Research Paper

The Relationship between Absolute Lymphocyte Count and Recovery Rate in Children With Immune Thrombocytopenic Purpura

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ABSTRACT

Background: Acute immune thrombocytopenic purpura (ITP) in children is a benign and self-limiting disease. This disease is considered chronic ITP when thrombocytopenia persists for more than 12 months. Total leukocyte count (TLC) and absolute lymphocyte count (ALC) at the time of diagnosis have been suggested as predictors of persistent/chronic ITP.

Objectives: The main objective of the present study was to investigate the relationship between ALC at the time of diagnosis and the course of the ITP.

Methods: In this study, 43 patients diagnosed with acute ITP under the age of 14 years were evaluated. For all patients, a complete blood cell count was performed at the time of admission. ALC at the time of diagnosis was calculated and compared between the recovered and chronic ITP group. Demographic information of patients, including age and sex were also recorded and finally analyzed by SPSS software, version 22 using an independent t-test.

Results: Of the patients, 23(53%) were male and 20(47%) were female. The mean age of patients at the time of diagnosis was 3.62±3.39 years. The majority of patients (79%) recovered, while 21% remained in a chronic condition. The mean ALC at the time of diagnosis in the recovered group was 5362±2608 mm^3, compared to 3941±1796 mm^3 in the chronic ITP group (P=0.13).

Conclusions: Although the ALC at the time of diagnosis was higher in the recovered group than in the chronic ITP group, this difference was not statistically significant.

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Introduction

Immune thrombocytopenic purpura (ITP) is one of the most common acquired bleeding disorders in children, characterized by thrombocytopenia, petechiae, purpura, ecchymosis, and mucosal hemorrhage [1, 2]. The peak incidence in children occurs between two to five years of age [3]. ITP in children is often self-limiting and usually occurs following viral infections, immunization, and an inappropriate immune response [4]. About 70 to 80% of cases are acute and recover spontaneously within a year of diagnosis, while 20 to 30% of cases become chronic, with thrombocytopenia persisting for more than 12 months [5].

Various treatments such as corticosteroids, intravenous immunoglobulin (IVIG), anti-D immunoglobulin, immunosuppressive drugs, rituximab, splenectomy, etc. are used for treating this disease; however, some patients do not respond to treatment [6, 7]. Older age, a more gradual onset and a platelet count greater than 50,000 mm^3 at the time of diagnosis are associated with an increased likelihood of progression to chronic ITP [1, 8]. Multiple autoimmune mechanisms and both humoral and cellular immune systems are involved in the pathogenesis of ITP. Lymphocytopenia is also commonly reported as a feature of chronic autoimmune diseases [9].

In some studies, total leukocyte count (TLC) and absolute lymphocyte count (ALC) have been reported as predictors of persistent/chronic ITP [9-11]. The aim of the current study was to investigate the relationship between ALC at the time of diagnosis and the course of the ITP, as well as the recovery rate.

Methods

In this retrospective study, 43 patients under the age of 14 years with a diagnosis of acute ITP who were admitted to the pediatric oncology hematology department of a tertiary referral hospital from 2016 to 2019 were evaluated. Patients who did not have regular follow-ups after discharge from the hospital and those lacking follow-up data were not included in the study. Patients who were hospitalized with the initial diagnosis of ITP but were later diagnosed with a different condition were excluded from the study.

Hospital electronic information was used to obtain laboratory data. Before starting treatment, a complete blood count (CBC) and differential were conducted for all patients, which included measurements of lymphocyte percentage, ALC, hemoglobin and platelet count. The ALC was calculated by multiplying the percentage of lymphocytes by the TLC. Chronic ITP was reported in this study for cases where the disease persisted for more than 12 months, while recovered ITP referred to cases in which patients had a platelet count greater than 100,000 mm^3 before 12 months of diagnosis and without ongoing treatment. Demographic information of patients, including age and sex, was also extracted from patients' records. Informed consent was obtained from all participants at the time of admission for diagnostic and therapeutic procedures. Data were entered into the SPSS software, version 22 and descriptive statistics were analyzed in terms of frequency, percentage, Mean±SD, along with analytical statistics using an independent t-test. A<0.05 was considered significant.

Results

43 patients diagnosed with ITP and aged fewer than 14 years were studied. 23(53%) patients were male and 20(47%) were female (P=0.64). The mean age of patients at the time of diagnosis was 3.62±3.39 years (range: 2 months to 14 years). 70% of patients were <5 years old. All patients were treated with IVIG at a dosage of 1 g/kg/day for two consecutive days at the time of diagnosis and other treatments, including corticosteroids, were used in cases of non-response to IVIG treatment. The complete blood cell count at the time of diagnosis is shown in Table 1. The ALC in boys and girls were 5044±2514 mm^3 and 5089±2572 mm^3 (P=0.95), respectively. The majority of patients (79%) in the current study recovered, while 21% of patients developed chronic ITP.

The mean lymphocyte count at the time of diagnosis in the recovered and chronic ITP groups was 5362±2608 mm^3 and 3941±1796 mm^3 (P=0.13), respectively, with no statistically significant difference between the two groups.

