients often extract all the energy from the doctors. Thus, the doctors in the units treating these patients must be very qualified to handle difficult clinical and psychological situations and should also receive financial support by the government, because the treatment of thalassemia is multifactorial and involves many specialties and a lot of money.

Finally, undoubtedly, here is psychological burden, due to thalassemia and iron chelation treatment to an important percentage of the patients. However, many patients have complied with novel treatments, have a very good quality of life, create families and live much longer than the past. This means that the hope and the optimism towards life have to be reflected by many patients, despite the fact that there is a serious disease with many problems.

CONCLUSIONS

From the analysis of the existing literature, as well as from the results of the present study, the need for psychological

support of patients with thalassemia major and the creation of a supportive environment is pointed out. A supportive environment means both the family environment and a framework staffed by specialists (psychologist, psychiatrist, therapist, social worker, etc.). This supportive environment should be ready from the very first period of the disease diagnosis. In fact, taking into account the fact that thalassemia is diagnosed from the very first years of life, the parents of the sick child will also need psychological support. Thus, they themselves should be guided and supported psychologically in order to endure and properly manage their child's illness. After all, they must receive help, so that they can give it to their child more correctly and thoroughly. The question is also, what could be done to shield even preventively the psychology of patients with thalassemia. Many psychological conditions, which are the product of pressure and discomfort of the patient trapped in the disease, appear in the second year, after a long period of suffering of the patient. Thus, initially, the patient should be fully informed, in order to understand in depth his illness and mainly to realize the seriousness of his health, but without reinforcing the feeling of fear and without cultivating a supportive family environment, which but it will be overprotective. Thus, this information should concern, not only the patient himself, but also his close family and friendly environment, which should create a safe and reasonably protective environment around the patient. Fears can be alleviated when the patient knows what to expect from the disease and of course if he has realized that he is not alone, but there are therapeutic measures on which he can rely. At the same time, counseling support from specialist scientists (psychologist, psychiatrist, social worker) would be desirable for all patients, even the most aware. As mentioned, it is good that this psychological support also applies to the child's parents. It is very important that this starts early, even in childhood, when the disease is usually diagnosed, so that the most serious effects on the personality, but also on the social life of the child, adolescent and of the individual in general. The establishment of a sense of diversity and inferiority should be avoided as much as possible. This is especially important for children and adolescents.

Adolescents are a special group of patients, as adolescence is the period of sexual maturity of the individual. At the same time, at this age, the adolescent's psychology is, however, fluctuating and the individual is very vulnerable. Patients with thalassemia are faced with a particular clinical picture, with reduced development with what this implies plays a special role in their psychology. In addition, taking into account the state of hypogonadism, which can be a complication of the disease, it is necessary to involve the endocrinologist in the health team that will support the adolescent. Hypogonadism creates additional problems of delayed sexuality and disturbed secondary sex characteristics. All of this composes and nurtures the teenager's sense of diminished self-esteem, which further complicates matters. Psychological support from specialists can also take the form of a counseling line, so that patients can be covered more immediately and quickly in emergencies. This would ensure, within a framework of anonymity, the safety of the patient and would perhaps be a more appropriate means of communication for the adolescent.

In addition, informing the patient's environment clearly will help both in accepting the situation and in supporting the effort in its own endeavor. After all, as mentioned, many times the parents themselves act guided by either overprotective or obligatory feelings towards their children, a fact that carries the corresponding behavioral risks for the child. Family sessions with a psychologist or social worker may have helped. In addition, the correct information and guidelines from specialists, must fall within the school and the wider educational environment of the child, in order to reduce as much as possible, the patient's sense of difference. The wider information could only cultivate a positive climate of acceptance of patients with thalassemia and an understanding that they have the same opportunities and opportunities for family life. This creates the need to improve patients' quality of life as best they can. A quality of life that definitely includes mental health. Thus, it is necessary to provide psychological support to patients and their guidance by specialist counselors (psychologists, psychiatrists, social workers). It is very important to emphasize the contribution of the wider society and for the field of antenatal care, as the dimension of the disease should be understood in its entirety, so that the known bodies are sensitized and do not hide their stretch marks. So, they will accept it and will not hesitate to announce it and accept any prenatal tests. Finally, it should be emphasized that it would be very important for the psychological support of patients with thalassemia to be provided free of charge, so that all social groups can receive the required psychotherapeutic care. In the context of the holistic approach of modern medicine, the mental aspect of a disease cannot be ignored and of course excluded from the financial care of the state.

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