

# Gender Disparities in Psychological Disturbances and Quality of Life Among Adolescent and Adult Patients with Thalassemia: A Review

Pandji Irani Fianza<sup>1</sup>, Anita Rahmawati<sup>1</sup>, Indra Wijaya<sup>1</sup>, Amaylia Oehadian<sup>1</sup>, Dimmy Prasetya<sup>1</sup>, Putri Vidyaniati<sup>1</sup>, Gusti Fungani Harti<sup>1</sup>, Trinugroho Heri Fadjar<sup>1</sup>, Ramdan Panigoro<sup>2</sup>

<sup>1</sup>Division of Hematology and Medical Oncology, Department of Internal Medicine, Faculty of Medicine, Universitas Padjadjaran/Hasan Sadikin General Hospital, Bandung, Indonesia; <sup>2</sup>Department of Biomedical Sciences, Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia

Correspondence: Pandji Irani Fianza, Department of Internal Medicine, Division of Hematology and Medical Oncology, Faculty of Medicine, Universitas Padjadjaran/Hasan Sadikin General Hospital, Pasteur Street No. 38, Bandung, Indonesia, Tel +62-22-203-4954, Email pandji.irani.fianza@unpad.ac.id

**Abstract:** Thalassemia is a chronic disease caused by impaired globin chain synthesis, leading to ineffective erythropoiesis, hemolysis, and chronic anemia. The treatment of patients with thalassemia, including blood transfusion combined with chelation therapy has progressed and improved their survival and prognosis. However, thalassemia-related psychological problems and impaired health-related quality of life (QoL) challenges still exist. Gender is one of the factors that has been suggested, to contribute to the disparities in psychological outcomes. This review article examined the evidence for gender differences in psychological disturbances and QoL in adolescent and adult patients with thalassemia. A non-systematic search of the literature was conducted in PubMed and Google Scholar for English full-text available from 2013 to 2023. We identified 23 studies with a sample size  $\geq 100$  that examined gender disparities in anxiety, depression, and QoL in adolescent and adult patients with thalassemia (mean prevalence of female = 53.1%; mean age = 28 years). Our review shows that there are gender disparities in psychological distress and QoL in adolescent and adult patients with thalassemia. Statistically significant gender differences were demonstrated in 62% of the psychological and QoL outcomes from 16 studies. Female patients had a higher prevalence of anxiety, depression, and poorer QoL in some studies. However, further studies with sufficient power and design are necessary to confirm the existence of gender disparities in psychological disturbances and QoL outcomes.

**Keywords:** gender disparities, anxiety, depression, quality of life, thalassemia

## Introduction

Thalassemia is a hereditary disorder caused by impaired globin chain synthesis, leading to ineffective erythropoiesis, hemolysis, and chronic anemia.<sup>1-4</sup> This genetic disease is prevalent in the thalassemia belt regions, including the Mediterranean countries (Italy, Greece, and Cyprus), Southeast Asia (especially Thailand, Cambodia, and Indonesia), as well as Turkey, Iran, and India.<sup>3,5-7</sup> The main treatment of thalassemia is repeated blood transfusion to correct the anemia, which can result in iron overload. Therefore, iron-chelating therapy is necessary to prevent complications of iron overload.<sup>1,8-10</sup>

Although the survival of patients with thalassemia has increased through a combination of regular blood transfusion and iron-chelating therapy,<sup>1,9,11-14</sup> serious clinical and psychological challenges still exist.<sup>11,15</sup> Patients with thalassemia face several problems during their lives, including the signs and symptoms of thalassemia, the presence of complications and comorbid chronic conditions, and treatment-related issues including painful injections and regular hospital visits due to blood transfusions.<sup>16-18</sup> It has been known that patients with thalassemia suffer from a wide range of psychological problems and health-related quality of life (QoL).<sup>7,13,19-22</sup> They may develop anxiety and depression because of social problems such as uncertainties about the future and limited social activity.<sup>6,21,23</sup>

Although many studies about psychological disturbances and QoL in patients with thalassemia have been published, only limited studies discussed the impact of gender differences in those aspects. Gender is one of the factors that has been

