TUMI HEALTH SCIENCES RESEARCH
e-ISSN 3084-7915

TUMI Health Sciences Research
Meléndez-Medina, G. TUMI Health Sci. Res. 2026;1(1):23–29
https://doi.org/10.64716/8se17h52

ORIGINAL RESEARCH **OPEN ACCESS**

Prevalence and risk factors with type 2 diabetes mellitus among young adults at a district hospital in Trujillo, Peru

Gandij Yamil Meléndez-Medina[1]

[1] Universidad César Vallejo, Trujillo, Peru.

ABSTRACT

Background: Type 2 diabetes mellitus (T2DM) can occur early in adulthood and coexist with metabolic abnormalities that increase the burden of disease in this population. **Objective:** To determine the prevalence of T2DM and the risk factors associated with the disease among young adults treated at a district hospital in Trujillo, Peru, between 2020 and 2024. **Methods:** An observational, retrospective, analytical, cross-sectional study was conducted among adults aged 18 to 30 years. Prevalence was estimated from 1,258 clinical records, while the analysis of risk factors was performed using 98 medical records. Age, sex, dyslipidemia, obesity, hypertension, and family history of T2DM were evaluated. Associations were assessed using the chi-square test and odds ratios, with a significance level of $p < 0.05$. **Results:** The prevalence of T2DM was 3.1% (39/1,258). In the analysis of 98 medical records, dyslipidemia (OR = 3.50; p = 0.012), obesity (OR = 3.80; p = 0.006), hypertension (OR = 3.45; p = 0.039), and family history of T2DM (OR = 3.33; p = 0.023) were significantly associated with T2DM. No significant associations were observed with age (p = 0.17) or sex (OR = 1.09; p = 0.85). **Conclusions:** Among the young adults studied, the prevalence of T2DM was 3%. Dyslipidemia, obesity, hypertension, and family history were identified as statistically significant risk factors associated with T2DM.

Keywords: Diabetes Mellitus, Type 2; Young Adult; Prevalence; Risk Factors; Cross-Sectional Studies.

***Corresponding author:** Gandij Yamil Meléndez-Medina
Universidad César Vallejo, Trujillo, Peru.
E-mail address: gandijyamilmelendez@gmail.com

ORCID iDs: G.Y. Meléndez-Medina, 0000-0001-7778-8527

Received: August 20, 2026
Revised: August 21, 2026
Accepted: August 22, 2026
Available online: August 23, 2026

Journal homepage: https://tumijournal.com/index.php/health-sciences-research/en
https://doi.org/10.64716/8se17h52
Editor-in-Chief: Yovana Melisza Gutierrez-Polanco

Introduction

Diabetes remains a major public health concern because of its frequency, complications, and need for long-term care. The most recent estimates indicate that approximately 589 million adults aged 20–79 years were living with diabetes in 2024, and this number is projected to reach 853 million by 2050 [1]. Although type 2 diabetes mellitus (T2DM) has traditionally been associated with middle and older age, its occurrence among younger people is increasingly recognized. Early presentation is particularly relevant because it entails longer lifetime exposure to hyperglycemia and may be accompanied by a faster decline in pancreatic beta-cell function and complications arising during otherwise productive years of life [2,3].

Young-onset T2DM does not arise from a single condition. Obesity and insulin resistance play a central role, but they frequently coexist with metabolic abnormalities such as dyslipidemia and hypertension. Family history also reflects an important underlying susceptibility, particularly when the disease develops at a younger age [2].

Recent studies in young adults have reported relevant associations between T2DM and obesity, hyperlipidemia, and hypertension-related conditions, suggesting that an unfavorable cardiometabolic profile may already be present early in adulthood [4]. This deserves clinical attention because diagnosis at a younger age extends the period during which individuals are exposed to both abnormal glucose metabolism and additional cardiovascular factors [3,4].

In Peru, evidence similarly indicates an increasing occurrence of T2DM among younger populations. An analysis of Ministry of Health records showed that the registered prevalence among individuals younger than 30 years increased from 2.1 to 22.1 cases per 100,000 population between 2005 and 2018 [5]. Other national studies have described the burden of T2DM in the general adult population, although estimates vary according to the populations evaluated and the methods used to identify cases [6].

Despite these findings, information simultaneously characterizing T2DM and cardiometabolic variables among young adults receiving hospital care in Peru remains limited. This gap is relevant because national or population-based estimates may not fully reflect the characteristics of young adults who seek care at health facilities [5,6].

