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REVIEW

Psychological Burden and Suicidal Vulnerability in Adolescents with Thalassemia Major: A Scoping Review

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Objective: To map the literature regarding suicidal ideation in adolescents with thalassemia, specifically examining its relationship with clinical, treatment-related, and psychosocial factors while identifying existing research gaps. This review is particularly timely as significant improvements in life expectancy for thalassemia patients have shifted the clinical priority toward long-term mental health management and suicide prevention.

Methods: This scoping review follows the framework developed by Arksey and O'Malley and is reported in accordance with the PRISMA-ScR guidelines. A systematic literature search was conducted in the PubMed, Scopus, and CINAHL databases. Studies meeting the inclusion criteria were primary research articles with cross sectional, cohort study, or qualitative designs involving adolescents with thalassemia and explicitly assessing the suicidal ideation or related psychosocial factors. Data were extracted using a standardized data extraction form and analyzed descriptively and thematically.

Results: Nine identified studies demonstrated a high prevalence of suicidal ideation in adolescents with thalassemia, which was closely related to disease severity, frequency of blood transfusions, and psychosocial stressors such as stigma and social isolation. This variance is explicitly driven by methodological differences, where self-report scales (Beck Scale) yielded significantly higher ideation rates compared to clinician-led diagnostic interviews (K-SADS), as well as demographic factors, with suicidal risk increasing alongside patient age and treatment intensity. Family and community-based support interventions demonstrated positive outcomes in reducing risk, although implementation was hampered by a lack of access to integrated mental health services. The review also revealed significant methodological gaps, including the absence of longitudinal study designs and randomized controlled trials.

Conclusion: Adolescents with thalassemia face significant psychological vulnerability due to chronic medical burdens and psychosocial developmental challenges. Routine mental health screening using validated instruments and a multidisciplinary approach involving families are needed for early detection and effective prevention of suicide risk.

Keywords: adolescents, chronic diseases, mental health, pediatric nursing, suicidal ideation, thalassemia

Introductions

Suicidal ideation in adolescents is a growing mental health concern worldwide, with profound impacts on individuals, families, and communities.[1] Suicide is the second leading cause of death among individuals aged 15 to 29 worldwide, reflecting a profound mental health crisis in this age group.[2] Studies show that the prevalence of suicidal behavior, including suicidal ideation, planning, and suicide attempts, increases substantially during adolescence and young adulthood.[3] Adolescence is a crucial transition period from childhood to adulthood, characterized by rapid physical, cognitive, and psychosocial changes, making many adolescents particularly vulnerable to mental health disorders, including suicidal ideation.[4]

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Thalassemia is a genetic blood disorder that has long-term physical and emotional impacts on patients, particularly adolescents with thalassemia major (TM) or transfusion-dependent thalassemia (TTD).[5] Thalassemia requires intensive and regular medical care, such as blood transfusions and medication to manage iron overload.[6] These ongoing care demands not only affect the patient's physical condition but can also lead to emotional stress, anxiety, and depression. This emotional burden is exacerbated by the fact that adolescents with thalassemia often feel isolated or different from their peers due to their chronic illness.[7] This can lead to feelings of hopelessness and suicidal ideation as a way to cope with the emotional and physical pain they face.[8]

Adolescence is a challenging period of psychosocial development, as adolescents begin to explore their identity and strive for acceptance within their social environment. However, for adolescents with thalassemia, ongoing physical challenges and uncertainty about their health can lead to feelings of depression and an inability to see a bright future.[9] The social stigma associated with the disease, coupled with feelings of being different from healthy peers, can exacerbate social isolation and feelings of low self-esteem.[10,11] These phenomena often contribute to an increased risk of suicidal ideation. Several studies have also shown that adolescents with thalassemia have higher levels of anxiety and depression compared to the general population, further increasing their vulnerability to suicidal ideation.[9,12,13]

From a biopsychosocial perspective, the psychological vulnerability of adolescents with thalassemia major is deeply rooted in the disease's complex neurobiological and clinical complications.[14] The necessity for lifelong regular blood transfusions inevitably leads to systemic iron overload, which triggers immune-inflammatory responses and oxidative stress toxicity that can potentially damage brain tissues and disrupt the neural mechanisms regulating mood and executive functions.[15] Specifically, iron deposition in the pituitary gland frequently results in severe endocrine abnormalities, such as hypogonadotropic hypogonadism, which directly correlates with significant growth retardation and delayed puberty.[10] These biological stressors are further compounded by visible physical developmental delays, including distinct skeletal deformities of the head and face, protruding forehead, and short stature.[16] The resulting poor self-image and physical discomfort often converge with the uncertainty of a chronic medical regimen to create a state of profound hopelessness, acting as a primary catalyst for suicidal ideation as these adolescents struggle to find their identity while feeling alienated from their healthy peers.[17]