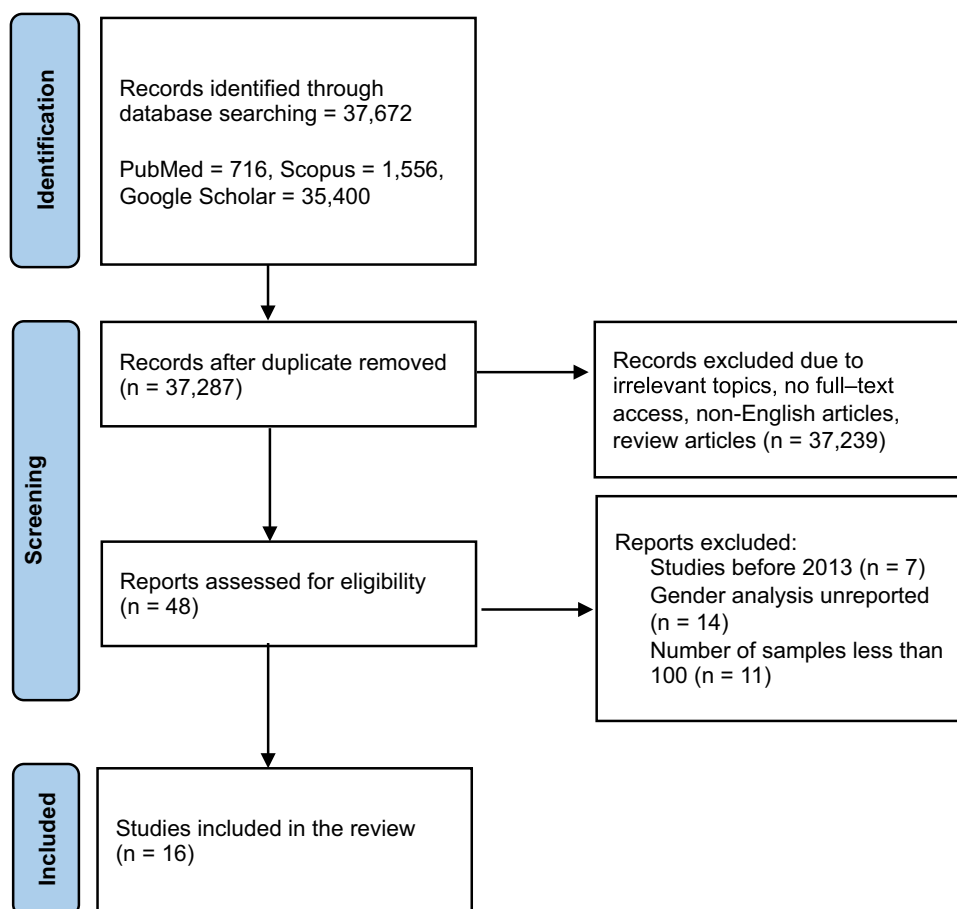
suggested to contribute to the disparities of psychological outcomes in chronic conditions.<sup>24–26</sup> Additionally, there is also a rising concern about the impact of gender on psychological and QoL outcomes in patients with thalassemia. Therefore, this review aimed to investigate the association between gender and psychological disturbances, as well as health-related QoL in adolescent and adult patients with thalassemia.

## Methods of Review

A comprehensive literature review was conducted using online sources, including PubMed, Scopus, and Google Scholar. The authors used a combination of the following search terms: “mental health” OR “mental illness” OR “psychological distress” OR “psychological disturbances” OR “anxiety” OR “depression” OR “quality of life” AND “thalassemia”. The inclusion criteria for the selection of studies for review were as follows: studies related to anxiety, depression, or QoL among adolescent and adult patients with thalassemia. We included original research articles written in English from 2013–2023. Figure 1 shows the article selection process. Articles that did not analyze gender associated with psychological distress or QoL were excluded. The sample size was set at a minimum of 100 to confirm an adequate power for statistical analyses in the studies. Only studies with quantitative methods were selected as the main articles. We identified 16 articles (sample sizes  $N = 100$ –10,046; mean prevalence of female 53.1%; mean age = 28 years), which met our inclusion criteria for review. The studies are listed in Table 1. A total of 21 outcomes from the 16 studies were examined in this review.

## Anxiety and Depression

Three out of 16 studies analyzed gender differences concerning anxiety.<sup>30,32,33</sup> Two studies demonstrated that female patients with thalassemia reported more anxiety than males.<sup>30</sup> One study showed that females had higher scores on anxiety symptoms, but the difference was not statistically significant.<sup>32</sup>



**Figure 1** The flow diagram of study selection in this review.

**Table I** Overview of Studies Examining Gender Disparities in Psychological Disturbance and Quality of Life Among Adolescent and Adult Patients with Thalassemia Listed Chronologically According to Year of Publication