Information obtained from clinical records may help identify the characteristics that most frequently accompany T2DM at this stage of life and provide local evidence to support surveillance and earlier recognition of individuals with an unfavorable metabolic profile. Obesity, physical inactivity, and other metabolic abnormalities have already been recognized as relevant considerations for clinical assessment and prevention in younger populations [7]. In this context, the objective of this study was to determine the prevalence of type 2 diabetes mellitus and evaluate the risk factors associated with the disease among young adults aged 18–30 years treated at a district hospital in Trujillo, Peru, between 2020 and 2024.

Materials and methods

Study design and setting

An observational, retrospective, analytical, cross-sectional study was conducted using clinical records of young adults treated at a district hospital in Trujillo, Peru. Records corresponding to the period from January 2020 to December 2024 were analyzed. The manuscript was prepared in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations for observational studies[8].

Population, sample, and sampling

The study population consisted of young adults aged 18–30 years who received care at the hospital during the study period. A total of 1,258 clinical records were considered to estimate the prevalence of type 2 diabetes mellitus (T2DM). The analysis of risk factors was conducted using an analytical sample of 98 medical records that met the eligibility criteria and contained the information required for the variables under study. Of these records, 21 corresponded to patients with T2DM and 77 to patients without T2DM.

The planned sample size for the analytical component was 98 medical records. It was estimated using the formula for a single proportion, considering an expected proportion of 10%, its complement of 90%, an absolute precision of 5%, and a Z value of 1.65, corresponding to an approximate confidence level of 90% [9]. Medical records were selected through non-probability convenience sampling according to their availability and fulfillment of the predefined criteria.

Eligibility criteria

Medical records of male and female patients aged 18–30 years who were treated at the hospital between 2020 and 2024 and contained sufficient information to establish the presence or absence of T2DM and assess the study variables were included. Records of patients with type 1 diabetes mellitus, pregnant women, individuals with metabolic or endocrine disorders other than and unrelated to T2DM, and medical records lacking the information required for the analysis were excluded.

Study variables

The main variable was the presence of T2DM, recorded dichotomously as present or absent. Diagnosis documented in the medical record and available information on glycemic criteria were considered. Diagnostic reference thresholds were those established by the American Diabetes Association: fasting plasma glucose ≥126 mg/dL, glycated hemoglobin ≥6.5%, 2-h plasma glucose ≥200 mg/dL during an oral glucose tolerance test, or random plasma glucose ≥200 mg/dL when documented as diagnostic in the clinical record [10].

Sociodemographic variables included age, expressed in completed years, and sex, recorded as male or female. The risk factors evaluated were dyslipidemia, obesity, hypertension, and family history of T2DM. Dyslipidemia was considered present when the medical record documented an abnormal lipid profile, operationally defined as total cholesterol >200 mg/dL, triglycerides >150 mg/dL, LDL cholesterol >130 mg/dL, and/or HDL cholesterol <40 mg/dL in men or <50 mg/dL in women. Obesity was identified from the recorded diagnosis and a body mass index >30 kg/m²[11], whereas hypertension was determined from the clinical diagnosis or systolic blood pressure >140 mmHg and/or diastolic blood pressure >90 mmHg [12]. Family history was considered present when T2DM in a first-degree relative, including parents or siblings, was documented.

Data collection instruments

Information was collected using a structured data extraction form specifically developed for the study. The instrument consisted of two sections. The first recorded age and sex, while the second collected clinical information on lipid profile abnormalities, blood pressure, obesity, family history of T2DM, and T2DM diagnosis. The form was designed to extract predefined variables from medical records and did not include scales, scores, or classifications derived from a total score.

Procedure

After institutional authorization to access clinical records was obtained, medical records corresponding to young adults treated between 2020 and 2024 were identified. Records were reviewed according to the eligibility criteria, and the availability of information required for the study variables was verified. Data from each record included in the analytical component were transferred to the data collection form and subsequently entered into an electronic Microsoft Excel database. Clinical information was used exclusively for research purposes and handled confidentially.

For prevalence estimation, the number of patients with T2DM was identified among the 1,258 records corresponding to the study period. The analysis of risk factors associated with T2DM was subsequently conducted using the 98 medical records included in the analytical sample.

Statistical Analysis

Data were processed using Microsoft Excel (Microsoft Corporation, Redmond, WA, USA). Age was summarized as mean and standard deviation, whereas categorical variables were expressed as absolute frequencies and percentages. T2DM prevalence was calculated as the number of records with T2DM divided by the total number of records evaluated during 2020–2024 and multiplied by 100.