Rates of suicidal ideation in adolescents with thalassemia vary worldwide, with some studies reporting relatively high prevalence rates. A study in Turkey reported that approximately 28.8% of adolescents with thalassemia major reported suicidal thoughts,[18] although this figure is lower than the findings from other study, who recorded a prevalence of suicidal thoughts of 78.7%.[19] This difference in prevalence suggests the importance of contextual factors, such as social support, quality of medical care, and socioeconomic conditions, in influencing the psychological well-being of adolescents with thalassemia. This study also showed that although many adolescents with thalassemia experience depressive symptoms, not all of them experience suicidal ideation, suggesting that protective factors may play a significant role.[20]

Although several studies have demonstrated a high prevalence of suicidal ideation in adolescents with thalassemia, the existing literature is limited in providing a deeper understanding of the factors influencing suicidal ideation in this population.[19,21,22] There is an urgent need for further research that can identify the psychosocial, clinical, and demographic factors that contribute to the high rates of suicidal ideation among adolescents with thalassemia. More in-depth research and more diverse methodologies, such as longitudinal studies or research involving qualitative analysis, will be essential to gain a clearer picture of the mental journey of adolescents with thalassemia and to identify the most effective interventions.

This scoping review aims to identify the range of study designs, concepts, and themes explored regarding suicidal ideation in adolescents with thalassemia, while highlighting existing knowledge gaps in this field. By mapping the variations in approaches and the scope of existing research, this review provides a comprehensive overview of the current literature landscape to inform future research directions.

Methods

Design

This study used a scoping review design based on the framework developed by Arksey and O'Malley (2005) and refined by Levac et al (2010).[23,24] The scoping review approach was chosen to map scientific evidence related to the concept of suicidal vulnerability (including ideation, readiness, and intent) and its clinical, treatment-related, and psychosocial aspects within the context of adolescent thalassemia. This method identifies a prespecified scope focusing on adolescents (10–19 years) and examines variations in methodological approaches, such as the use of diagnostic interviews (K-SADS) versus self-report scales, to highlight knowledge gaps regarding the lack of longitudinal and experimental studies. The scoping review process follows five main stages, namely: (1) formulation of research questions, (2) identification of relevant studies, (3) selection of studies based on inclusion and exclusion criteria, (4) organization and extraction of data, and (5) synthesis and reporting of results.

Identifying Research Questions

This review aims to define from the published literature what has been described about the clinical and psychosocial correlates of suicidal ideation in adolescents with thalassemia, with a view to using these studies to identify trends in mental health research. Our objective is to map the range of study designs, conceptual frameworks, and evidence gaps that inform the current understanding of suicidal risk in this population.

Search Strategy

A systematic literature search was conducted in three major databases: PubMed, Scopus, and CINAHL. The selection of these databases aimed to ensure comprehensive and relevant coverage of the literature in the fields of health and psychology. The search strategy was developed using the PCC (Population, Concept, Context) framework combined with Boolean operators (AND/OR), and adapted to MeSH terms or subject areas in each database. In consultation with an information specialist, the search terms were expanded to include related concepts such as “psychological distress,” “self-harm,” “iron overload,” and “quality of life” using MeSH terms to ensure a comprehensive capture of all relevant studies across the selected databases. Keywords used included Population (P) categories such as “Thalassemia,” “Thalassemia Major,” or “Transfusion Dependent Thalassemia”; Concept (C) categories such as “Suicidal Ideation,” “Suicide Risk,” “Self-Abuse,” and Context (C) categories such as “Adolescents,” “Thalassemia Treatment,” “Mental Health in Adolescents,” and “Mental Health Interventions.” The search was limited to English and Indonesian because these languages align with the linguistic expertise of the research team.

Study Selection

Inclusion and exclusion criteria were established to ensure the suitability of the studies to the research objectives, based on the PCC framework. Inclusion criteria included: (1) Population: studies involving adolescents aged 10 to 19 years diagnosed with thalassemia and experiencing suicidal ideation; (2) Concept: use or development of interventions aimed at reducing suicidal ideation or other related psychological disorders in adolescents with thalassemia; (3) Context: studies reporting the application of interventions in the context of health care or community-based prevention programs, not just research protocols; and (4) Publication Type: primary research articles with quantitative, qualitative, or mixed methods designs. Exclusion criteria included: (1) review articles, editorials, commentaries, or letters to the editor; (2) gray literature; and (3) studies that did not explicitly address suicidal ideation in adolescents with thalassemia. Reported for selecting articles followed PRISMA Flow Diagram (Figure 1).[25]

Data Extraction

Data from eligible studies were extracted using a standardized data extraction form specifically designed to address the research questions. Extracted variables included: general information (author, year of publication, country, study design), sample characteristics, type and description of the intervention implemented, context of application, mental health skills outcomes measured, and key findings from the study. Data extraction was conducted independently by two researchers to ensure accuracy and consistency, with disagreements resolved through discussion or by involving a third researcher.

