

RESEARCH ARTICLE

Depression Leads to Physical Inactivity in Patients with Beta-Thalassemia Major

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Abstract

Beta-thalassemia major (BTM) is difficult to treat chronic disease, causing physical and psychological burdens for the patient. Several studies have confirmed a decrease in physical activity and depression in thalassemia patients, but limited studies examine the relationship between these two conditions. This study aims to analyze the relationship between depression and physical activity in BTM patients in Bandung city. It was analytical observational research with a cross-sectional design. Data were collected during September–December 2018 by interviewing 65 patients selected by simple random sampling from 300 thalassemia patients registered at the Association of Parents with Thalassemia Indonesia/*Perhimpunan Orangtua Penderita Thalassemia Indonesia* (POPTI) Bandung city. The instruments used were the Global Physical Activity Questionnaire (GPAQ) to measure physical activity and the Beck Depression Inventory (BDI) to assess depressive symptoms. Data were analyzed by chi-square test using SPSS for Windows ver. 23.0. The results showed that most BTM patients in Bandung city were depressed (52%) and had low physical activity levels (65%). Furthermore, there was a statistically significant relationship between depression and physical activity in thalassemia patients in Bandung city ($p=0.04$, $p<0.05$). Therefore, it can be concluded that BTM patients in Bandung city with depression have lower physical activity.

Keywords: BDI, beta-thalassemia major, depression, GPAQ, physical activity

Depresi Berdampak pada Aktivitas Fisik yang Rendah pada Pasien Talasemia Beta Mayor

Abstrak

Talasemia beta mayor merupakan penyakit kronis yang sulit disembuhkan sehingga menimbulkan beban fisik dan psikologis bagi pasien. Beberapa penelitian telah mengonfirmasi penurunan aktivitas fisik dan depresi pada pasien talasemia, namun studi yang mengkaji hubungan antara kedua kondisi ini masih terbatas jumlahnya. Penelitian ini bertujuan menganalisis hubungan antara kondisi depresi dan tingkat aktivitas fisik pada penderita talasemia beta mayor di Kota Bandung. Desain penelitian bersifat observasional analitik dengan rancangan potong lintang. Pengambilan data dilakukan selama September–Desember 2018 dengan mewawancarai 65 pasien yang dipilih secara *simple random sampling* dari 300 pasien talasemia yang terdaftar di Perhimpunan Orangtua Penderita *Thalassemia* Indonesia (POPTI) Kota Bandung. Instrumen yang digunakan adalah *Global Physical Activity Questionnaire* (GPAQ) untuk mengukur aktivitas fisik dan *Beck Depression Inventory* (BDI) untuk menilai gejala depresi. Data dianalisis dengan uji *chi-square* menggunakan *SPSS for Windows ver. 23.0*. Hasil penelitian menunjukkan mayoritas penderita talasemia beta mayor di Kota Bandung mengalami depresi (52%) dan memiliki tingkat aktivitas fisik rendah (65%). Selanjutnya, terdapat hubungan bermakna secara statistik antara depresi dan aktivitas fisik pada penderita talasemia di Kota Bandung ($p=0,04$; $p<0,05$). Oleh karena itu, dapat disimpulkan bahwa penderita talasemia beta mayor di Kota Bandung yang mengalami depresi memiliki aktivitas fisik yang lebih rendah.

Kata kunci: Aktivitas fisik, BDI, depresi, GPAQ, talasemia beta mayor

Received: 2 February 2021; Revised: 26 July 2021; Accepted: 4 August 2021; Published: 31 August 2021

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Introduction

Thalassemia is the most common genetic blood disease globally, characterized by defects in hemoglobin production and red blood cell destruction. Beta-thalassemia major (BTM) is the most severe form of thalassemia in which severe hemolytic anemia occurs.¹ In 2011, there were 5,501 thalassemia patients in Indonesia, of which 800 or about 15% came from West Java. The prevalence of BTM in Bandung region, West Java, was 800, while Bandung city itself was 300.² Thalassemia is a chronic high-cost disease that can be a stressor for patients in socioeconomic, psychosocial, and disease burden. Uncertainty about the future, worry of being a family burden, long-term complications of the illness, discrimination by friends or coworkers, and fear of being stigmatized by society make thalassemia sufferers a trigger for depression.³

