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ORIGINAL ARTICLE

Frequency of dyslipidemia in children with Type 1 diabetes.

Fariya[1], Zulqarnain Dilawar[2], Fazal Rabbi[3]

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ABSTRACT… Objective: To determine the frequency of dyslipidemia in children with type 1 diabetes presenting to tertiary care hospital. **Study Design:** Cross-sectional study. **Setting:** Ayub Teaching Hospital Abbottabad, Khyber Pakhtunkhwa, Pakistan. **Period:** October 2024 to January 2025. **Methods:** A total of 125 children aged 1 to 15 years with T1DM were included. Dyslipidemia was defined based on established lipid thresholds. Demographic data, diabetes duration, and fasting lipid profiles were collected and analyzed. **Results:** The average age of the individuals was 8.5 years, accompanied with an average diabetic period of 4.6 years. The prevalence of dyslipidaemia was 20.8%, notably higher in children over 10 years (32.6%) than in those between 1–10 years (13.9%) ($p = 0.013$). No notable correlations were detected between dyslipidaemia and gender ($p = 0.645$) or the duration of diabetes ($p = 0.156$). **Conclusion:** This study underscores a significant prevalence of dyslipidaemia in children with Type 1 Diabetes Mellitus, especially in older children.

Key words: Children, Dyslipidemia, Lipid Profile, Type 1 Diabetes Mellitus.

INTRODUCTION

Type 1 diabetes (T1DM) is an autoimmune disorder characterised by the targeted death of the insulin-secreting beta cells in the pancreas, resulting in a complete lack of insulin.[1] It exists since childhood through adolescent years but does develop even much later.[2] The disease carries lifelong dependence on insulin administration and maintaining normal levels of glucose to avoid complications ranging from acute such as ketoacidoid diabetic attacks to chronic ones in forms of micro-and macroangiopathic events.[3] Despite considerable advances made to manage this pathology, T1DM individuals continue remaining in a higher risk to be exposed to the cardiovascular diseases that still stay major causes for morbidity and mortality within subjects affected.[4]

Dyslipidemia is generally characterized by an abnormal level of lipids within the blood and is considered one of the major modifiable risk factors for cardiovascular diseases.[5] In the setting of type 1 diabetes mellitus, this is usually manifested as increased levels of LDL-C and triglycerides, together with a reduction in HDL-C.[6,7] The pathophysiology of dyslipidemia in T1DM is multifactorial and includes chronic hyperglycemia, insulin resistance, and inflammation, even in non-obese individuals, while genetic and lifestyle contributors explain the heterogeneous nature of lipid abnormalities noted in such patients.[8]

The factors affecting dyslipidemia in T1DM include several population characteristics, like age and duration of diabetes, besides those relating to glycemic control.[9] Indeed, poor lipid profiles have been consistently associated with all cohorts who have poor HbA1c control.[9] Additionally, hypertension, obesity, and nephropathy contribute to the deterioration of dyslipidemia in the subjects.[10] Importantly, early-onset dyslipidemia with T1DM is especially susceptible; this points to the need for early screening and intervention.[10]

Dyslipidaemia is a prevalent complication in paediatric patients with type 1 diabetes, marked

1. MBBS, Resident Pediatrician, Ayub Teaching Hospital Abbottabad, Khyber Pakhtunkhwa, Pakistan
2. MBBS, Resident Cardiologist, Ayub Teaching Hospital Abbottabad, Khyber Pakhtunkhwa, Pakistan
3. MBBS, MD (Int. Care Med), Intensivist, Capital Hospital, CDA Islamabad, Pakistan

Correspondence Address:
Dr. Fariya
Department of Pediatrician
Ayub Teaching Hospital Abbottabad,
Khyber Pakhtunkhwa, Pakistan
drkhan.medico@gmail.com

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by aberrant lipid levels in the bloodstream, including high LDL cholesterol, diminished HDL cholesterol, and increased triglycerides.[11] These lipid abnormalities are often linked to poor glycemic control and insulin resistance, increasing the risk of cardiovascular disease over time.[12] Early diagnosis and management through lifestyle modifications, optimized glycemic control, and, in some cases, pharmacological interventions are crucial to mitigating long-term complications. Routine lipid profile assessment is advised for pediatric patients with type 1 diabetes to facilitate prompt intervention.[13] A study by Soliman H et al. demonstrated that the prevalence of dyslipidaemia in children with type 1 diabetes was 70.47%.[14]

Determining the prevalence of dyslipidemia in our local Type 1 diabetic children would allow healthcare providers to implement effective, population-based interventions that might result in lower cardiovascular morbidity and mortality, better outcomes for patients, and more effective utilization of scarce health resources. These findings will also help to develop further research and can thus contribute to the review of local clinical practice guidelines for continuous improvement in quality of care of patients with T1DM in our region.