Synthesis and Reporting of Results

The extracted data were synthesized using a descriptive and thematic analysis approach. This synthesis process involved three main stages: (1) data quantification to describe the distribution of studies by publication year, country, and study design; (2) thematic analysis to categorize the types of interventions used, implementation contexts, and reported mental health outcomes;

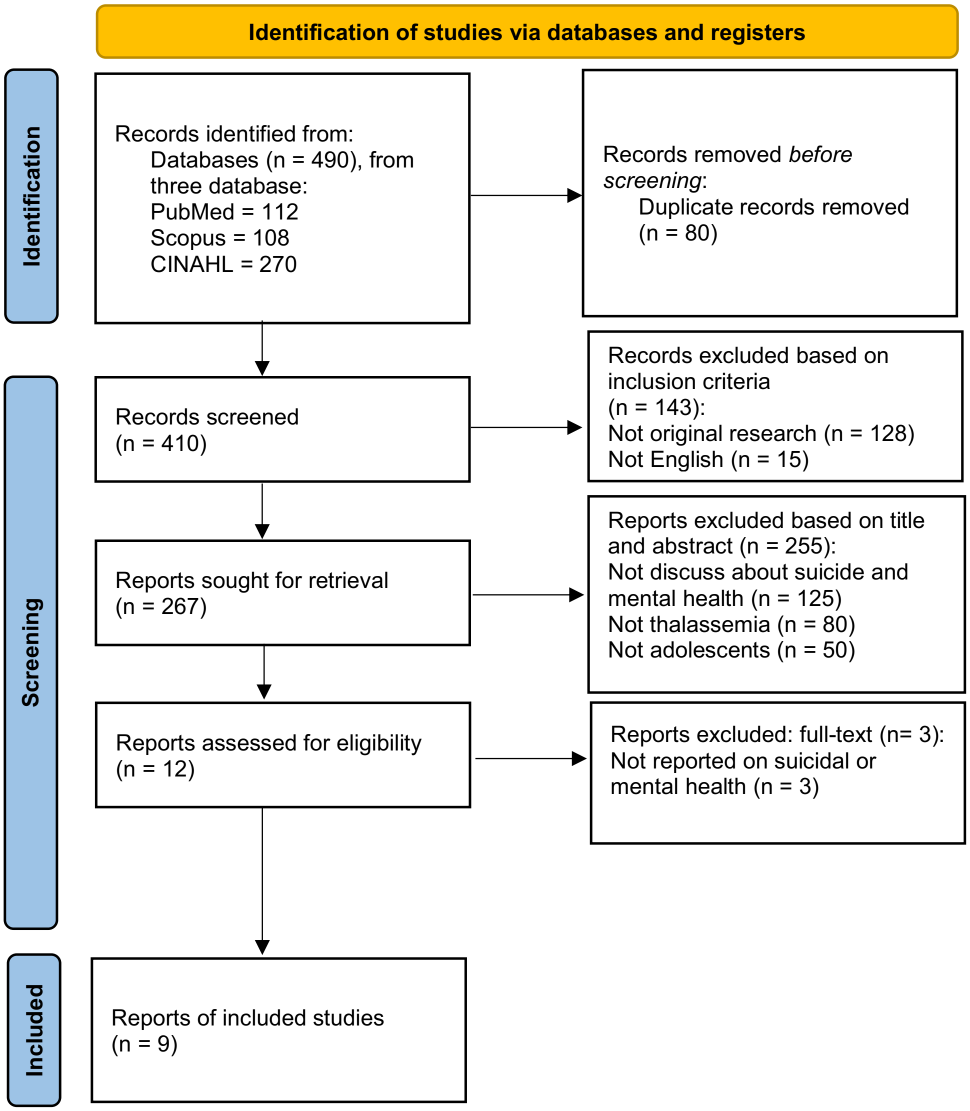

Figure 1 PRISMA Flow Diagram.[25]

and (3) conceptual mapping to identify the range of themes and patterns explored in the literature, without evaluating the effectiveness or implying causality between specific interventions and suicidal outcomes. The results of this scoping review are presented descriptively and narratively in accordance with PRISMA-ScR guidelines and used to identify research trends and knowledge gaps that require further research.