Associations between T2DM and the proposed risk factors dyslipidemia, obesity, hypertension, and family history were evaluated using bivariate analyses. Sex was also examined as a sociodemographic variable. The chi-square test was applied, and unadjusted odds ratios (ORs) with 95% confidence intervals were calculated. Age was compared between participants with and without T2DM using the Student's t-test. Statistical significance was set at $p < 0.05$. No multivariable adjustment model was performed.

Ethical considerations

Institutional authorization was obtained to access the medical records. Information was handled confidentially and used exclusively for scientific purposes. The study was conducted considering the ethical principles of the World Medical Association Declaration of Helsinki [13]

and the principles governing privacy, confidentiality, and responsible use of health information established in the Declaration of Taipei [14].

Results

A total of 1,258 clinical records from young adults treated between 2020 and 2024 were analyzed to estimate the prevalence of type 2 diabetes mellitus (T2DM). The analysis of risk factors included 98 medical records, of which 21 corresponded to patients with T2DM and 77 to patients without T2DM.

Mean age was 24.52 ± 3.05 years among participants with T2DM and 24.61 ± 2.95 years among those without the disease, with no statistically significant difference between groups (p = 0.17). Among participants with T2DM, 13 (62%) were men and 8 (38%) were women, whereas the group without T2DM included 46 (59%) men and 31 (41%) women. Sex was not significantly associated with T2DM (OR = 1.09; 95% CI: 0.70–1.70; p = 0.85) (Table 1).

Hypertension was present in 6 participants with T2DM (29%) and 8 participants without T2DM (10%) and was significantly associated with the disease (OR = 3.45; 95% CI: 1.90–6.80; p = 0.039). A family history of T2DM was recorded in 8 participants with the disease (38%) compared with 12 (16%) without T2DM. Family history was also significantly associated with T2DM (OR = 3.33; 95% CI: 1.60–6.10; p = 0.023) (Table 3).

Discussion

The main finding of this study was a 3% prevalence of T2DM among young adults treated between 2020 and 2024. Among the risk factors evaluated, dyslipidemia, obesity, hypertension, and a family history of T2DM showed statistically significant associations with the presence of the disease, whereas age and sex showed no significant associations. Taken together, these findings indicate that T2DM in this young population was accompanied by several recognized metabolic and familial risk factors relevant to cardiometabolic assessment.

Table 1. Characteristics of young adults included in the analysis according to type 2 diabetes mellitus status.

Characteristic	T2DM (n = 21)	No T2DM (n = 77)	OR (95% CI)	p
Age, years, mean ± SD	24.52 ± 3.05	24.61 ± 2.95	—	0.17
Male sex, n (%)	13 (62)	46 (59)	1.09 (0.70–1.70)	0.85
Female sex, n (%)	8 (38)	31 (41)	Reference	—

Note: SD: standard deviation; T2DM: type 2 diabetes mellitus; OR: odds ratio; 95% CI: 95% confidence interval. p-values were calculated using the Student's t-test for continuous variables (age) and the Chi-square test for categorical variables (sex).

Among the 1,258 clinical records evaluated during the study period, 39 patients had T2DM, corresponding to an approximate prevalence of 3% among young adults treated at the healthcare facility (Table 2).

Table 2. Prevalence of type 2 diabetes mellitus among young adults treated between 2020 and 2024.

Type 2 diabetes mellitus	n	%
Yes	39	3
No	1,219	97
Total	1,258	100

In the analytical sample, dyslipidemia was present in 14 of the 21 participants with T2DM (67%) and in 28 of the 77 participants without T2DM (36%). Dyslipidemia was significantly associated with T2DM (OR = 3.50; 95% CI: 1.80–6.30; p = 0.012). Obesity was identified in 12 participants with T2DM (57%) and 20 participants without T2DM (26%), and a significant association was observed (OR = 3.80; 95% CI: 2.20–7.10; p = 0.006).

The prevalence observed in this study was close to the 2.3% reported by Tanoey and Becher among Indonesian adults when diabetes was identified through self-report [15], although it was lower than several estimates reported in other young populations. A recent systematic review among South Asian populations found a wide range in the prevalence of young-onset T2DM, from 0.1% to 28.3% depending on the population and study design [16]. Nanditha et al. reported a prevalence of 7.8% among individuals aged 20–39 years in southern India in 2016, compared with 4.5% a decade earlier [17]. These differences should be interpreted cautiously because age ranges, diagnostic procedures, and healthcare settings differed considerably. In the present study, prevalence was calculated from diagnoses documented in clinical records. Consequently, it reflects diagnosed T2DM within a hospital-treated population rather than a population-based estimate for Trujillo. This distinction is particularly relevant because Tanoey and Becher found substantially higher prevalence estimates when HbA1c

measurements were incorporated than when previously recognized diabetes alone was considered [15].

