INSIGHTS-JOURNAL OF
HEALTH AND REHABILITATION

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

# ASSESSING NURSING STUDENTS' KNOWLEDGE REGARDING FACTORS LINKED TO EARLY ONSET OF DIABETES AMONG YOUNG ADULTS IN PAKISTAN

*Original Research*

**Hafiz Muhmmad Awais Qadri[1]*, Sadaqat Aftab[2], Madiha Mukhtar[3]**
[1]BSN Student, Lahore School of Nursing, The University of Lahore, Lahore, Pakistan.
[2]Lecturer, Lahore School of Nursing, The University of Lahore, Lahore, Pakistan.
[3]Associate Professor, Lahore School of Nursing, The University of Lahore, Lahore, Pakistan.
**Corresponding Author:** Hafiz Muhmmad Awais Qadri, BSN Student, Lahore School of Nursing, The University of Lahore, Lahore, Pakistan.
awaisnurseprofession@gmail.com
**Acknowledgement:** The authors gratefully acknowledge the support of the Lahore School of Nursing for facilitating this research.

Conflict of Interest: None
Grant Support & Financial Support: None

## ABSTRACT

**Background:** Early-onset diabetes mellitus is becoming an increasingly prevalent public health concern, especially in younger populations across developing countries. With nursing students serving as future healthcare providers, their understanding of early-onset diabetes is critical for effective disease prevention, early detection, and management. Ensuring that nursing students possess adequate knowledge can have a significant impact on community health outcomes.

**Objective:** This study aimed to assess the knowledge levels of undergraduate nursing students regarding early-onset diabetes and to evaluate the influence of demographic factors—age, gender, and academic year—on their understanding.

**Methods:** A cross-sectional descriptive survey was conducted at the Lahore School of Nursing, University of Lahore. A total of 152 nursing students from the first, second, and third academic years were selected using purposive sampling. Data were collected using a validated, structured questionnaire consisting of 24 multiple-choice questions. Knowledge scores were categorized into three levels: Good (≥85), Fair (70–84), and Average (<70). Descriptive statistics and Chi-square tests were performed using SPSS version 25 to analyze associations between knowledge levels and demographic variables.

**Results:** Among 152 participants, 60.5% were male and 39.5% were female. Good knowledge scores were achieved by 35% of males and 30% of females. First-year students had the lowest proportion of good knowledge (20%), compared to 40% in second-year and 33% in third-year students. Age-wise, 34% of students aged 18–22 years had good knowledge, followed by 29% (23–26 years) and 25% (27–30 years). Academic year showed a statistically significant association with knowledge levels ($p < 0.05$), while gender and age did not ($p > 0.05$).

**Conclusion:** Academic progression significantly influences nursing students' knowledge of early-onset diabetes. Tailored interventions—especially early theoretical integration, reinforcement in senior years, and age/gender-sensitive teaching strategies—are necessary to enhance educational outcomes and prepare nursing students to manage diabetes effectively.

**Keywords:** Age factors, Curriculum, Diabetes mellitus, Education, Knowledge, Nursing students, Surveys and questionnaires.

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

## INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by sustained hyperglycemia resulting from impaired insulin secretion, insulin action, or both. In recent decades, there has been a concerning rise in the prevalence of type 2 diabetes mellitus (T2DM) among late adolescents and young adults, a demographic previously considered at relatively low risk (1). This shift in disease onset is largely attributed to modifiable lifestyle factors such as physical inactivity, increased consumption of energy-dense diets, and rising rates of obesity—issues that are particularly prominent in developing nations undergoing rapid urbanization (2). Early-onset T2DM is not merely a clinical concern; it poses significant socio-economic implications, given its association with long-term complications including cardiovascular disease, nephropathy, and retinopathy, which ultimately lead to reduced productivity and increased healthcare burden (3). Despite the growing prevalence of diabetes in younger populations, there remains a notable gap in knowledge among future healthcare providers, especially nursing students, regarding the risk factors, prevention strategies, and management approaches for early-onset diabetes. Nursing students, as emerging professionals, are expected to play a vital role in patient education and chronic disease prevention. However, insufficient awareness and understanding of diabetes-related issues among this group can significantly hinder their ability to provide competent care and promote effective public health interventions (4). Previous studies have emphasized that healthcare professionals in training often lack the foundational knowledge required to combat the diabetes epidemic, pointing to a critical need for improved education in this area (5,6).