Depression generally occurs in people with unhealthy behavior and people with chronic diseases, including beta-thalassemia major.⁴ Similar to other people, patients with chronic illness could suffer depression due to stress, disease burden, hereditary, and socioeconomic stress such as high medical expenses and fear of losing a job, but with a higher risk. Several studies state that the prevalence of depression in thalassemia patients is >30%,^{5,6} and thalassemia patients have a 4–5 fold risk of developing depression than average adults.^{7–9}

Symptoms of thalassemia are similar to those of anemia, characterized by weakness, fatigue, lethargy, and fatigue. As a result, it can reduce work productivity and physical activity.¹⁰ Both pediatric and adult thalassemia sufferers spend more time with a sedentary lifestyle per day than their age group.¹¹ Thalassemia sufferers with depression experience decreased quality of life and almost two times the risk of limiting physical activity when compared to patients without depression.³ Research conducted by Gariépy et al.¹¹ stated that only 12.5% of thalassemia patients performed moderate and vigorous activity following the recommendations of the Physical Activity Guidelines.

Beta-thalassemia major is a chronic disease that is difficult to cure, resulting in an increased disease burden. It can increase the risk of developing depression. Thalassemia patients with depression may experience limited physical activity. Various studies have been conducted

to describe depression and physical activity levels in beta-thalassemia major patients.^{12–14} However, there is limited research examine the relationship between depression and the level of physical activity, even though depression and physical activity are factors that affect the quality of life in beta-thalassemia major patients.¹² This study aims to analyze the relationship between depression and the level of physical activity in beta-thalassemia major sufferers in Bandung city.

Methods

The subjects of this research were BTM patients registered in the Association of Parents with Thalassemia Indonesia/*Perhimpunan Orangtua Penderita Thalassemia Indonesia* (POPTI) Bandung city, which have 300 members. The number of subjects that meet the inclusion criteria is 200. The minimum sample size from the calculation with the formula of proportion difference was 46. We selected the subject using a simple random sampling method with a random number generator from Microsoft Excel. We added some other subjects to anticipate the dropout, and we got 65 patients in total.

The inclusion criteria include patients aged \geq ten years who are registered at POPTI Bandung city, have regular blood transfusions at least once a month during 2018, and are willing to participate in research. The exclusion criteria included beta-thalassemia major patients with other hypertension, diabetes mellitus, and congenital heart disease.

An observational analytic study with a cross-sectional design determined the relationship between depression and physical activity levels as assessed using the Beck Depression Inventory (BDI) with the Global Physical Activity Questionnaire (GPAQ).

The BDI contains a depression scale consisting of 21 questions that can evaluate symptoms of depression. Each question has values ranges from 1–4, and the scores of each question are added up to get a total score. The results were classified into normal if the patient has a total score of less than nine and depression if more than that. We chose the BDI as an instrument because this questionnaire is easy to use in patients with diverse characteristics like in this study, easier to categorize, and able to measure depression, which makes analysis easier. The GPAQ consists of 16 questions that are grouped to capture physical

activity in three behavioral domains, namely physical activity on weekdays, trips to and from places of activity, and recreational activities. The GPAQ measurement results are classified into low and medium-high.

The data was collected from September–December 2018. Data analysis was performed using the SPSS for Windows version 23.0 at 95% confidence level and $p \text{ value} \leq 0.05$. This study has received ethical approval from the Health Research Ethics Committee of the Faculty of Medicine, Universitas Islam Bandung number: 65/Komite Etik.FK/III/2018.