| Author                                  | Study design    | Country            | N      | % Female (N) | Endpoint                 | Impact of Gender |
|---|-----------------|--------------------|--------|--------------|--------------------------|------------------|
| Ansari et al* (2014) <sup>27</sup>      | Case-control    | Iran               | 250    | 48.4 (121)   | QoL                      | +                |
| Khairkhah et al* (2015) <sup>28</sup>   | Cross-sectional | Iran               | 150    | 53.3 (80)    | QoL                      | +                |
| Gan et al (2016) <sup>29</sup>          | Cross-sectional | Malaysia           | 127    | 62.2 (79)    | QoL                      | -                |
| Seyedifar et al (2016) <sup>30</sup>    | Cross-sectional | Iran               | 512    | 50.2 (257)   | QoL, anxiety, depression | +                |
| Floris et al* (2018) <sup>31</sup>      | Cross-sectional | Italy              | 190    | 49.5 (94)    | QoL                      | +                |
| Maheri et al (2018) <sup>32</sup>       | Cross-sectional | Iran               | 389    | 54.0 (210)   | Anxiety, depression      | -                |
| Patel et al (2018) <sup>33</sup>        | Retrospective   | United States (US) | 10,046 | 69.6 (6994)  | Anxiety, depression      | +                |
| Patel et al* (2019) <sup>34</sup>       | Cross-sectional | Sri Lanka          | 120    | 53.6 (74)    | QoL, depression          | +                |
| Yousif et al (2019) <sup>35</sup>       | Cross-sectional | Iraq               | 100    | 53.0 (53)    | Depression               | +                |
| Goulas et al (2020) <sup>36</sup>       | Cross-sectional | Greece             | 131    | 56.5 (74)    | QoL                      | -                |
| Rikos et al* (2020) <sup>37</sup>       | Cross-sectional | Greece             | 119    | 52.9 (63)    | QoL                      | +                |
| Hamdy et al (2021) <sup>38</sup>        | Cross-sectional | Egypt              | 112    | 43.8 (49)    | QoL                      | + (VT)           |
| Khodashenas et al* (2021) <sup>39</sup> | Cross-sectional | Iran               | 100    | 55.8 (53)    | QoL                      | -                |
| Mardhiyah et al (2022) <sup>40</sup>    | Cross-sectional | Indonesia          | 120    | 45.8 (55)    | QoL                      | -                |
| Sarhan et al* (2022) <sup>41</sup>      | Cross-sectional | Palestine          | 163    | 55.2 (90)    | Depression               | +                |
| Hossain et al (2023) <sup>42</sup>      | Cross-sectional | Bangladesh         | 356    | 46.0 (163)   | QoL                      | + (BP, PHS)      |

**Notes:** \*Gender only used as covariate, VT, vitality (SF-36); BP, bodily pain (SF-36); PHS, physical health summary (SF-36).

Six out of sixteen studies examined gender disparities in depression.<sup>30,32–35,41</sup> Four studies demonstrated that females faced more depression than males.<sup>30,33–35</sup> On the contrary, one study found that males reported more depression symptoms than females.<sup>41</sup> Results from another study showed no relationship between gender and depression.<sup>32</sup>

## Quality of Life

Twelve out of sixteen studies investigated gender differences concerning QoL.<sup>27–31,34,36–40,42</sup> Four studies found that women had reduced QoL in terms of lower satisfaction with physical health, psychological health, and social relationships,<sup>34</sup> lower vitality domain,<sup>38</sup> bodily pain, and physical health summaries,<sup>42</sup> and faced more problems on daily activity than males.<sup>30</sup> Contrary to those results, two studies found that females had better QoL<sup>27</sup> and significantly higher scores in the overall perception of the health domain.<sup>31</sup> The other six studies did not show a significant association between QoL and gender, although the scores were lower in females.<sup>28,29,36,37,39,40</sup>

There was a 62% (13 out of 21) statistically significant gender impact associated with the outcomes reported in the 16 studies overall (Table 1). Therefore, there is an indication to suggest the existence of gender differences in psychological and QoL outcomes among adolescent and adult patients with thalassemia.

## Discussion

Regular blood transfusion in thalassemia treatment aims to reduce the complications of severe thalassemia by ameliorating anemia and suppressing erythropoiesis. Morbidity and mortality related to thalassemia have been reduced significantly with the administration of iron-chelating therapy.<sup>4,43</sup> Nonetheless, patients with thalassemia suffer from a variety of symptoms, including large spleen and liver, bone disorders, and especially visible changes in head and facial bones with a change in gaze.<sup>6,44</sup> Bone deformities and short stature may contribute to poor self-image. Severe complications such as heart failure, liver disease, and infections are common among patients with thalassemia. Painful and prolonged treatments of thalassemia, physical abnormalities, increased risk of death, and activity limitation expose the patients to mental health and emotional conditions, causing anxiety, depression, and deterioration QoL.<sup>45,46</sup>

Previous studies found that anxiety is prevalent in patients with thalassemia. Thalassemia as a chronic disease can lead to anxiety and worry as other chronic illnesses. Adolescents and adults with thalassemia had several physical problems, which resulted in stress.<sup>47</sup> The stress exposure may be a source of anxiety for patients with thalassemia.<sup>48</sup>

Additionally, the anxiety could be a consequence of repeated blood transfusions, fear of death, concern about family formation, negative thoughts, and different feelings in these patients.<sup>30,32,33,49</sup>