METHODS

Between October 2024 and January 2025, a descriptive study was carried out in the Pediatrics Department of ATH Abbottabad after approval from ethical committee (RC-EA-2024/167). A total of 125 children, aged 1 to 15 years, diagnosed with Type 1 Diabetes Mellitus (T1DM), were included. T1DM was defined as requiring insulin therapy for over one year, confirmed through medical documentation. The sample size was determined using WHO sample size calculation software, factoring in a 95% confidence level, an 8% margin of error, and an anticipated dyslipidemia prevalence of 70.47% in children with T1DM.14 Children with other chronic illnesses, autoimmune conditions, or on medications that could influence lipid metabolism were excluded.

Ethical clearance was obtained, and informed consent was collected from parents or legal guardians. Demographic data such as age, gender, and the duration of diabetes were documented. All participants underwent fasting lipid profile evaluations at the hospital's laboratory to ensure consistency. Dyslipidemia parameters were defined as follows: total cholesterol (TC) ≥200 mg/dL, low-density lipoprotein cholesterol (LDL-C) ≥130 mg/dL, non-high-density lipoprotein cholesterol (Non-HDL-C) ≥145 mg/dL, high-density lipoprotein cholesterol (HDL-C) <40 mg/dL, triglycerides ≥100 mg/dL for children aged 0–9 years, and triglycerides ≥130 mg/dL for those aged 10–15 years.

The results for continuous variables like age and diabetes duration were presented as mean ± standard deviation, while categorical variables such as gender and dyslipidemia status were shown as frequencies and percentages. Dyslipidemia prevalence was analyzed based on age, gender, and diabetes duration. Statistical analysis was conducted using the chi-square test, and a p-value of ≤0.05 was regarded as statistically significant.

RESULTS

The children included in this research had an average age of 8.51 ± 3.87 years, with an average diabetes duration of 4.65 ± 3.63 years. Analysis of their lipid profiles revealed a mean total cholesterol level of 193.24 ± 34.77 mg/dL, mean low-density lipoprotein cholesterol (LDL-C) at 115.07 ± 32.89 mg/dL, mean non-high-density lipoprotein cholesterol (Non-HDL-C) at 134.83 ± 38.82 mg/dL, mean high-density lipoprotein cholesterol (HDL-C) at 50.86 ± 14.37 mg/dL, and mean triglyceride level at 93.94 ± 44.70 mg/dL. Among the participants, 61.6% were boys, while 38.4% were girls as shown in Table-I.

Dyslipidemia was present in 20.8% of children, while 79.2% did not exhibit dyslipidemia, with a total sample size of 125 children as shown in Table-II.

Stratified analysis revealed that the frequency of dyslipidaemia was markedly greater in children over 10 years (32.6%) than in those aged

1–10 years (13.9%), with a p-value of 0.013. No notable correlation was identified between gender and dyslipidaemia, with incidence rates of 19.5% in males and 22.9% in females (p-value = 0.645). The total duration of diabetes showed no significant correlation with dyslipidaemia, exhibiting an incidence of 17.1% for a period of ≤5 years and 27.9% for a duration of >5 years (p-value = 0.156) as shown in Table-III.

Demographics		Mean ± SD / n (%)
Age (years)		8.512±3.87
Duration of Diabetes (years)		4.648±3.63
Total cholesterol (mg/dl)		193.240±34.77
Low-density lipoprotein cholesterol (mg/dl)		115.072±32.89
Non-high-density lipoprotein cholesterol (mg/dl)		134.832±38.82
High-density lipoprotein cholesterol (mg/dl)		50.864±14.37
Triglycerides (mg/dl)		93.944±44.70
Gender	Male	77 (61.6%)
	Female	48 (38.4%)

Table-I. Patient demographics

Dyslipidemia	Frequency	%age
Yes	26	20.8%
No	99	79.2%
Total	125	100%

Table-II. Prevalence of dyslipidemia

Clinical and Demographic Factors		Dyslipidemia		P-Value
		Yes n (%)	No n (%)	
Age (years)	1-10	11 (13.9%)	68 (86.1%)	0.013
	>10	15 (32.6%)	31 (67.4%)	
Gender	Male	15 (19.5%)	62 (80.5%)	0.645
	Female	11 (22.9%)	37 (77.1%)	
Duration of Diabetes (years)	≤ 5	14 (17.1%)	68 (82.9%)	0.156
	>5	12 (27.9%)	31 (72.1%)	