The significance of addressing this issue lies in its implications for both clinical practice and healthcare policy. Strengthening the diabetes-related knowledge base of nursing students is essential for developing a skilled and informed nursing workforce capable of contributing meaningfully to diabetes prevention and control (7,8). Furthermore, enhancing nursing curricula based on such research findings can help align educational programs with contemporary healthcare demands, thereby supporting more effective patient outcomes and broader public health goals (9,10). In this context, the current study seeks to assess nursing students' knowledge of the factors contributing to early-onset diabetes, with the aim of identifying educational gaps and informing curriculum development to improve future clinical competence (11).

## METHODS

The study adopted a cross-sectional descriptive survey design to evaluate the existing knowledge of early-onset diabetes among undergraduate nursing students. This design was suitable as it enabled data collection at a single point in time, providing insight into the participants' understanding without the influence of external variables or interventions. The research was conducted at the Lahore School of Nursing, University of Lahore, a setting selected for its diverse academic representation across multiple academic years. The study population consisted of undergraduate Bachelor of Science in Nursing (BSN) students enrolled in their first, second, or third academic year, aged between 18 and 30 years. Inclusion criteria required participants to be currently enrolled, to have completed at least one clinical rotation, and to be willing to participate. Students who were on academic leave, enrolled in postgraduate or diploma nursing programs, or unwilling to participate were excluded from the study. A purposive sampling strategy was employed to ensure proportional representation across all academic years, facilitating a more comprehensive understanding of knowledge distribution. The sample size was calculated using Cochran's formula, considering a population size of 250 students (N), a confidence level of 95% (Z = 1.96), an assumed prevalence of sufficient knowledge at 50% (p = 0.5), and a 5% margin of error (e = 0.05). The resulting sample size was approximately 152 students, which was rounded up to ensure adequate representation and statistical validity (12). Data were collected over a five-month period, covering the stages of ethical clearance, participant recruitment, tool administration, and data analysis. A structured, pre-validated questionnaire was used for data collection. The tool was divided into two sections: Section A captured demographic variables (age, gender, academic year), while Section B assessed knowledge related to early-onset diabetes through 24 multiple-choice questions addressing its causes, risk factors, prevention, and management. The operational definition of early-onset diabetes for this study was diabetes diagnosed at or before the age of 40, encompassing both type 1 and type 2 diabetes and related preventative strategies (14).

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

The scoring system for knowledge assessment required clarification due to inconsistencies in overlapping score ranges originally proposed. To ensure methodological soundness and avoid misclassification, the knowledge levels were redefined with mutually exclusive ranges as follows: a score of ≥102 was classified as "Good Knowledge," scores between 84 and 101 were classified as "Fair Knowledge," and scores <84 were considered "Average Knowledge." This corrected classification eliminated overlaps and allowed for accurate categorization of responses. The validity of the questionnaire had already been established by the original developers. For this study, a pilot test was conducted on 30 students to assess reliability, producing a Cronbach's alpha of 0.82, indicating high internal consistency. Ethical approval was obtained from the Institutional Review Board of the University of Lahore. Informed written consent was secured from all participants following a detailed explanation of the study's purpose, procedures, and voluntary nature. The questionnaire was administered in classroom settings, with 20 minutes allocated for completion, and responses were collected immediately to ensure accuracy and minimize data loss. Statistical analysis was conducted using IBM SPSS version 25. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize demographic data and knowledge scores. The Chi-square test was employed to examine associations between demographic variables and knowledge levels. Throughout the study, strict ethical principles were observed. Participants were guaranteed anonymity and confidentiality, with assurances of voluntary participation and the right to withdraw at any time without academic or personal repercussions. The study involved no foreseeable physical, psychological, or academic risks (15).