Patients with thalassemia were predisposed to depression. The prevalence of depression in adults with thalassemia ranges from 10.3–35% depending on different factors, including the design and power of the study, different types of questionnaires, as well as the place it was conducted.<sup>50</sup> Depression is a disorder of mental with changes in cognitive function, mood, behavior, and physical health,<sup>51</sup> which may be a result of the long-term treatment and chronicity of the thalassemia.<sup>18,52</sup> Depression and thalassemia have bidirectional relationships. Depressed patients with thalassemia had more fatigue, discomfort, pain, and sleep disturbance, while depression affects the physical and mental health of patients with thalassemia.<sup>48,53</sup> It is related to morbidity and mortality because of its effect on decreased compliance.<sup>54</sup> It has been suggested that all patients with thalassemia should be assessed for depression so that suitable interventions can be implemented.<sup>55</sup>

Genetic components may contribute to the etiology of depression in patients with thalassemia. Genetic studies showed a possible genetic predisposition for depression on chromosome 11, which is close to the gene responsible for thalassemia.<sup>51,56</sup> Additionally, it has been found one of the human tryptophan hydroxylase genes (TPH1) on the short arm of chromosome 11 (11p14-p15.3), which plays the role of a rate-limiting enzyme in serotonin biosynthesis that is associated with depressive symptoms.<sup>22,57</sup> Hypothalamic-pituitary-adrenal (HPA) axis will respond to the depression and cause an increase in basal cortisol levels, which will affect the symptoms of depression and worsen the course of the disease. On the other hand, iron toxicity can alter the HPA axis, which results in lower ACTH levels.<sup>44</sup>

Gender plays a role in the likelihood of the detection process and diagnosis of mental disease. Females may have many psychological disorders. Furthermore, the role of females as caregivers in the family enhances difficulty and stress in their lives. There is a discrepancy between gender role expectations and the needs that may lead to psychological distress.<sup>58</sup> Different psychological disorders affect females more than males. Females tend to have depression and anxiety disorders.<sup>53</sup> However, in this review only one study in Palestine showed that males reported more depression than females.<sup>41</sup> The reasons for this contradiction were high social expectations for marriage, economic success, education, and responsibility for the family in this population of male patients.

Adolescent and adult patients with thalassemia are at higher risk of developing psychological disorders associated with physical, mental, and social problems that result in decreased QoL.<sup>15,47,59,60</sup> QoL measurement is a multidimensional concept that emphasizes the influence of the disease and its treatment on the well-being of an individual.<sup>12,61,62</sup> Thalassemia influences the patients' well-being, which is reported as a difference in QoL regarding psychological, social, and health-related issues. The results varied widely from study to study, which can be attributed to the differences in socioeconomic status, countries where studies took place, and differences in healthcare quality.<sup>63</sup> QoL is an acceptable index to evaluate the overall health of patients with thalassemia.<sup>39</sup> Evaluation of factors associated with the QoL is essential in developing clinical counseling and social support programs that could positively affect the outcome.<sup>55,64</sup>

In this review, impaired QoL due to bodily pain has been observed in patients with thalassemia. Adolescent patients with thalassemia experienced pain similar to the general population, whereas older adults experienced worsened pain. Low vitamin D levels are associated with increased pain and lower bone density. Some possible pain mechanisms in thalassemia include pathologic fractures and impingement on nerve roots by hematopoietic masses. Increased pain was observed with the administration of deferoxamine, which may be due to the route of administration. Pain can reduce QoL in terms of both physical functioning and mental health.<sup>11</sup>

It has been shown that gender differences existed in the observed data of the QoL in patients with thalassemia. Females tend to report lower health-related QoL scores than males.<sup>30,34,38,42</sup> In addition, females may be more willing to discuss symptoms and reporting of health-related QoL than males.<sup>26</sup> Females without social support who are exposed to life events are more vulnerable than males.<sup>25</sup> Female patients may have more emotional distress, which refers to poorer QoL when compared to males. Conversely, two studies found that females had better QoL<sup>27</sup> and significantly higher scores in the overall perception of the health domain.<sup>31</sup> This discrepancy could be due to a burden focused on males in different countries. Additionally, in Western countries, female patients with thalassemia show a better prognosis, which could improve their health perception and QoL.