The risk associations observed for dyslipidemia and obesity are consistent with the metabolic profile described in young-onset T2DM. Xu et al. reported obesity among the strongest factors associated with diagnosed young-adult-onset T2DM and also found important associations with the use of lipid-lowering and antihypertensive medications [4]. In a prospective cohort of more than 92,000 participants, Tian et al. identified metabolic syndrome and insulin resistance as particularly relevant pathways leading to T2DM, with stronger associations at younger ages; obesity, hypertension, and dyslipidemia formed part of this cardiometabolic pattern [18]. Belete and Sithole similarly found an independent association between overweight or obesity and diabetes in an adult population, with an adjusted OR of 2.43 [19]. Although those estimates are not directly comparable with the unadjusted ORs obtained in the present study, their direction supports the clustering of metabolic abnormalities among individuals with T2DM.

Obesity showed the largest association in our analysis. This finding is biologically plausible because excess adiposity is closely related to insulin resistance and progressive impairment of glucose regulation, mechanisms of particular concern when diabetes develops early in adulthood [2,3]. Recent population-based evidence also indicates that increasing rates of young-onset T2DM have occurred alongside increases in obesity and dyslipidemia. In the STRiDE-I study from southern India, the rise in T2DM prevalence among younger individuals was accompanied by increasing obesity and lipid abnormalities, while obesity and family history were among the major factors contributing to this trend [17].

Hypertension was also identified among the risk factors significantly associated with T2DM in the present sample. Given the cross-sectional nature of the analysis, however, this finding does not establish that hypertension preceded or caused diabetes. Rather, both conditions may occur within the same metabolic context and share mechanisms related to adiposity, insulin resistance, and vascular dysfunction. Tian et al. found that hypertension, obesity, and dyslipidemia tended to show stronger associations with incident T2DM at younger ages than among older groups [18]. Such clustering is clinically relevant because the coexistence of several cardiometabolic abnormalities from early adulthood may extend exposure to conditions associated with cardiovascular disease and other diabetes-related complications [3].

Family history was likewise identified as a significant risk factor associated with T2DM. This observation is supported by much larger population-based studies. Using genealogical and electronic health records from young and middle-aged adults, Smith et al. found a clear association between family history and T2DM; individuals with two or more affected first-degree relatives had a relative risk of 3.31 compared with those without affected first-degree relatives [20]. Nanditha et al. also identified family history, together with obesity, among the main factors related to increasing T2DM prevalence among younger adults [17]. Family history likely reflects both inherited susceptibility and shared environmental exposures, making it useful for identifying young adults who may warrant closer metabolic assessment without implying that family history alone determines disease occurrence.

No association was identified between sex and T2DM, and mean age was nearly identical between participants with and without the disease. Tanoey and Becher also reported no significant association between sex and early-onset adult diabetes in Indonesia [15]. The absence of an age difference in our study should additionally be considered in light of the narrow 18–30-year age range, which provides limited variability for detecting an age-related gradient. Therefore, these results do not suggest that age or sex are irrelevant to the broader epidemiology of T2DM; they indicate only that no association was detected within the population examined.

From a clinical and public health perspective, the findings suggest that assessment of young adults should not focus exclusively on glycemic status when obesity, lipid abnormalities, hypertension, or a family history of T2DM are present. Considering these characteristics together may help identify individuals who warrant closer metabolic follow-up and earlier preventive measures. The increasing burden of younger-onset T2DM has prompted calls for greater attention to weight management, cardiometabolic abnormalities, and modifiable exposures before prolonged disease develops [21]. Nevertheless, the present findings identify risk factors associated with T2DM in this healthcare population and do not demonstrate that any specific screening strategy reduces incidence or complications.

Strengths of the study include the evaluation of records covering a five-year period and its specific focus on young adults, a population for which local evidence

Table 3. Risk factors associated with type 2 diabetes mellitus among young adults.