Results

Table 1 shows that more male respondents (52%) with an age median are 12 years, ranging from 10–17 years. Based on the residence, most respondents live in Bandung city (38 respondents, 58%), and most are still in elementary school (66%). There is one respondent who does not go to school. From the socioeconomic aspect, most of their parents are in low social-economic status with a salary below the regional minimum wage of Bandung city in 2018, consisting of 60 respondents (92%).

Based on the health status, we can see that most respondents were diagnosed with thalassemia at 0–2 years. As many as 58 respondents (89%) and 60 respondents (92%) had blood transfusions 1–2 times/month.

Table 2 shows the most of the beta-thalassemia major sufferers in Bandung experienced depression (52%) and do low-level physical activity (65%). Among this 52% of patients with depression, the severity is ranging from mild to severe symptoms.

The proportion of depressive symptoms based on the components of the BDI questionnaire shows that the most prominent depressive symptoms in patients with BTM in Bandung are fatigue (constantly feeling tired), sadness, feeling guilty, crying easily, and irritability (Table 3). There is also a small number of patients who have severe symptoms such as suicidal ideation (14%).

In Table 4, the p value is 0.04 ($p < 0.05$) using the chi-square test, so it can be concluding there is a statistically significant relationship between depression and the level of physical activity. In addition, the majority of respondents who experienced depression have a low level of physical activity.

Discussion

In this study, 52% of respondents were male. It is consistent with the epidemiology of BTM and various previous studies such as by Yahia et al.,⁶ with 58.1% of his respondents were male. In a

Table 1 Respondents' Characteristics

Categories	f (n=65)	%
Sex		
Male	34	52
Female	31	48
Age		
Median (min–max)	12 (10–17)	
Residence		
West Bandung	9	14
Bandung regency	11	17
Bandung city	38	58
Cimahi	7	11
Education		
No school	1	2
Elementary school	43	66
Junior high school	17	26
Senior high school	4	6
Occupation		
No school	1	1
Student	64	99
Parents' monthly income (IDR)		
<3,091,345.56 (minimum wage)	60	92
>3,091,345.56	5	8
Age at diagnosis (years)		
0–2	58	89
>2	7	11
Transfusion frequency		
1–2 times/month	60	92
More than twice/month	5	8

Table 2 Depression and Physical Activity Level of Patients

Category	n=65 (%)
Depression	
Yes	34 (52)
No	31 (48)
Physical activity	
Low	42 (65)
Moderate–high	23 (35)

Table 3 Proportion of Depression Symptoms in Patients based on Beck Depression Inventory

BDI Component	f (n=65)	%
Fatigue	39	60
Sadness	38	58
Feeling guilty	34	52
Crying	32	49
Irritability	32	49
Sleep disturbed	31	48
Worried about health	30	46
Feeling punished	29	45
Dissatisfaction	27	42
Anorexia	25	38
Look unattractive	23	35
Feeling a failure	22	34
Difficulty with decisions	22	34
Dissatisfied in self	21	32
Critical of self	18	28
Discouraged	17	26
Work inhibition	17	26
Weight loss	14	22
Discouraged about future	13	20
Loss of interest in people	13	20
Suicidal ideation	9	14

similar study, the number of BTM sufferers was more male than female (52–63%).^{1,15,16} Another characteristic of respondents in this study also resembling some previous studies, such as their age, occupation, education, and socioeconomic level.^{1,16–18}

Most of the respondents were diagnosed with thalassemia at the age of 0–2 years, as many as 58 respondents (89%). Similar to a study conducted by Fibach and Rachmilewitz,¹⁹ most people with BTM were diagnosed within the first two years of life. Most of the respondents in this study had blood transfusions 1–2 times/month, and this was a little less frequent than some findings in

another study that mentioned that the majority of BTM patients had blood transfusions every 3–4 weeks.^{1,20}

Most of the BTM sufferers in Bandung were depressed (34 respondents, 52%). This is slightly higher but still in line with some previous research such as Pattanashetti et al.¹² (49.4%). Several similar studies state which the prevalence of depression in thalassemia patients is >30%.^{5,6} The high rate of depression is thought to be due to the many risk factors present in the patients, such as socioeconomic and psychological stress, both personally and in families.