The findings regarding gender differences in psychological problems and QoL among patients with thalassemia were important for comprehensive thalassemia management. Screening and prevention of the emergence of mental disorders

were recommended for patients with thalassemia.<sup>44</sup> Routine monitoring and treatment of complications were also compulsory. The gender differences in psychological disturbances and QoL suggest the requirement for more attention to female patients and for areas of enhancement to be explored.<sup>56</sup> A gender approach to health means socio-biological factors identification and thoughtful consideration of how gender difference influences health outcomes. A gender approach to mental health assists in the appropriate responses from the mental healthcare system.<sup>25</sup> Adolescent and adult patients with thalassemia require support through personalized psychological and social programs to help them overcome all the problems related to chronic illness and its complications. Such provision may improve the QoL, enhance a productive and hopeful life, and ensure their role and acceptance within their community.<sup>7,13,23,27,35</sup> Additionally, counseling may help to reduce the depression, anxiety, and fear experienced by patients with thalassemia. It also can increase QoL.<sup>46</sup> Studies showed that patients with good psychosocial status demonstrated better treatment adherence, including regular blood transfusion and iron-chelating therapy.<sup>16,53,65</sup>

Although females seem to have higher anxiety or depression symptoms and tend to report poorer QoL, there were some limitations of the studies in this review to be considered. Some of the studies only included gender as a covariate in adjusted analysis rather than focusing on gender differences as the main objective of the study. The methodological differences among the studies, including the study design, timing of the psychological assessment, and the way to assess the outcomes (such as generic questionnaires or medical diagnosis based on diagnostic criteria) should be considered. Additionally, most studies used convenience samples and cross-sectional study design. Therefore, it was difficult to explain and determine the cause and effect of gender on psychological disturbances and QoL.

## Conclusion

Based on the reviewed research studies, gender is suggested as an essential contributor to disparities in psychological disturbances and QoL among adolescent and adult patients with thalassemia. Female patients tend to report more anxiety or depression symptoms and tend to have lower QoL than males. Nonetheless, future research with a good study design and including a large-scale population is necessary to elucidate the exact influence of gender on psychological and QoL outcomes. Additionally, patients with thalassemia should be screened for comorbid mental disorders. They are likely to need some assistance with psychological adjustment, especially females. A multidisciplinary team should be involved in treating patients with thalassemia. The provision of psychological-related treatment may result in decreased anxiety and depression, together with improvement of QoL.

## Disclosure

The authors declare no conflicts of interest in this work.

## References

- Meri MA, Al-Hakeem AH, Al-Abeadi RS. Overview on thalassemia: a review article. *Med Sci J Adv Res*. 2022;3(1):26–32. doi:10.46966/msjar.v3i1.36
- Tari K, Ardalan PV, Abbaszadehdibavar M, Atashi A, Jalili A, Gheidishahran M. Thalassemia an update: molecular basis, clinical features and treatment. *Int J BioMed Public Health*. 2018;1(1):48–58. doi:10.22631/IJBMPH.2018.56102
- Motta I, Bou-Fakhredin R, Taher AT, Cappellini MD. Beta thalassemia: new therapeutic options beyond transfusion and iron chelation. *Drugs*. 2020;80(11):1053–1063. doi:10.1007/s40265-020-01341-9
- Khandros E, Kwiatkowski JL. Beta thalassemia: monitoring and new treatment approaches. *Hematol Oncol Clin North Am*. 2019;33(3):339–353. doi:10.1016/j.hoc.2019.01.003
- Arian M, Mirmohammadhani M, Ghorbani R, Soleimani M. Health-related quality of life (HRQoL) in beta-thalassemia major ( $\beta$ -TM) patients assessed by 36-item short form health survey (SF-36): a meta-analysis. *Qual Life Res*. 2019;28(2):321–334. doi:10.1007/s11136-018-1986-1
- Attar S, Bakhshani NM, Aliabad QM. An investigation on the frequency of thoughts, readiness and suicide attempt in individuals with thalassemia. *Pakistan J Medical Health Sci*. 2021;15(6):1847–1853. doi:10.53350/pjmhs211561847
- Yousuf R, Akter S, Wasek SM, Sinha S, Ahmad R, Haque M. Thalassemia: a review of the challenges to the families and caregivers. *Cureus*. 2022;14(12):e32491. doi:10.7759/cureus.32491
- Fianza PI, Rahmawati A, Widiastha SH, et al. Iron overload in transfusion-dependent Indonesian thalassemic patients. *Anemia*. 2021;2021:5581831. doi:10.1155/2021/5581831
- Forni GL, Grazzini G, Boudreaux J, Agostini V, Omert L. Global burden and unmet needs in the treatment of transfusion-dependent  $\beta$ -thalassemia. *Front Hematol*. 2023;2:1187681. doi:10.3389/frhem.2023.1187681
- Mohamed R, Rahman AHA, Masra F, Latiff ZA. Barriers to adherence to iron chelation therapy among adolescent with transfusion dependent thalassemia. *Front Pediatr*. 2022;10:951947. doi:10.3389/fped.2022.951947