Discussion

In our study, 21% of patients developed chronic ITP, which is similar to other studies that reported a range of 15 to 25% [10, 12, 13]. The most important risk factors for chronic ITP are the gradual onset of symptoms over a period of more than two weeks, age over ten years at the time of diagnosis and a platelet count greater than 20,000 mm^3 [14]. In a retrospective cohort analysis, patients over 10 years of age at the time of diagnosis and with a platelet count greater than 20,000 mm^3 were five times more likely to progress to chronic ITP than

Table 1. Baseline hematologic parameters of the study groups

Parameter	Mean±SD		P
	Recovered Group (n=34)	Chronic ITP Group (n=9)	
Platelet (mm^3)	11264±7867	9888±5710	0.56
Hemoglobin (g/dL)	11.1±1.3	11.5±1.5	0.51
Mean corpuscular volume (fL)	77.2±5.1	75.3±3.8	0.23
White blood cell count (mm^3)	9.7±3.5	8.9±3	0.47
Lymphocyte (%)	52.1±15.4	48.8±14	0.55
Absolute lymphocyte count (mm^3)	5362±2608	3941±1796	0.13

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children younger than two years of age with a platelet count <20,000 mm^3 [1]. In another study, the gradual onset of symptoms and the absence of viral infection before illness were strongly associated with progression to chronic ITP, and most children between the ages of one and ten exhibited mild symptoms [15]. Edslev et al. suggested a clinical score that includes male gender, younger age, lower platelet count, preceding infection, abrupt onset and wet purpura to predict a brief course of the disease [16].

Useful biological markers that predict the progression of the disease to chronicity in children with newly diagnosed ITP are relatively few. In the study by Del Vecchioet al. high levels of IL-10 at the onset of ITP predicted an acute clinical course resulting in remission of the disease in less than 1 year, confirming the role of this cytokine in immunotolerance [17]. In the study by Culić et al. an inverse relationship was observed between ALC at the presentation of ITP and platelet count in adult patients, suggesting that a high ALC may indicate a poor prognosis in adult ITP [18]; however, there are few studies in children in this context. A study by Deel et al. involving 204 children aged three months to 18 years showed that ALC at the time of diagnosis did not predict the course of the disease, but ALC three months after diagnosis was a significant predictor [11]. In contrast, in the present study, the ALC at the time of diagnosis was not significantly different between children with recovered and chronic ITP, which could be due to differences in sample size and age range of patients in our study compared to their study.

In the study by Akbayram et al. ALC at the time of diagnosis was a predictor of chronic ITP [9]. In another study, complete or partial response at 3 and 12 months after diagnosis was associated with a higher ALC at the time of diagnosis [19]. In the study by Yang et al. ALC was not significantly different between newly diagnosed ITP and chronic ITP when patients were classified by different age groups [20].

In the study by Ahmed et al. TLC and ALC at presentation were strong predictors of persistent/chronic ITP in children [10]. Wang et al. also showed that ALC at the time of diagnosis is an independent factor for the prognosis of children with ITP [21].

In our study, although the ALC in the recovered group was higher than that in the chronic ITP group, this difference was not statistically significant. This lack of significance could be due to the different age ranges and the small number of patients in the present study compared to the study by Ahmed et al. [10].

Conclusion

Although the ALC at the time of diagnosis was higher in the recovered group than in the chronic ITP group, this difference was not statistically significant. More research is needed with a larger sample size across multiple centers to confirm these findings, assess the underlying pathophysiology and evaluate the causes of disease progression to a chronic state.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of the Zahedan University of Medical Sciences (Code: IR.ZAUMS.REC.1394.153).

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Authors contributions

Conceptualization, study design and writing the original draft: Ghasem Miri-Aliabad; Data collection and analysis: Maedeh Azad Review and editing: Fatemeh Dahmardeh.

Conflicts of interest

The authors declared no conflicts of interest.

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References

1. Glanz J, France E, Xu S, Hayes T, Hambidge S. A population-based, multisite cohort study of the predictors of chronic idiopathic thrombocytopenic purpura in children. Pediatrics. 2008; 121(3):e506-12. [DOI:10.1542/peds.2007-1129]

2. Medeiros D, Buchanan GR. Idiopathic thrombocytopenic purpura: Beyond consensus. Curr Opin Pediatr. 2000; 12(1):4-9. [DOI:10.1097/00008480-200002000-00002]

3. Yong M, Schoonen WM, Li L, Kanas G, Coalson J, Mowat F, et al. Epidemiology of paediatric immune thrombocytopenia in the general practice research database. Br J Haematol. 2010; 149(6):855-64. [DOI:10.1111/j.1365-2141.2010.08176.x]

4. Miri-Aliabad G, Rashidi S. Immune thrombocytopenic purpura and hemolytic anemia secondary to hepatitis A. Int J Hematol Oncol Stem Cell Res. 2017; 11(2):89-91. [PMID]