In this study, the most prominent symptoms of depression in patients with BTM in Bandung were fatigue, sadness, feeling guilty, crying easily, and irritability. The results of a similar study stated that as many as 85% experienced a depressive mood, 81% were easily tired, 62.7% were irritable, and 50% felt punished.^{21–23} A study conducted by Kumar et al.²⁴ showed that the prevalence of depressive mood symptoms and irritability was more common in thalassemia sufferers.

Most BTM sufferers in Bandung did the low physical activity, as many as 42 respondents (65%). Jatnika's¹⁴ research supported the results of this study, it was found that 35 respondents (56%) had a low level of physical activity in PMI Hospital Bogor city. This is in line with a similar study that states that thalassemia sufferers have a lower activity level than children their age. There is no significant difference in the physical activity performed pre-transfusion and post-transfusion.¹¹ This can be caused by depression,²⁵ low levels of Hb in the long term,²⁶ the buildup of iron due to repeated blood transfusions and not taking iron-chelating drugs,²⁷ and pain resulting from bone marrow expansion and loss of bone mass.²⁸ Many factors can make BTM patients more susceptible to depression and low physical activity, including the impact of therapy and transfusions. The adverse side effects of

Table 4 Association of Depression and Physical Activity Level in Beta-Thalassemia Major Patients

Depression	Physical Activity Level				Total		p
	Low		Moderate–High		n=65	%	
	n=42	%	n=23	%			
Yes	26	76	8	24	34	100	0.04*
No	16	52	15	48	31	100	

Note: *chi-square test, p<0.05 significant

transfusions are often the result of low adherence to iron-chelating drugs.²⁹

The results of statistical tests using the chi-square test at the 95% degree of confidence showed a statistically significant relationship between depression and the level of physical activity in patients with BTM with a $p=0.04$ ($p<0.05$). The majority of respondents experienced depression with a low level of physical activity as many as 26 people (76%). This association was in line with research by Karacan et al.,³⁰ which shows a relationship between high depression and decreased quality of life, especially physical activity. Several similar studies suggest that physical activity is significantly affected by depression in people with beta-thalassemia major.^{9,13,31} Research conducted by Mutlu et al.³² has a different result, which shows that there is no significant relationship between depression and physical activity in patients with other chronic diseases, namely, type 1 diabetes. The different research results can be caused by differences in the research instruments used, namely the Children's Depression Inventory (CDI) which measures depression symptoms more than the BDI; and most of the items measure cognitive aspects compared to somatic aspects and behavioral.³³

During the first year of life, the child cannot comprehend the beta-thalassemia major disease comprehensively. As they enter their teens, children become more aware of the clinical manifestations of beta-thalassemia major. Thalassemia sufferers are aware of differences between themselves and children of their healthy age, primarily related to physical appearance (facial, stunted growth, bone deformity) or the inability to do physical activity. They develop a sense of resistance to disease, insecurity, and prolonged sadness that can become a trigger for depression.³

Beta-thalassemia major patients with depression have the possibility of experiencing limited physical activity due to depression and the biological changes they suffer due to their diseases. Depressive symptoms can cause significant disruption to daily physical activities. This symptom indirectly becomes an additional burden for BTM patients. The patients who experience depression are often associated with an increased disease burden in the form of pain and fatigue, and additional functional disorders that can result in decreased physical activity.²⁵

This study highlights the need for comprehensive care for patients with thalassemia to have a good quality of life, not just treatment for the disease itself. To improve the patients' quality of life, it is essential to initially address one of the more easily modified physical activity or depression prevention conditions. This support can be done by family members as caregivers or health workers as well. Unfortunately, in this study, we did not measure several aspects that can separately affect the onset of depression and decrease physical activity levels. These include biological factors such as calorie intake, hemoglobin levels, family support, and the patient's environmental conditions. The absence of some of these data is a limitation of this research that should be considered in future studies.