11. Trachtenberg F, Foote D, Martin M, et al. Pain as an emergent issue in thalassemia. *Am J Hematol*. 2010;85(5):367–370. doi:10.1002/ajh.21670
12. Mulas O, Pili I, Sanna M, La Nasa G. Systematic review and meta-analysis of health-related quality of life in patients with  $\beta$ -thalassemia that underwent hematopoietic stem cell transplantation. *Clin Pract Epidemiol Ment Health*. 2023;19(Suppl-1,M3):e174501792301031. doi:10.2174/17450179-v17-e211208-2021-HT2-1910-4
13. Messina G, Colombo E, Cassinero E, et al. Psychosocial aspects and psychiatric disorders in young adult with thalassemia major. *Intern Emerg Med*. 2008;3(4):339–343. doi:10.1007/s11739-008-0166-7
14. Giannoni L, Angelucci E. Current and future therapies for  $\beta$ -thalassaemia: a review article. *EMJ Hematol*. 2021;9(1):94–104. doi:10.33590/emjhematol/20-00249
15. Zhang R, Zhang S, Ming J, et al. Predictors of health state utility values using SF-6D for Chinese adult patients with  $\beta$ -thalassemia major. *Front Public Health*. 2023;10:1072866. doi:10.3389/fpubh.2022.1072866
16. Haghpahan S, Nasirabadi S, Ghaffarpasand F, et al. Quality of life among Iranian patients with beta-thalassemia major using the SF-36 questionnaire. *Sao Paulo Med J*. 2013;131(3):166–172. doi:10.1590/1516-3180.2013.1313470
17. Rafii Z, Ahmadi F, Nourbakhsh SMK, Hajizadeh E. The effects of an orientation program on quality of life of patients with thalassemia: a quasi-experimental study. *J Caring Sci*. 2016;5(3):223–229. doi:10.15171/jcs.2016.024
18. Kalra RK, Kaur D, Sodhi M, Kaur J. Knowledge, attitude and practice in parents of chronically transfused thalassemic patients regarding thalassemia in thalassemia day care unit in government medical college, Amritsar, Punjab, India. *Int J Contemp Pediatr*. 2019;6(6):2469–2475. doi:10.18203/2349-3291.ijcp20194718
19. Akter K, Khatun S, Hossain MS. Lived experience of thalassaemic children in Bangladesh. *Open J Nurs*. 2020;10(11):1109–1125. doi:10.4236/ojn.2020.1011079
20. Zafar M. Common mental disorders and its associated factors among thalassemic patients. *Ann Indian Psychiatry*. 2022;6(4):328–331. doi:10.4103/aip.aip\_44\_22
21. Wangi K, Birriel B, Smith C. Psychosocial burden in transfusion dependent beta-thalassemia patients and its impact on the quality of life and the problem of dignity. *J Taibah Univ Med Sci*. 2023;18(6):1217–1219. doi:10.1016/j.jtumed.2023.05.002
22. Mansoor S, Othman Z, Othman A, Husain M. A descriptive study on quality of life among adolescents with beta-thalassemia major in the Maldives. *Int Medical J*. 2018;25:211–214. doi:10.5281/zenodo.2588035
23. Zeykani M, Nikmanesh Z. The effect of positive psychotherapy on perceived competence and quality of life among children with thalassemia. *Jundishapur J Chronic Dis Care*. 2018;7(1):e60809. doi:10.5812/jjcdc.60809
24. Brouwers C, van den Broek KC, Denollet J, Pedersen SS. Gender disparities in psychological distress and quality of life among patients with an implantable cardioverter defibrillator. *Pacing Clin Electrophysiol*. 2011;34:798–803. doi:10.1111/j.1540-8159.2011.03084.x
25. Afifi M. Gender differences in mental health. *Singapore Med J*. 2007;48(5):385–391.
26. Yu T, Enkh-Amgalan N, Zorigt G, Hsu Y-J, Chen H-J, Yang H-Y. Gender differences and burden of chronic conditions: impact on quality of life among the elderly in Taiwan. *Aging Clin Exp Res*. 2019;31(11):1625–1633. doi:10.1007/s40520-018-1099-2
27. Ansari S, Baghersalimi A, Azarkeivan A, Nojomi M, Rad AH. Quality of life in patients with thalassemia major. *Iran J Ped Hematol Oncol*. 2014;4(2):57–63.