Results

Selection of Sources of Evidence

A systematic literature search was conducted through three electronic databases: PubMed, Scopus, and CINAHL. The final search was conducted on October 1, 2025. Based on the screening results, a total of nine primary studies met the final inclusion criteria for this review synthesis. The in-depth search strategy for each database, including the Boolean strings used (Supplementary File 1), while the article selection process is detailed in the PRISMA Flowchart (Figure 1).

Characteristics of Included Studies

Nine studies were included in this review, with publication years ranging from the earliest in 1993[26] to the most recent in 2025.[27] Most studies focused on the more recent period, with four studies (approximately 44% of the total) published between 2018 and 2025.[9,18,19,27] Geographically, these studies are dominated by countries in the Thalassemia Belt, with major contributions from Iran (four studies:[13,19,21,22]) and Turkey (three studies:[9,18,28]). There is also one study from Thailand.[27] The earliest study has a location not explicitly mentioned in the summary, but comes from a similar geographic context.[26]

In terms of methodological design, these studies mostly used cross-sectional designs.[9,19,21,27,28] Only two studies explicitly used a case-control design.[13,22] No studies reported using a Randomized Controlled Trial (RCT) design, instead focusing on assessing prevalence and correlations.[18,19] Data collection methods often involved a combination of self-report tools and clinician-led diagnostic interviews. Three specific studies used semi-structured diagnostic interviews such as the Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS).[18,21] Others relied on standardized scales, such as the Beck Suicide Thought Assessment Questionnaire[19] and the Revised Child Anxiety and Depression Scale (RCADS).[9] Although most studies were cross-sectional, the authors emphasized the need for future prospective or longitudinal studies to evaluate the nature and course of psychological symptoms, especially the continuity of suicidal ideation, in this patient group.[18,21]

Participants in the studies analyzed were mostly children and adolescents with Thalassemia Major or Transfusion Dependent Thalassemia (TDT), with a focus age range between 6 and 18 years.[9,13,18,21,27] Some studies also included older patient populations, with respondents reaching 46 or 64 years of age.[19] Four studies compared TM/TDT patients with age- and sex-matched healthy controls,[9,13,22,27] while other studies focused on patients and their caregivers.[28]

Mapping of Suicidal Ideation and Associated Factors

The results of data extraction were mapped into several main themes that describe the scope of suicidal ideation and the factors that influence it in adolescents with thalassemia (Table 1).

Table 1 Data Extraction

Authors, Year	Objective	Country	Sample	Variables	Key Results	Identified Knowledge Gaps
(Örengül et al, 2019)	To survey the prevalence of psychiatric disorders and suicide in children and adolescents with Thalassemia Major (TM) using a semi-structured diagnostic interview (K-SADS).	Türkiye	59 children with transfusion-dependent TM, aged 6–17 years.	Psychiatric diagnosis (K-SADS), depressive symptoms (CDI), suicide (thoughts, intentions, attempts).	Psychiatric morbidity was 47.5%. The most common diagnoses were nocturnal enuresis (22.0%) and specific phobia (15.3%). Subclinical depression was more common than Major Depressive Disorder (MDD). 28.8% reported suicidal thoughts, 5.1% suicidal intent, and 1.7% suicide attempts.	Lack of control group and prospective studies; limited sample size.
(Attar et al, 2021)	To investigate the frequency of suicidal thoughts, readiness, and attempts in individuals with thalassemia.	Iran	150 thalassemia patients, age range 10 to 46 years.	Suicidal thoughts, readiness, and attempts (Beck Suicidal Thoughts Assessment Questionnaire).	The prevalence of suicidal thoughts was 78.7%, suicide readiness 14%, and suicidal intent 7.3%. There was a significant negative correlation between age and the prevalence of suicidal thoughts/attempts (−0.234). The average prevalence of suicidal thoughts/attempts was significantly higher in men (1.89) than in women (0.79).	Lack of complete study on psychosocial indicators like social support and life expectancy.

(*Continued*)

Table 1 (Continued).