Factor present	T2DM (n = 21) n (%)	No T2DM (n = 77) n (%)	OR (95% CI)	p
Dyslipidemia	14 (67)	28 (36)	3.50 (1.80–6.30)	0.012
Obesity	12 (57)	20 (26)	3.80 (2.20–7.10)	0.006
Hypertension	6 (29)	8 (10)	3.45 (1.90–6.80)	0.039
Family history of T2DM	8 (38)	12 (16)	3.33 (1.60–6.10)	0.023

Note: T2DM: type 2 diabetes mellitus; OR: unadjusted odds ratio; 95% CI: 95% confidence interval. Bivariate analysis was performed using the Chi-square test.

remains more limited than for older adults. Several routinely available clinical characteristics were also assessed simultaneously. Important limitations should be acknowledged. This was a retrospective, single-center study, and the findings cannot be generalized to all young adults in Trujillo. Prevalence was estimated from healthcare records and may therefore have missed undiagnosed cases. The risk-factor analysis was based on 98 medical records, a different subset from the 1,258 records used to estimate prevalence, and selection according to record availability may have introduced selection bias. Medical-record data are also susceptible to incomplete documentation and variability in how clinical information was recorded. In addition, the reported ORs were derived from bivariate analyses without multivariable adjustment, so confounding between obesity, dyslipidemia, hypertension, family history, and unmeasured characteristics such as diet, physical activity, or socioeconomic conditions cannot be excluded. Finally, the cross-sectional design does not establish temporality and therefore does not support causal inference.

Future studies should include multicenter populations and probability-based sampling, together with standardized glucose and HbA1c assessment to identify both known and previously undiagnosed T2DM. Prospective designs would provide stronger evidence regarding the temporal relationship between cardiometabolic exposures and disease onset. Including physical activity, dietary patterns, smoking, detailed family history, and socioeconomic variables, followed by multivariable modeling, would also allow adjusted associations to be estimated and may help determine which risk factors independently contribute to identifying young adults more likely to have or subsequently develop T2DM.

Conclusions

Among young adults aged 18–30 years treated at a district hospital in Trujillo, Peru, between 2020 and 2024, the prevalence of type 2 diabetes mellitus was 3%. Dyslipidemia, obesity, hypertension, and a family history of type 2 diabetes mellitus were identified as statistically significant risk factors associated with the disease. In contrast, age and sex were not significantly associated with T2DM. These findings highlight a group of metabolic and familial risk factors that may be relevant when assessing T2DM in young adults within the population studied.

Author Contributions Statement (CrediT)

GYM: Conceptualization, Methodology, Investigation, Formal Analysis, Data Curation, Visualization, Writing – Original Draft, Writing – Review & Editing, and Project Administration

Acknowledgments

The author acknowledges the research advisor for her guidance throughout the study and the institutions that provided academic resources and facilitated access to the information required for its conduct.

Funding

This research received no specific funding from public, commercial, or not-for-profit funding agencies.

Conflict of Interest

The author declares no financial, institutional, professional, or personal conflicts of interest that could have influenced the conduct or publication of this study.

Data Availability

The data supporting the findings of this study are not publicly available because of ethical and confidentiality restrictions associated with information obtained from medical records. Requests for access may be directed to the corresponding author and will be subject to the appropriate institutional authorization.

References

[1] Genitsaridi I, Salpea P, Salim A, Sajjadi SF, Tomic D, James S, et al. 11th edition of the IDF Diabetes Atlas: global, regional, and national diabetes prevalence estimates for 2024 and projections for 2050. Lancet Diabetes Endocrinol. 2026;14(2):149-156. https://doi.org/10.1016/S2213-8587(25)00299-2

[2] Strati M, Moustaki M, Psaltopoulou T, Vryonidou A, Paschou SA. Early onset type 2 diabetes mellitus: an update. Endocrine. 2024;85(3):965-978. https://doi.org/10.1007/s12020-024-03772-w

[3] Magliano DJ, Sacre JW, Harding JL, Gregg EW, Zimmet PZ, Shaw JE. Young-onset type 2 diabetes mellitus: implications for morbidity and mortality. Nat Rev Endocrinol. 2020;16(6):321-331. https://doi.org/10.1038/s41574-020-0334-z

[4] Xu L, Ran J, Shao H, Chen M, Tang H, Li Y, et al. Incidence and risk factors of diagnosed young-adult-onset type 2 diabetes in the U.S.: the National Health Interview Survey 2016-2022. Diabetes Care. 2025;48(3):371-380. https://doi.org/10.2337/dc24-1699