28. Khairkhah F, Nesheli HM, Yahyaie A, Khodabakhsh E, Hosseini SR. Evaluation of mental health and quality of life among  $\beta$ -thalassemia major patients. *Caspian J of Pediatr*. 2015;1(2):54–59. doi:10.22088/acadpub.BUMS.1.2.54
29. Gan GG, Hue YL, Sathar J. Factors affecting quality of life in adult patients with Thalassaemia major and intermedia. *Ann Acad Med Singap*. 2016;45(11):520–523.
30. Seyedifar M, Dorkoosh FA, Hamidieh AA, et al. Health-related quality of life and health utility values in beta thalassemia major patients receiving different types of iron chelators in Iran. *Int J Hematol Oncol Stem Cell Res*. 2016;10(4):224–231.
31. Floris F, Comitini F, Leoni G, et al. Quality of life in Sardinian patients with transfusion-dependent thalassemia: a cross-sectional study. *Qual Life Res*. 2018;27(10):2533–2539. doi:10.1007/s11136-018-1911-7
32. Maheri A, Sadeghi R, Shojaeizadeh D, Tol A, Yaseri M, Rohban A. Depression, anxiety, and perceived social support among adults with beta-thalassemia major: cross-sectional study. *Korean J Fam Med*. 2018;39(2):101–107. doi:10.4082/kjfm.2018.39.2.101
33. Patel K, Bhivandkar S, Desai R, Antin T. The burden of psychiatric illnesses in adult patients with beta-thalassemia: a 5-year nationwide inpatient evaluation in the United States. *Ann Hematol*. 2019;98(4):851–860. doi:10.1007/s00277-018-3557-5
34. Patel P, Beamish P, da Silva TL, et al. Examining depression and quality of life in patients with thalassemia in Sri Lanka. *Int J Non-Commun Dis*. 2019;4:27–33. doi:10.4103/jncd.jncd\_49\_18
35. Yousif LH, Yacoub SE. Depression in adolescents with beta-thalassemia major in Erbil city-Iraq. *Adv Med J*. 2019;5(2):12–18. doi:10.56056/amj.2019.93
36. Goulas V, Kouraklis-Symeonidis A, Manousou K, et al. A multicenter cross-sectional study of the quality of life and iron chelation treatment satisfaction of patients with transfusion-dependent  $\beta$ -thalassemia, in routine care settings in Western Greece. *Qual Life Res*. 2021;30(2):467–477. doi:10.1007/s11136-020-02634-y
37. Rikos N, Giannadaki G-K, Spontidaki A, Tzagarakaki M, Linardakis M. Health status, anxiety, depression, and quality of life of patients with thalassemia. *J Public Health*. 2020;29:1313–1320. doi:10.1007/s10389-020-01241-y
38. Hamdy M, Draz IH, El Sayed IT, Ayyad AAF, Salemd MR. Assessment of quality of life among beta-thalassemia major patients attending the hematology outpatient clinics at Cairo University Hospital. *Open Access Maced J Med Sci*. 2021;9(E):156–160. doi:10.3889/oamjms.2021.5692
39. Khodashenas M, Mardi P, Taherzadeh-Ghahfarokhi N, Tavakoli-Far B, Jamee M, Ghodrati N. Quality of life and related paraclinical factors in Iranian patients with transfusion-dependent thalassemia. *J Environ Public Health*. 2021;2021:2849163. doi:10.1155/2021/2849163
40. Mardhiyah A, Mediani HS, Panduragan SL, Yosep I, Lindayani L. Hope and quality of life among adolescent with thalassemia: a cross-sectional study in Indonesia. *Open Access Maced J Med Sci*. 2022;10(G):667–673. doi:10.3889/oamjms.2022.9597
41. Sarhan AL, Modallal S, Mahamid FA, Berte DZ. Depression symptoms and associated factors among thalassemia patients in the Palestinian territories: a cross-sectional study. *Middle East Curr Psychiatry*. 2022;29:2. doi:10.1186/s43045-021-00166-w
42. Hossain MJ, Islam MW, Munni UR, et al. Health-related quality of life among thalassemia patients in Bangladesh using the SF-36 questionnaire. *Sci Rep*. 2023;13(1):7734. doi:10.1038/s41598-023-34205-9