Authors, Year	Objective	Country	Sample	Variables	Key Results	Identified Knowledge Gaps
(Behdani et al, 2015)	To assess the psychological aspects and Quality of Life (QOL) in Iranian children and adolescents with thalassemia major compared with the control group.	Iran	60 patients with thalassemia major and 60 healthy control subjects, aged 7–18 years.	Depression (CDI), Anxiety (SATA), QOL (PedsQL™), Behavioral Screening (SDQ).	Children with TM had more psychological problems and lower QOL than healthy subjects (P = 0.001). Depression rates were higher in the TM group (P = 0.015). Approximately 26.7% of TM patients experienced depression.	Dearth of studies addressing QOL across different age groups; need for integrated psychiatric clinics.
(Kaewkong et al, 2025)	To compare health risk behaviors between adolescents with thalassemia and healthy controls, and to identify associated clinical and sociodemographic factors.	Thailand	60 adolescents with thalassemia and 60 age- and sex-matched healthy controls, aged 10–18 years.	Health risk behavior (Thai Youth Risk Behavior Survey/YRBS), mental health problems, unintentional injuries, acts of violence, disease severity (Hb levels).	Adolescents with thalassemia reported higher rates of seatbelt failure (25.0% vs. 1.7%) and mental health problems (13.3% vs. 0.8%). Lower pre-transfusion hemoglobin levels were associated with an increased risk of mental health problems.	Cross-sectional design limits causality; reliance on self-reporting; single-center nature.
(Yetim Şahin et al, 2024)	To investigate the levels of depression and anxiety and related psychological disorders in adolescents with transfusion-dependent thalassemia (TDT).	Türkiye	40 adolescents with TDT and 62 healthy controls, aged 10 to 18 years.	Depression, generalized anxiety, separation anxiety, panic disorder, social phobia, obsessions (Revised Child Anxiety and Depression Scale/ RCADS).	All subscale scores (depression, anxiety, obsession, panic disorder, and social phobia) were significantly higher in the TDT group. Frequent transfusions (biweekly) and younger age (<15 years) were associated with a higher risk of psychological disorders.	Information on socioeconomic status and family education level was lacking.
(Ghiam et al, 2010)	To evaluate the relationship of thalassemia minor with suicide, impulsivity, and aggression.	Iran	293 suicide subjects, 300 violent criminals, and 300 control subjects (all screened for thalassemia minor trait).	The presence of Thalassemia Minor trait is associated with suicidal behavior and violent crime.	Thalassemia trait did not show a significant correlation with increased rates of violence and suicide. The prevalence of thalassemia trait in criminal groups (7.3%) and suicide subjects (8.9%) did not differ significantly from controls (6.7%).	Male-only sample; need for large epidemiological studies with follow-up periods.
(Ghanizadeh et al, 2006)	To study the level of psychiatric disorders and suicidal behavior in children with thalassemia major.	Iran	110 TM subjects, age range 7 to 18 years.	Mental disorders (Farsi version of K-SADS), depressive symptoms, suicidal behavior, anxiety symptoms.	The most common psychiatric disorders were Major Depressive Disorder (6.4%) and Separation Anxiety Disorder (4.5%). Approximately 49% experienced depressed mood; 62.7% experienced irritability and anger. Rates of suicidal behavior were not higher than those in the general population.	Need for control groups and more detailed correlation studies with medical and demographic data.

(*Continued*)

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Table 1 (Continued).

Authors, Year	Objective	Country	Sample	Variables	Key Results	Identified Knowledge Gaps
(Yengil et al, 2014)	To assess depression and anxiety in BTM patients and their caregivers, and evaluate their impact on quality of life.	Türkiye	88 BTM patients (age > 12 years) and 63 caregivers.	Depression (BDI), Anxiety (BAI), Quality of Life (SF-36).	Depression was found in 20.5% of patients and 28.6% of caregivers. Depression negatively impacted both physical and mental components of QOL in both patients and caregivers, independent of anxiety. 96.6% of patients and 98.4% of caregivers reported suicidal ideation.	Limited number of studies investigating caregivers; small sample size for longitudinal conclusions.
(Beratis, 1993)	To assess the psychosocial status in pre-adolescent children with beta-thalassemia.	Not mentioned explicitly, but in a Mediterranean/ European context.	Pre-adolescent children with beta-thalassemia (small sample).	Mental disorders (DSM-III -R based diagnostic interview), psychosocial status.	Detecting a high rate of Oppositional Defiant Disorder (ODD) of 41.9%. The prevalence of enuresis was reported at 12.2%.	Small sample size; limited geographic context; necessity for broader age group comparison.