## RESULTS

The study included a total of 152 undergraduate nursing students. Among them, 60.5% were male (n=92) and 39.5% were female (n=60). The majority of the participants (73.0%, n=111) were between 18 and 22 years of age, followed by 25.0% (n=38) aged between 23 and 26 years, and 2.0% (n=3) aged between 27 and 30 years. With respect to academic year distribution, 45.4% (n=69) of the participants were in their second year, 28.3% (n=43) in their first year, and 26.3% (n=40) in their third year. The mean knowledge score among all participants was 83.25, with a standard deviation of 8.44. Scores ranged from a minimum of 56 to a maximum of 105. The median score was 83, while the mode, representing the most frequently occurring score, was 87. These findings reflect a moderately high level of knowledge across the study population. Based on the scoring criteria, knowledge levels were categorized as follows: scores ≥85 were classified as good knowledge, 70–84 as fair knowledge, and <70 as average knowledge. Of the total participants, 33% demonstrated good knowledge, 53% had fair knowledge, and 14% fell into the average knowledge category.

Further analysis of knowledge distribution by demographic characteristics showed that 35% of male students demonstrated good knowledge, compared to 30% of female students. In terms of age, participants aged 18–22 years exhibited the highest proportion of good knowledge at 34%, followed by 29% in the 23–26 age group, and 25% among those aged 27–30 years. Academic year had a more pronounced impact on knowledge levels: 40% of second-year students scored within the good knowledge category, compared to 33% of third-year students and 20% of first-year students. These results suggest that academic progression was associated with improved knowledge scores, with second-year students showing the strongest performance. Gender and age differences in knowledge levels were observed but were relatively modest and not statistically significant.

Inferential analysis was performed to assess the association between demographic variables and knowledge levels using the Chi-square test. Although male participants exhibited a slightly higher proportion of good knowledge (35%) compared to females (30%), the difference was not statistically significant ($p > 0.05$), suggesting that gender did not have a meaningful influence on knowledge scores. When analyzing academic year, second-year students demonstrated the highest percentage of good knowledge (40%), followed by third-year students (33%) and first-year students (20%). The association between academic year and knowledge level was statistically significant ($p < 0.05$), indicating that academic progression was positively correlated with improved knowledge. Age-wise comparison showed that the youngest group (18–22 years) had the highest proportion of good knowledge (34%), with a gradual decline observed in the older age groups—29% in those aged 23–26 years and 25% in those aged 27–30 years.

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

**Table 1: Demographic Characteristics of Nursing Students (N = 152)**

| Variable | Category | Frequency | Percentage (%) |
|---|---|---|---|
| Gender | Male | 92 | 60.5 |
| | Female | 60 | 39.5 |
| Age Group | 18–22 Years | 111 | 73.0 |
| | 23–26 Years | 38 | 25.0 |
| | 27–30 Years | 3 | 2.0 |
| Academic Year | 1st Year | 43 | 28.3 |
| | 2nd Year | 69 | 45.4 |
| | 3rd Year | 40 | 26.3 |
| Total | | 152 | 100.0 |

**Table 2: Descriptive Statistics of Knowledge Scores among Nursing Students**

| Statistic | Value |
|---|---|
| Mean | 83.25 |
| Mode | 83.00 |
| Median | 87.00 |
| SD | 8.44 |
| Range | 49.00 |