43. Ali SS, Tarawah AM, Al-Hawsawi ZM, Zolaly MA, Turkustani W. Comprehensive patient care improves quality of life in transfusion dependent patients with  $\beta$ -thalassemia. *Saudi Med J*. 2015;36(5):575–579. doi:10.15537/smj.2015.5.10442
44. Ningtiar HW, Suryawan A. Determinant factors of depression in beta major thalassemia children. *Fol Med Indones*. 2021;57(1):46–52. doi:10.20473/fmi.v57i1.13664
45. Zahmatkeshan N, Mobasser N, Zamanzadeh V. Quality of life in thalassemia major patients in an Iranian District. *Glob J Health Sci*. 2016;9(5):266–273. doi:10.5539/gjhs.v9n5p266
46. Mardhiyah A, Panduragan SL, Mediani HS, Yosep I. Nursing interventions to improve quality of life among children and adolescents with thalassemia: a scoping review. *J Multidiscip Healthc*. 2023;16:1749–1762. doi:10.2147/JMDH.S415314
47. Eren R, Karışmaz A, Aslan C, et al. Beta thalassemia minor: patients are not tired but depressed and anxious. *Med Princ Pract*. 2021;30(1):69–72. doi:10.1159/000508981
48. Allehaiby AH, Alluheibi SM, Alnassar SM, et al. Assessment of patients with beta-thalassemia. *Egypt J Hosp Med*. 2017;69(7):2814–2818. doi:10.12816/0042571
49. Hamed H, Ezzat O, Hifhaw T. Psychological manifestations in adolescents with thalassemia. *Middle East Curr Psychiatry*. 2011;18(4):237–244. doi:10.1097/01.XME.0000405035.39112.10
50. Venty V, Rismarini R, Puspitasari D, Kesuma Y, Indra RM. Depression in children with thalassemia major: prevalence and contributing factors. *Paediatr Indones*. 2018;58(6):263–268. doi:10.14238/pi58.6.2018.263-8
51. Alsaad AJ. Psychosocial aspects of thalassemia and patient's quality of life: a narrative review. *Majmaah J Heal Sci*. 2020;8(1):82–96. doi:10.5455/mjhs.2020.01.009
52. Azarkeivan A, Hajibeigi B, Alavian SM, Lankarani MM, Assari S. Associates of poor physical and mental health-related quality of life in beta thalassemia-major/intermedia. *J Res Med Sci*. 2009;14(6):349–355.
53. Keşkek ŞÖ, Kırım S, Turhan A, Turhan FG. Depression in subjects with beta-thalassemia minor. *Ann Hematol*. 2013;92(12):1611–1615. doi:10.1007/s00277-013-1851-9
54. Khoury B, Musallam KM, Abi-Habib R, et al. Prevalence of depression and anxiety in adult patients with  $\beta$ -thalassemia major and intermedia. *Int J Psychiatry Med*. 2012;44(4):291–303. doi:10.2190/PM.44.4.a
55. Nasiri M, Hosseini SH, Shahmohammadi S. Mental health status in patients with thalassemia major in Iran. *J Pediatr Rev*. 2014;2(1):55–61. doi:10.7508/JPR-V2-N1-55-61
56. Borras L, Constant E-L. Depression and beta-thalassemia: a genetic link? *Acta Neuropsychiatr*. 2014;19:134. doi:10.1111/j.1601-5215.2006.00180.x
57. Edge D, Bhugra D. Ethnic and cultural effects on mental healthcare for women. In: Castle DJ, Abel KM editors. *Comprehensive Women's Mental Health*. Cambridge University Press; 2016:14–27. doi:10.1017/CBO9781107045132.003.
58. Kaewkong P, Boonchooduang N, Charoenkwan P, Louthrenoo O. Resilience in adolescents with thalassemia. *Pediatr Hematol Oncol*. 2021;38(2):124–133. doi:10.1080/08880018.2020.1821140
59. Zolaly MA, Zolaly FM, Al Belawi L, et al. Depression, anxiety, and stress symptoms in patients with beta thalassemia major in Almadinah Almunawwarah, Saudi Arabia. *Cureus*. 2020;12(11):e11367. doi:10.7759/cureus.11367
60. Hakeem GLA, Mousa SO, Moustafa AN, Mahgoob MH, Hassan EE. Health-related quality of life in pediatric and adolescent patients with transfusion-dependent  $\beta$ -thalassemia in upper Egypt (single center study). *Health Qual Life Outcomes*. 2018;16(1):59. doi:10.1186/s12955-018-0893-z
61. Atwa ZTH, Wahed WYA. The impact of illness perception and socio-clinico-demographic factors on perceived quality of life in children and adolescents with thalassemia intermedia. *Pediatr Blood Cancer*. 2019;66(7):e27735. doi:10.1002/pbc.27735
62. Alzahrani RA, Almutairi OM, Alghoraibi MS, et al. Quality of life in transfusion-dependent thalassemia patients. *J Taibah Univ Med Sci*. 2017;12(5):465–470. doi:10.1016/j.jtumed.2017.05.006
63. Alshamsi S, Hamidi S, Narci HO. Health-related quality of life and associated factors of children with transfusion-dependent thalassemia in Dubai, United Arab Emirates. *Glob J Health Sci*. 2021;13(7):18–31. doi:10.5539/gjhs.v13n7p18
64. Ghorbanpoor M, Mirzaie M, Mirhaghjou SN, Roshan ZA. The relationship between psychosocial status and adherence to treatment regimen in adolescents with thalassemia. *J Holist Nurs Midwifery*. 2020;30(2):78–85. doi:10.32598/jhnm.30.2.78

## Journal of Multidisciplinary Healthcare

Dovepress

## Publish your work in this journal

The Journal of Multidisciplinary Healthcare is an international, peer-reviewed open-access journal that aims to represent and publish research in healthcare areas delivered by practitioners of different disciplines. This includes studies and reviews conducted by multidisciplinary teams as well as research which evaluates the results or conduct of such teams or healthcare processes in general. The journal covers a very wide range of areas and welcomes submissions from practitioners at all levels, from all over the world. The manuscript management system is completely online and includes a very quick and fair peer-review system. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/journal-of-multidisciplinary-healthcare-journal>