Conclusions

Although depression and physical inactivity can occur separately in BTM patients, there is an association between these two conditions. Therefore, BTM patients who have depression will tend to have a low level of physical activity.

Conflict of Interest

The authors have no conflict of interest with any patients or institutions in this research.

Acknowledgments

The author would like to thank the POPTI Bandung management for helping in the identification of respondents eligible for this study.

References

1. Hamamy HA, Al-Allawi NAS. Epidemiological profile of common haemoglobinopathies in Arab countries. *J Community Genet.* 2013;4(2):147–67.
2. RSUP Dr. Hasan Sadikin. Jawa Barat ranking 1 penderita thalassemia [Internet]. Bandung: RSUP Dr. Hasan Sadikin; 2011 June 8 [cited 2019 Agustus 12]. Available from: <http://web.rshs.or.id/jawa-barat-ranking-1-penderita-thalassemia>.
3. Koutelekos J, Haliasos N. Depression and thalassemia in children, adolescents and adults. *Health Sci J.* 2013;7(3):239–46.
4. Centers for Disease Control and Prevention.

- Current depression among adults—United States, 2006 and 2008. *Morb Mortal Wkly Rep.* 2010;59(38):1229–35.
5. Khoury B, Musallam KM, Abi-Habib R, Bazzi L, Ward ZAL, Succar J, et al. Prevalence of depression and anxiety in adult patients with β -thalassemia major and intermedia. *Int J Psychiatry Med.* 2012;44(4):291–303.
 6. Yahia S, El-Hadidy MA, El-Gilany AH, Anwar R, Darwish A, Mansour AK. Predictors of anxiety and depression in Egyptian thalassemic patients: a single center study. *Int J Hematol.* 2013;97(5):604–9.
 7. Mojtabai R, Olfson M, Han B. National trends in the prevalence and treatment of depression in adolescents and young adults. *Pediatrics.* 2016;138(6):e20161878.
 8. Major T, Ghanizadeh A, Khajavian S, Ashkani H. Prevalence of psychiatric disorders, depression, and suicidal behavior in child and adolescent with thalassemia major. *J Pediatr Hematol Oncol.* 2006;28(12):781–4.
 9. Godil A, Mallick MSA, Adam AM, Haq A, Khetpal A, Afzal R, et al. Prevalence and severity of depression in a pakistani population with at least one major chronic disease. *J Clin Diagn Res.* 2017;11(8):OC05–10.
 10. Masrizal. Anemia defisiensi besi. *JKMA.* 2007;2(1):140–5.
 11. Gariépy C, Lal A, Fung E. Reduced physical activity in adult and pediatric patients with thalassemia. *Blood.* 2010;116(21):5174.
 12. Pattanashetti M, Mugali J, Pattanashetty N, Patil S. A study of severity of depression in thalassemia patients. *Int J Indian Psychol.* 2017;4(2):29–33.
 13. Yengil E, Acipayam C, Kokacya MH, Kurhan F, Oktay G, Ozer C. Anxiety, depression and quality of life in patients with beta thalassemia major and their caregivers. *Int J Clin Exp Med.* 2014;7(8):2165–72.
 14. Jatnika KD. Gambaran tingkat aktivitas fisik pada anak usia sekolah dengan thalassemia di Ruang Thalassemia RS PMI Kota Bogor tahun 2017 [undergraduate thesis]. Bandung: Politeknik Kesehatan Kementerian Kesehatan Bandung; 2017 [cited 2019 Agustus 12]. Available from: <http://repository.poltekkesbdg.info/files/original/cd7a51d880a7311bd05952c4a7abac84.pdf>.
 15. Joseph N, Pai S, Sengupta S, Bharadwaj S, Dhawan S, Khare K. A clinico-epidemiological study of thalassemia cases in India. *J Nat Sc Biol Med.* 2018;9(2):236–41.
 16. Roghani A, Khan N, Shah I, Khan S, Taj AS, Yousafzai YM. Quality of life and its determinants in transfusion dependent thalassemia. *Pak J Physiol.* 2018;14(3):64–7.
 17. Ayoub MD, Radi SA, Azab AM, Abulaban AA, Balkhoyor AH, Bedair SW, et al. Quality of life among children with beta-thalassemia major treated in western Saudi Arabia. *Saudi Med J.* 2013;34(12):1281–6.
 18. Goyal JP, Hpapani PT, Gagiya H. Awareness among parents of children with thalassemia major from western India. *Int J Med Sci Public Health.* 2015;4(10):1356–9.
 19. Fibach E, Rachmilewitz EA. Pathophysiology and treatment of patients with beta-thalassemia—an update. *F1000Res.* 2017;6:2156.
 20. Bejaoui M, Guirat N. Beta thalassemia major in a developing country: epidemiological, clinical and evolutionary aspects. *Mediterr J Hematol Infect Dis.* 2013;5(1):e2013002.
 21. Al-Yasiri AR, AbdKarkosh YS. The validity of beck depression inventory—short version in depressed patients diagnosed according to ICD10. *Iraqi Postgrad Med J.* 2013;12(4):603–12.
 22. Ghanizadeh A, Baligh-Jahromi P. Depression, anxiety and suicidal behaviour in children and adolescents with haemophilia. *Haemophilia.* 2009;15(2):528–32.
 23. Örengül AC, Ucuz İ, Oner Battaloglu N, Ozek G, Gormez V. Prevalence of psychiatric disorders and suicidality among children and adolescents with thalassemia major—a Turkish sample. *Child Health Care.* 2018;48(1):120–9.
 24. Kumar N, Singh J, Khullar H, Arora M. Cross sectional study to assess behavioral problems in multi-transfused thalassemic children and psychosocial factors affecting them. *Int J Contemp Pediatr.* 2018;5(3):839–42.
 25. Katon WJ. Epidemiology and treatment of depression in patients with chronic medical illness. *Dialogues Clin Neurosci.* 2011;13(1):7–23.
 26. Benedetto D, Rao CM, Cefalù C, Aguglia DO, Cattadori G, D'Ascola DG, et al. Effects of blood transfusion on exercise capacity in thalassemia major patients. *PLoS One.* 2015;10(5):e0127553.
 27. Dahlui M, Hishamshah MI, Rahman AJA,