5. Rodeghiero F, Stasi R, Gernsheimer T, Michel M, Provan D, Arnold DM, et al. Standardization of terminology, definitions and outcome criteria in immune thrombocytopenic purpura of adults and children: Report from an international working group. Blood. 2009; 113(11):2386-93. [DOI:10.1182/blood-2008-07-162503]

6. Singh G, Bansal D, Wright NAM. Immune thrombocytopenia in children: Consensus and controversies. Indian J Pediatr. 2020; 87(2):150-7. [DOI:10.1007/s12098-019-03155-4]

7. Ansari Sh, Rostami T, Yousefian S, Kiumarsi A, Miri-Aliabad G, Ramim T. Rituximab efficacy in the treatment of children with chronic immune thrombocytopenic purpura. Pediatr Hematol Oncol. 2014; 31(6):555-62. [DOI:10.3109/08880018.2014.930766]

8. Watts RG. Idiopathic thrombocytopenic purpura: A 10-year natural history study at the childrens hospital of alabama. Clin Pediatr. 2004; 43(8):691-702. [DOI:10.1177/00099228040430080 2]

9. Akbayram S, Karaman K, Dogan M, Ustyol L, Garipardic M, Oner AF. Initial lymphocyte count as prognostic indicator for childhood immune thrombocytopenia. Indian J Hematol Blood Transfus. 2017; 33(1):93-6. [DOI:10.1007/s12288-016-0664-0]

10. Ahmed I, Rajpurkar M, Thomas R, Chitlur M. Initial lymphocyte count and the development of persistent/chronic immune thrombocytopenic purpura. Pediatr Blood Cancer. 2010; 55(3):508-11. [DOI:10.1002/pbc.22570]

11. Deel MD, Kong M, Cross KP, Bertolone SJ. Absolute lymphocyte counts as prognostic indicators for immune thrombocytopenia outcomes in children. Pediatr Blood Cancer. 2013; 60(12):1967-74. [DOI:10.1002/pbc.24628]

12. Zeller B, Rajantie J, Hedlund-Treutiger I, Tedgård U, Wesenberg F, Jonsson OG, et al. Childhood idiopathic thrombocytopenic purpura in the Nordic countries: Epidemiology and predictors of chronic disease. Acta Paediatr. 2005; 94(2):178-84. [DOI:10.1111/j.1651-2227.2005.tb01887.x]

13. ITP A, British Committee for Standards in Haematology General Haematology Task Force. Guidelines for the investigation and management of idiopathic thrombocytopenic purpura in adults, children and in pregnancy. Br J Haematol. 2003; 120(1):574-96. [DOI:10.1046/j.1365-2141.2003.04131.x]

14. ElAlfy M, Farid S, Abdel Maksoud A. Predictors of chronic idiopathic thrombocytopenic purpura. Pediatr Blood Cancer. 2010; 54(7):959-62. [DOI:10.1002/pbc.22481]

15. Roganovic J, Letica-Crepulja M. Idiopathic thrombocytopenic purpura: A 15-year natural history study at the Children's Hospital Rijeka, Croatia. Pediatr Blood Cancer. 2006; 47(55):662-4. [DOI:10.1002/pbc.20995]

16. Edslev PW, Rosthøj S, Treutiger I, Rajantie J, Zeller B, Jonsson OG, et al. A clinical score predicting a brief and uneventful course of newly diagnosed idiopathic thrombocytopenic purpura in children. Br J Haematol. 2007; 138(4):513-6. [DOI:10.1111/j.1365-2141.2007.06682.x]

17. Del Vecchio GC, Giordano P, Tesse R, Piacente L, Altomare M, De Mattia D. Clinical significance of serum cytokine levels and thrombopoietic markers in childhood idiopathic thrombocytopenic purpura. Blood Transfus. 2012; 10(2):194-9. [PMID]

18. Culić S, Labar B, Marusić A, Salamunić I. Correlations among age, cytokines, lymphocyte subtypes, and platelet counts in autoimmune thrombocytopenic purpura. Pediatr Blood Cancer. 2006; 47(55):671-4. [DOI:10.1002/pbc.20999]

19. Singaravadivelu P, Ramamoorthy JG, Delhi Kumar CG. Clinical outcome and its predictors in children with newly diagnosed immune thrombocytopenia. Indian Pediatr. 2024; 61(6):527-32. [DOI:10.1007/s13312-024-3201-5] [PMID]

20. Yang X, Wan X, Huang C, Fu J, Hu X, Le P, et al. Re-evaluate the prognostic value of absolute lymphocyte count in pediatric immune thrombocytopenia. J Pediatr Hematol Oncol. 2023; 45(2):e254-8. [DOI:10.1097/MPH.0000000000002508]

21. Wang LY, Liu KK, Chu JH, Yang LH, Xie ZW, Zhang KL, et al. [Influencing factors in the chronicity of immune thrombocytopenia in children (Chinese)]. Zhongguo Shi Yan Xue Ye Xue Za Zhi. 2021; 29(3):881-6. [DOI:10.19746/j.cnki.issn.1009-2137.2021.03.036] [PMID]

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