Range and Prevalence of Suicidal Ideation

A literature review reveals wide variation in the reporting of suicidal ideation. One study found that 28.8% of children and adolescents reported suicidal thoughts, although rates of intent (5.1%) and suicide attempts (1.7%) were much lower.[18] In contrast, significantly higher prevalence rates were found in older populations, reaching 96.6%[28] and 78.7%.[19] Another study noted that 43.6% of patients had recurrent thoughts of death, while 27.3% had considered suicide in the past year.[21] However, one study evaluating carriers of the thalassemia minor trait found no significant correlation between carrier status and increased risk of suicide or violence.[22]

Clinical Factors and Treatment Burden

Several studies have explored the relationship between clinical conditions and mental health:

Hemoglobin Level

Lower pre-transfusion hemoglobin levels were significantly associated with an increased risk of mental health problems, including suicidal ideation.[27]

Transfusion Frequency

Patients undergoing transfusions every two weeks showed a higher risk of psychological disorders, including increased total depression and anxiety.[9]

Ferritin Levels

Although serum ferritin levels are positively correlated with depression and anxiety scores, this factor is often influenced by age and transfusion frequency as confounding variables.[9]

Psychosocial and Demographic Factors

Demographic factor mapping shows mixed results:

Age: There is a negative association between age and the prevalence of suicidal ideation, with the risk tending to decrease with age in certain samples.[19] However, adolescents under the age of 15 have been identified as the most vulnerable group for obsessive-compulsive disorder and total anxiety.[9]

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Gender: Results regarding gender are contradictory; one study reported a higher risk in women,[18] while another study found a higher prevalence of suicidal ideation in men[19] or higher anxiety and obsession scores in men.[9]

Psychosocial Impact: This chronic disease triggers feelings of isolation, social stigma, and low self-esteem due to physical changes such as growth retardation.[13,26] Thalassemia also negatively impacts quality of life (QOL), with thalassemia patients having a lower QOL than healthy controls.[13,27]

Identification of Knowledge Gaps

Based on evidence mapping, several major knowledge gaps were identified:

Study Design: All included studies were observational (cross-sectional or case-control), and no Randomized Controlled Trials (RCTs) or longitudinal studies tracking the development of suicidal ideation over time were found.

Instruments: Most studies rely heavily on self-report instruments, although some studies have used structured diagnostic interviews such as the K-SADS.[18,21]

Interventions: There is limited evidence regarding the effectiveness of specific interventions to reduce suicidal ideation in the thalassemia population, although family social support is often identified as a potential protective factor.

The synthesis of findings from the nine included studies is structured through the PAGER (Patterns, Advances, Gaps, Evidence for Practice, and Research Recommendations) framework to critically map the current research landscape and identify the dynamic relationship between clinical burden and suicidal risk in adolescents with thalassemia. This framework reveals a consistent pattern of heightened psychological distress tied to disease severity and transfusion frequency, while recognizing the methodological advance toward more rigorous, clinician-led assessment tools (Table 2).

Table 2 PAGER Framework: Suicidal Ideation in Adolescents with Thalassemia

Pattern	Advance	Gap	Evidence for Practice	Research Recommendation
High Psychological Vulnerability Adolescents with Thalassemia Major (TM) consistently show higher risks for suicidal ideation, depression, and anxiety compared to healthy peers.	**Clinician-Led Diagnostic Tools** There is a move toward using semi-structured interviews (e.g., K-SADS) alongside self-reports to reduce over-diagnosis and improve diagnostic accuracy.	**Lack of Longitudinal Data** Current evidence is almost entirely cross-sectional, failing to describe the nature and course of suicidal symptoms over time.	**Routine Mental Health Screening** Integration of validated tools (K-SADS, RCADS, Beck) into standard hematological follow-ups is essential for early detection.	**Strengthening Study Designs** There is an urgent need for Randomized Controlled Trials (RCTs) and prospective longitudinal studies to validate intervention efficacy.
Clinical-Psychosocial Interplay Suicidal risk is driven by disease severity (low Hb levels, high ferritin) combined with social factors like stigma and isolation.	**Holistic Multidisciplinary Care** Emerging care models recommend establishing pediatric psychiatric clinics alongside thalassemic units for integrated treatment.	**Absence of Intervention Evidence** No studies currently evaluate the effectiveness of specific psychological protocols for reducing suicidal risk in this population.	**Targeting High-Risk Subgroups** Prioritizing screening for early adolescents (<15 years) and those requiring biweekly blood transfusions.	**Biological-Psychological Mechanisms** Future research should explore biological pathways, such as the impact of iron deposition in the brain on mood disorders.
Demographic and Regional Conflicts Findings on age and gender remain inconsistent, with risk profiles varying significantly across different cultural and geographic contexts.	**Biological Trait Investigations** Research has begun to differentiate between chronic disease burden (TM) and biological traits (Minor), clarifying that carrier status alone is not a primary risk factor for suicide.	**Geographical Bias** Literature is heavily concentrated in the "Thalassemia Belt" (Iran and Turkey), limiting the global generalizability of findings.	**Family-Based Support Systems** Psychosocial interventions involving family and community support are noted as major catalysts for reducing patient hopelessness.	**Multicenter Global Studies** Expansion of research to broader geographic and cultural contexts to understand the influence of varying social support systems.
Subjective vs. Objective Reporting Discrepancies exist between adolescent self-reports and parent/clinician observations regarding the severity of psychological distress.	**Digital and App-Based Support** Potential for digital platforms to offer disease education and peer support to reduce social isolation in chronic illness.	**Self-Report Dependence** Heavy reliance on subjective questionnaires rather than objective physiological metrics or direct behavioral observations.	**Optimizing Treatment Adherence** Clinical care focusing on maintaining optimal Hb levels (>9 g/dL) is directly correlated with better mental health outcomes.	**Objective Metric Improvement** Use of longitudinal tracking and more objective measurement tools to suppress subjective reporting bias.