Table-III. Stratification of dyslipidemia with clinical and demographic factors

DISCUSSION

The findings of this study highlight a noteworthy prevalence of dyslipidemia (20.8%) among children with type 1 diabetes, emphasizing the need for early lipid screening and management in this population. The significant association between older age (>10 years) and higher prevalence of dyslipidemia (p=0.013) underscores the potential impact of age-related metabolic changes and the cumulative effects of diabetes duration on lipid profiles. Although gender and diabetes duration were not significantly associated with dyslipidemia, their clinical relevance cannot be overlooked, as these factors may interact with other unmeasured variables. These results align with existing literature that suggests an increased cardiovascular risk in pediatric diabetes, necessitating targeted interventions to prevent long-term complications. In our study, the mean age of participants was 8.512 ± 3.87 years, and the mean duration of diabetes was 4.648 ± 3.63 years. Dyslipidemia was present in 20.8% of the children, with significant age-related differences; the prevalence was higher among children older than 10 years (32.6%) compared to those aged 1–10 years (13.9%) (p=0.013). These findings align with those reported by Monteiro et al.[15] who observed an increasing prevalence of dyslipidemia with advancing age in children with type 1 diabetes mellitus. Similar to our findings, they noted a progression in lipid profile deterioration, particularly in LDL-C and total cholesterol, as the disease duration increased. Our results indicated that the mean total cholesterol was 193.240 ± 34.77 mg/dL, LDL-C was 115.072 ± 32.89 mg/dL, and non-HDL-C was 134.832 ± 38.82 mg/dL. These levels are comparable to those observed by Homma et al.[16] where dyslipidemia prevalence was as high as 72.5%, particularly marked by elevated LDL-C and total cholesterol. However, our study's dyslipidemia prevalence of 20.8% was substantially lower, possibly reflecting differences in population characteristics, glycemic control, or healthcare practices.

Interestingly, gender did not show a significant association with dyslipidemia in our study (p=0.645), a finding echoed in the work of Jihan Osman Ahmed[17], who similarly reported no significant gender-based differences in lipid abnormalities among children with T1DM in Sudan. However, Homma et al.[16] observed a

higher prevalence among pubertal females, likely influenced by hormonal changes during puberty, which may not have been fully explored in our cohort. The absence of a significant association between dyslipidemia and the duration of diabetes in our study contrasts with the findings of Iqbal et al.[18] who reported higher dyslipidemia rates among children with longer disease duration (>5 years). While our prevalence rates for ≤5 years (17.1%) and >5 years (27.9%) suggest a trend toward increased dyslipidemia with disease progression, the lack of statistical significance might reflect our smaller sample size or other population-specific factors. Our mean triglyceride levels (93.944 ± 44.70 mg/dL) and HDL-C levels (50.864 ± 14.37 mg/dL) were within acceptable ranges for children, aligning with the findings of Tayyem et al.[19] who noted no significant dietary contributions to dyslipidemia in their cohort. This reinforces the idea that dyslipidemia in T1DM may be driven more by glycemic control and intrinsic disease factors than by diet alone, a notion also supported by Maahs et al. [20] The age-stratified analysis in our study underscores the need for early and consistent screening for dyslipidemia, especially in older children with T1DM. The significant age-related increase in dyslipidemia prevalence (p=0.013) suggests that puberty and associated metabolic changes may amplify cardiovascular risks, as highlighted in studies by Homma et al and Jamil et el. also identified significant factors of the diabetes.[21,22] Moreover, the lack of gender or duration-related associations in our findings suggests that dyslipidemia risk should not be underestimated in any demographic group.

This study possesses specific limitations that must be recognized. The small sample size of 125 youngsters may restrict the generalizability of our results to broader populations. Moreover, as a single-center study, the findings may not accurately represent the variability in medical practices, socioeconomic influences, and genetic predispositions found in larger, multi-center populations. Future research with larger, multi-center cohorts is advised to corroborate and enhance these findings.

CONCLUSION

Our study has concluded that dyslipidemia is a significant concern among children with type 1 diabetes mellitus, with a higher prevalence observed in older children. The findings highlight that age plays a crucial role in the likelihood of developing dyslipidemia, while no significant association was found with gender or the duration of diabetes. These results emphasize the importance of routine screening and targeted interventions, particularly for older children, to mitigate the risk of long-term cardiovascular complications.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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REFERENCES

1. Popoviciu MS, Kaka N, Sethi Y, Patel N, Chopra H, Cavalu S. **Type 1 diabetes mellitus and autoimmune diseases: a critical review of the association and the application of personalized medicine.** J Pers Med. 2023; 13(3):422-26.