- Aljunid SM. Quality of life in transfusion-dependent thalassaemia patients on desferrioxamine treatment. *Singapore Med J*. 2009;50(8):794–9.
28. Oliveros O, Trachtenberg F, Haines D, Gerstenberger E, Martin M, Carson S, et al. Pain over time and its effects on life in thalassemia. *Am J Hematol*. 2013;88(11):939–43.
29. Gustiana H, Gunantara T, Rathomi HS. Kepatuhan konsumsi obat kelasi besi dan kadar feritin serum pasien talasemia beta-mayor di RSUD Al-Ihsan Bandung. *JKS*. 2020;2(1):26–30.
30. Karacan FA, Kaya B, Pekün F. Psychiatric comorbidity and quality of life in patients with beta thalassemia major. *Eur Psychiatry*. 2013;28(Suppl 1):2314.
31. Adeniyi AF, Okafor NC, Adeniyi CY. Depression and physical activity in a sample of nigerian adolescents: levels, relationships and predictors. *Child Adolesc Psychiatry Ment Health*. 2011;5:16.
32. Mutlu EK, Mutlu C, Taskiran H, Ozgen IT. Association of physical activity level with depression, anxiety, and quality of life in children with type 1 diabetes mellitus. *J Pediatr Endocrinol Metab*. 2015;28(11–12):1273–8.
33. Washington Chapter of the American Academy of Pediatrics. Pediatric provider toolkit: primary care and behavioral health [Internet]. Seattle: Washington Chapter of the American Academy of Pediatrics; 2017 [cited 2019 Agustus 14]. Available from: <http://wcaap.org/wp-content/uploads/2017/07/2017-Tool-Kit-electronic.pdf>.