Abbreviations: PAGER, Patterns, Advances, Gaps, Evidence for Practice, Research Recommendations; TM/TDT, Thalassemia Major / Transfusion-Dependent Thalassemia; K-SADS, Kiddie Schedule for Affective Disorders and Schizophrenia; RCADS, Revised Child Anxiety and Depression Scale; Hb, Hemoglobin.

Discussion

This scoping review indicates that suicidal ideation is a significant and highly prevalent mental health problem among adolescents with thalassemia major. Findings from various studies indicate wide variations in prevalence, ranging from 28.8% in adolescents in Turkey to as high as 78.7% in patients in Iran.[18,19] These striking differences in prevalence rates are likely influenced by contextual factors, including social support systems, the quality of local healthcare services, and socioeconomic conditions in each country.[19,29] Overall, the literature confirms that adolescents with thalassemia major are at high psychological risk, requiring immediate clinical attention.[18]

Variations in research findings are also significantly influenced by differences in methodology and participant age. Studies using structured diagnostic interviews such as the K-SADS tend to report lower rates than studies using self-report instruments such as the Beck Suicide Thought Assessment Questionnaire.[18,28] For example, a suicidal ideation rate of 96.6% was reported in a study involving an older age group with a mean age of 17.42 years, while studies with a mean age of 11 years reported lower rates.[18,28] This suggests a trend toward an increased risk of suicidal ideation as adolescents age.[18]

Clinical factors and treatment burden play a crucial role in triggering psychological distress that leads to suicidal ideation. The chronic nature of thalassemia requires adolescents to undergo intensive medical procedures, such as regular blood transfusions and iron chelation therapy.[30,31] Studies show that low pre-transfusion hemoglobin levels significantly increase the risk of mental health problems.[27] Furthermore, patients who require more frequent blood transfusions, such as every two weeks, have been found to have higher total depression and anxiety scores than those with less frequent transfusions.[9,32]

In addition to physical burdens, psychosocial factors such as stigma and social isolation are major contributors to the risk of suicidal ideation. Adolescents with thalassemia often feel different or isolated from their peers due to physical limitations and frequent hospitalizations.[33] Obvious physical changes, including facial bone deformities, darkening of the skin, and delayed puberty, often damage self-image and lower self-esteem.[13,26] Feelings of helplessness in facing the future due to this chronic illness exacerbate depressive symptoms and trigger thoughts of death.[34]

The relationship between demographic factors such as age and gender and suicidal ideation has shown contradictory results in the literature. The study indicate that early adolescents (under 15 years of age) are at highest risk for anxiety disorders and depression due to the stress of delayed pubertal changes.[9] However, other studies have found a significant negative correlation, with the prevalence of suicidal ideation tending to decrease with age.[19] Regarding gender, a higher risk has been found in females in some contexts due to emotional vulnerability, but other studies have reported a higher prevalence of suicidal ideation in males, which is associated with psychological distress related to future social roles.[18,19,27]

It is important to note that this psychological burden appears to be more specific to thalassemia major than to thalassemia minor or trait carriers. While there are biological hypotheses linking hypocholesterolemia in thalassemia minor to impulsive and aggressive behavior, studies have failed to demonstrate a significant correlation between thalassemia carrier status and an increased risk of suicide or violence.[22,35] These findings strengthen the argument that suicidal ideation in thalassemia is driven more by the burden of disease chronicity and daily psychosocial challenges than simply biological genetic factors.[32,36]

Despite the seriousness of this issue, the current literature still suffers from significant methodological limitations. Most available studies utilize cross-sectional designs, which only provide a snapshot at a single point in time and cannot account for the longitudinal development of suicidal ideation.[6,27] Furthermore, there is a lack of randomized controlled trials evaluating the effectiveness of specific mental health interventions for this population.[7,9] This gap highlights the need for future research that focuses more on evidence-based interventions and long-term mental health tracking.