[5] Ccorahua-Ríos MS, Atamari-Anahui N, Miranda-Abarca I, Campero-Espinoza AB, Rondón-Abuhadba EA, Pereira-Victorio CJ. Prevalencia de la diabetes mellitus tipo 2 en población menor de 30 años para el período de 2005 a 2018 con datos del Ministerio de Salud de Perú. Medwave. 2019;19(10):e7723. https://doi.org/10.5867/medwave.2019.10.7723

[6] Carrillo-Larco RM, Bernabé-Ortiz A. Diabetes mellitus tipo 2 en Perú: una revisión sistemática sobre la prevalencia e incidencia en población general. Rev Peru Med Exp Salud Publica. 2019;36(1):26-36. https://doi.org/10.17843/rpmesp.2019.361.4027

[7] Miravet-Jiménez S, Pérez-Unanua MP, Alonso-Fernández M, Escobar-Lavado FJ, González-Mohino Loro B, Piera-Carbonell A. Manejo de la diabetes mellitus tipo 2 en adolescentes y adultos jóvenes en atención primaria. Semergen. 2020;46(6):415-424. https://doi.org/10.1016/j.semerg.2019.11.008

[8] Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP; STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. PLoS Med. 2007;4(10):e296. https://doi.org/10.1371/journal.pmed.0040296

[9] Charan J, Biswas T. How to calculate sample size for different study designs in medical research? Indian J Psychol Med. 2013;35(2):121-126. https://doi.org/10.4103/0253-7176.116232

[10] American Diabetes Association Professional Practice Committee for Diabetes. 2. Diagnosis and classification of diabetes: Standards of Care in Diabetes—2026. Diabetes Care. 2026;49(Suppl 1):S27-S49. https://doi.org/10.2337/dc26-S002

[11] World Health Organization. Obesity and overweight. Geneva: World Health Organization; 2025. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

[12] World Health Organization. Hypertension. Geneva: World Health Organization; 2025. https://www.who.int/news-room/fact-sheets/detail/hypertension

[13] World Medical Association. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human participants. JAMA. 2025;333(1):71-74. https://doi.org/10.1001/jama.2024.21972

[14] World Medical Association. WMA Declaration of Taipei on ethical considerations regarding health databases and biobanks. Ferney-Voltaire: World Medical Association; 2016. https://www.wma.net/policies-post/wma-declaration-of-taipei-on-ethical-considerations-regarding-health-databases-and-biobanks/

[15] Tanoey J, Becher H. Diabetes prevalence and risk factors of early-onset adult diabetes: results from the Indonesian Family Life Survey. Glob Health Action. 2021;14(1):2001144. https://doi.org/10.1080/16549716.2021.2001144

[16] Reji S, Sankaraeswaran M, Ulagamathesan V, Wesley H, Ramesh G, Srinivasan S, et al. Cohort prevalence of young-onset type 2 diabetes in South Asia: a systematic review. Diabetes Res Clin Pract. 2025;221:112013. https://doi.org/10.1016/j.diabres.2025.112013

[17] Nanditha A, Susairaj P, Satheesh K, Raghavan A, Snehalatha C, Ramachandran A. The rising prevalence of type 2 diabetes among the youth in southern India—an ancillary analysis of the Secular TRends in DiabEtes in India (STRiDE-I) study. J Diabetes. 2024;16(7):e13576. https://doi.org/10.1111/1753-0407.13576

[18] Tian X, Chen S, Zhang Y, Xu Q, Xia X, Wu S, et al. Age-specific effect and pathways of risk factors on the risk of incident type 2 diabetes: a 13-year prospective cohort study. Diabetes Metab Res Rev. 2025;41(1):e70028. https://doi.org/10.1002/dmrr.70028

[19] Belete GK, Sithole HL. Prevalence and associated factors of diabetes among adult populations of Hawassa town, southern Ethiopia: a community based cross-sectional study. PLoS One. 2025;20(1):e0318081. https://doi.org/10.1371/journal.pone.0318081

[20] Smith KR, Meeks H, Curtis D, Brown BB, Kole K, Kowaleski-Jones L. Family history of type 2 diabetes and the risk of type 2 diabetes among young and middle-aged adults. Chronic Dis Transl Med. 2025;11(1):46-56. https://doi.org/10.1002/cdt3.147

[21] Sattar N, Kennon B, White AD. Increased prevalence of younger onset type 2 diabetes: why and what could be done? Lancet Diabetes Endocrinol. 2024;12(10):687-690. https://doi.org/10.1016/S2213-8587(24)00231-6