2. Kahkoska AR, Dabelea D. **Diabetes in youth: A global perspective.** Endocrinol Metab Clin North Am. 2021; 50(3):491-512. doi: 10.1016/j.ecl.2021.05.007

3. Banday MZ, Sameer AS, Nissar S. **Pathophysiology of diabetes: An overview.** Avicenna J Med. 2020; 10(4):174-88.

4. Chiesa ST, Marcovecchio ML. **Preventing cardiovascular complications in type 1 diabetes: The need for a lifetime approach.** Front Pediatr. 2021; 9:696499. doi: 10.3389/fped.2021.696499.

5. Addisu B, Bekele S, Wube TB, Hirigo AT, Cheneke W. **Dyslipidemia and its associated factors among adult cardiac patients at Ambo university referral hospital, Oromia region, west Ethiopia.** BMC Cardiovasc Disord. 2023; 23(1):321. doi: 10.1186/s12872-023-03348-y

6. Mohammadi F, Yadegar A, Rabizadeh S, Ayati A, Seyedi SA, Nabipoorashrafi SA, et al. **Correlates of normal and decreased HDL cholesterol levels in type 2 diabetes: A cohort-based cross-sectional study.** Lipids Health Dis. 2024; 23(1):18. doi: 10.1186/s12944-024-02010-6

7. Abera A, Worede A, Hirigo AT, Alemayehu R, Ambachew S. **Dyslipidemia and associated factors among adult cardiac patients: A hospital-based comparative cross-sectional study.** Eur J Med Res. 2024; 29(1):237-39.

8. Galicia-Garcia U, Benito-Vicente A, Jebari S, Larrea-Sebal A, Siddiqi H, Uribe KB, et al. **Pathophysiology of type 2 diabetes mellitus.** Int J Mol Sci. 2020; 21(17):6275-79.

9. Kang P, Kim KY, Shin HY. **Association between dyslipidemia and glycated hemoglobin in a population-based study.** Metabolites. 2024; 14(2):92-96.

10. Berberich AJ, Hegele RA. **A modern approach to dyslipidemia.** Endocr Rev. 2022; 43(4):611-53.

11. Alrasheed AA. **Dyslipidemia among patients with type 1 diabetes and its associated factors in Saudi Arabia: an analytical cross-sectional study.** Cureus. 2022; 14(2):e21923. doi: 10.7759/cureus.21923

12. Colom C, Rull A, Sanchez-Quesada JL, Pérez A. **Cardiovascular disease in type 1 diabetes mellitus: Epidemiology and management of cardiovascular risk.** J Clin Med. 2021; 10(8):1798-1801.

13. Catamo E, Robino A, Dovc K, Tinti D, Tamaro G, Bonfanti R, et al. **Screening of lipids and kidney function in children and adolescents with type 1 diabetes: Does age matter?** Front Endocrinol (Lausanne). 2023; 14:1186913. doi: 10.3389/fendo.2023.1186913

14. Soliman H, Ibrahim A. **Prevalence and pattern of dyslipidemia in an Egyptian children and adolescents with type 1 diabetes.** Egypt Pediatric Association Gaz. 2021; 69:21.

15. Monteiro AL, Demartini AAC. **Lipid profile of children and adolescents with type 1 diabetes mellitus.** Residência Pediátrica. 2022.

16. Homma TK, Endo CM. **Dyslipidemia in young patients with type 1 diabetes mellitus.** Arch Endocrinol Metab. 2015; 59(3):215-19.

17. Ahmed JO. **Prevalence of dyslipidemia in children with type 1 diabetes in Khartoum [dissertation].** Khartoum: University of Khartoum; 2005.

18. Iqbal S, Ahmed I. **Frequency of dyslipidemia in type 1 diabetic children.** Med Forum. 2017; 28(5):77-80.

19. Tayyem R, Nawaiseh H. **Assessment of nutrients intake in pediatrics with type 1 diabetes and dyslipidemia in Jordan.** Adolesc Health Med Ther. 2024; 15:31-43.

20. Maahs DM, Wadwa RP. **Dyslipidemia in youth with diabetes: To treat or not to treat?** J Pediatr. 2008; 153(4):458-465.

21. Ur Rahman J, Ahmad T, Khan M, Ur Rahman A, Ghani S, Ullah Khan F. **Assessment of prescribing patterns and medication errors related to prescriptions in hospitalized diabetes mellitus type-2 patients in Khyber Pakhtunkhwa, Pakistan.** Journal of Pharmaceutical Health Services Research. 2023; 14(1):49-54.

22. Shah S, Abbas G, Aslam A, Randhawa FA, Khan FU, Khurram H, et al. **Assessment of health-related quality of life among patients with obesity, hypertension and type 2 diabetes mellitus and its relationship with multimorbidity.** PLoS One. 2023; 18(8):e0289502.

AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Fariya:** Conceptualize and initial draft.
2	**Zulqarnain Dilawar:** Data collection and method.
3	**Fazal Rabbi:** Data analysis and complication final draft.