As a clinical implication, it is highly recommended that thalassemia service centers integrate routine mental health screening into standard care protocols. The use of validated measurement tools is crucial for early detection of depressive symptoms and suicidal ideation.[16,18] Furthermore, a multidisciplinary approach involving pediatricians, psychiatrists, and social workers is essential for providing holistic support, especially for adolescents at high clinical risk.[27,37] Establishing a child psychiatry clinic adjacent to a thalassemia clinic could be a strategic step to comprehensively address the psychological aspects of this disease.[13,38]

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Analysis of PAGER patterns suggests that the vulnerability of adolescents with Thalassemia Major (TM) to suicidal ideation is not simply a statistical phenomenon, but rather a manifestation of the failure of support systems to compensate for the biological burden of the disease. Despite advances in the use of diagnostic instruments such as the K-SADS to differentiate between general emotional distress and clinical mental disorders,[18] the literature still shows marked inconsistencies in prevalence across geographic regions.[19,21] This suggests that the sociocultural context and the quality of local healthcare services are as influential as clinical parameters such as hemoglobin levels in determining an individual's degree of suicide risk. The association between high transfusion frequency and depression levels suggests that medical procedures that are supposed to prolong life often erode the psychological stability of these adolescents.[9]

The knowledge gaps identified in PAGER, particularly the lack of longitudinal studies and RCTs imply the lack of evidence-based mental health intervention protocols for this population. This lack of data contributes to current clinical practice being reactive rather than preventive, often missing opportunities for early intervention before ideation becomes action.[19,27] The recommendation to integrate psychiatric services directly into thalassemia centers[13] is a crucial step in bridging theoretical advances with practical needs, but its effectiveness will remain limited without a shift from reliance on self-reports to more objective measurement methods. Therefore, future research must not only map risk but also critically evaluate the role of family interventions and peer support in mitigating the impact of social isolation and stigma, which have been identified as key drivers of psychological vulnerability in adolescents with thalassemia.[27]

Implications And Recommendations

This review provides important insights for clinical practice and health policy related to adolescents with thalassemia, particularly regarding the early detection and management of suicidal ideation. Based on the findings, one key implication is the need for routine mental health screening in thalassemia patients, especially among adolescents, to identify symptoms of depression and suicidal ideation at an early stage. This screening can be conducted using validated measurement tools such as the K-SADS or the Beck Suicide Thought Assessment Questionnaire, which have been used in several of the reviewed studies. Given the high prevalence of suicidal ideation found, a multidisciplinary approach involving physicians, psychologists, and social workers is essential to provide more holistic support for adolescents with thalassemia.

Furthermore, the development of intervention programs that are more sensitive to the psychosocial conditions of adolescents with thalassemia needs to be prioritized. Family- and community-based intervention programs that prioritize emotional support, stress management, and improving mental health literacy can be effective in reducing the psychological burden faced by adolescents. Furthermore, educational programs for parents and medical personnel on the importance of mental health monitoring in thalassemia patients are also needed to enable early detection and management of psychological problems.

Limitations

This review has several limitations, primarily related to the methodology used in the analyzed studies. Most used cross-sectional designs, which only provide a snapshot at a specific point in time and cannot describe changes or developments in suicidal ideation over the long term. Furthermore, the reviewed studies were predominantly from countries in the Thalassemia Belt, such as Iran and Turkey, which may not fully reflect global conditions, particularly in countries with lower thalassemia prevalence or limited resources. Another limitation is the use of self-report-based instruments in most studies, which may affect the accuracy of the data obtained. Therefore, studies with longitudinal designs, more geographically diverse samples, and the use of more objective measurement tools are urgently needed to strengthen the findings of this review.

Conclusions

Adolescents with thalassemia major face significant psychological vulnerability to suicidal ideation, fueled by the physical and emotional burden of the chronic disease. This condition is strongly influenced by clinical factors such as disease severity and the need for intensive and frequent blood transfusions. In addition to medical challenges, psychosocial factors such as disease stigma, social isolation, and feelings of being different from peers exacerbate the mental distress experienced by these adolescents. The complex interaction between declining physical health and barriers to social development ultimately creates a sense of hopelessness that increases the risk of overall psychological vulnerability.

Effective treatment requires the integration of routine mental health screening into standard care protocols to detect depressive symptoms and suicide risk early. Multidisciplinary approaches involving family and community support have been shown to have significant potential in reducing emotional burden and providing psychological protection for patients. Although social support-based interventions have shown positive results, the current literature is still dominated by cross-sectional studies, limiting understanding of the long-term development of risk. Therefore, future research with longitudinal designs is urgently needed to develop more targeted and sustainable prevention strategies for adolescents with thalassemia.

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