**Table 3: Distribution of Knowledge Levels Regarding Early-Onset Diabetes among Nursing Students**

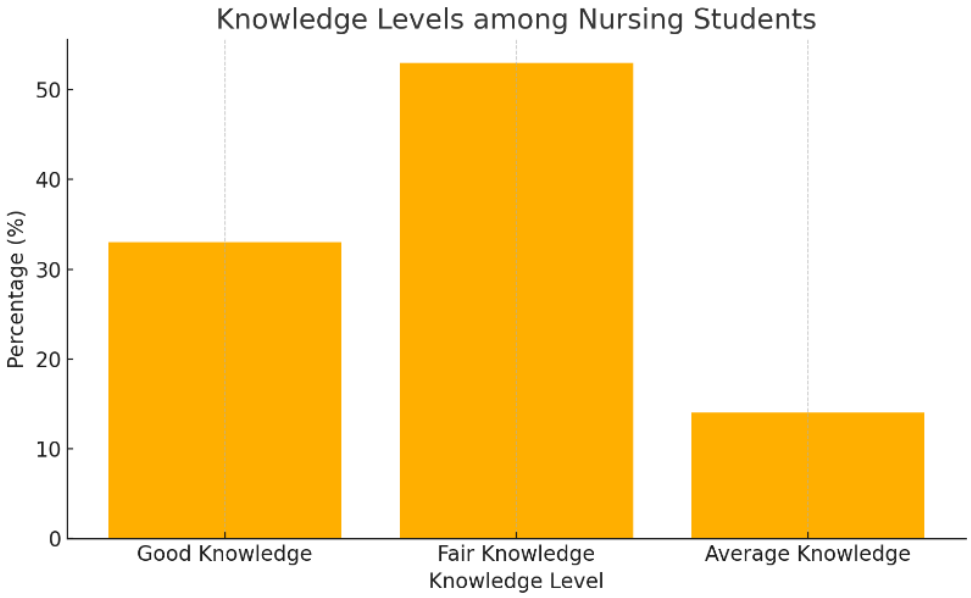
| Knowledge Level | Score Range | Frequency (%) |
|---|---|---|
| Good Knowledge | ≥85 | 33% |
| Fair Knowledge | 70–84 | 53% |
| Average Knowledge | <70 | 14% |

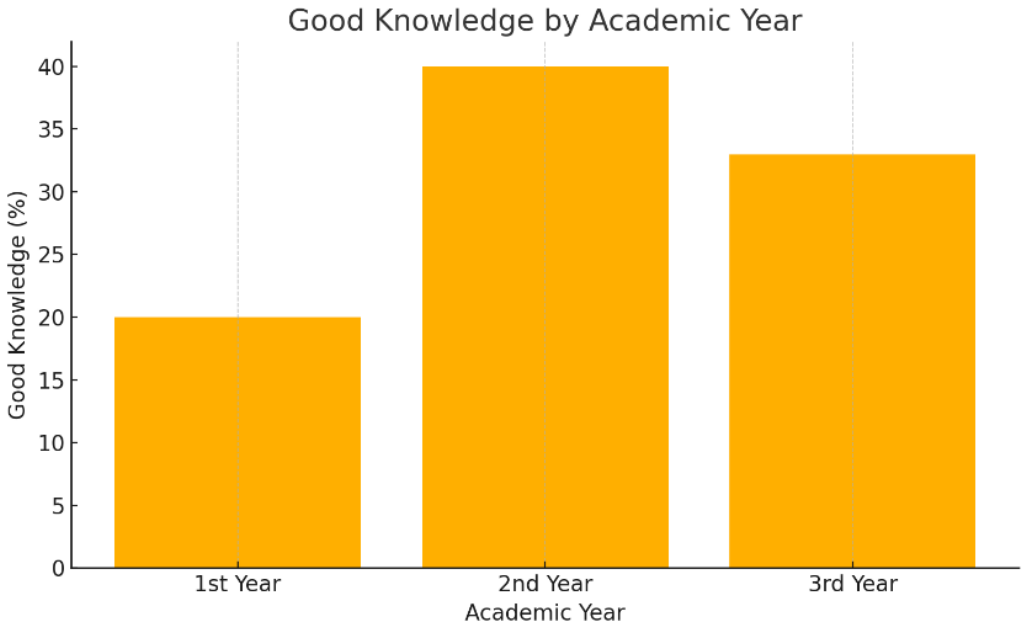
**Table 4: Distribution of Good Knowledge Levels by Demographic Variables**

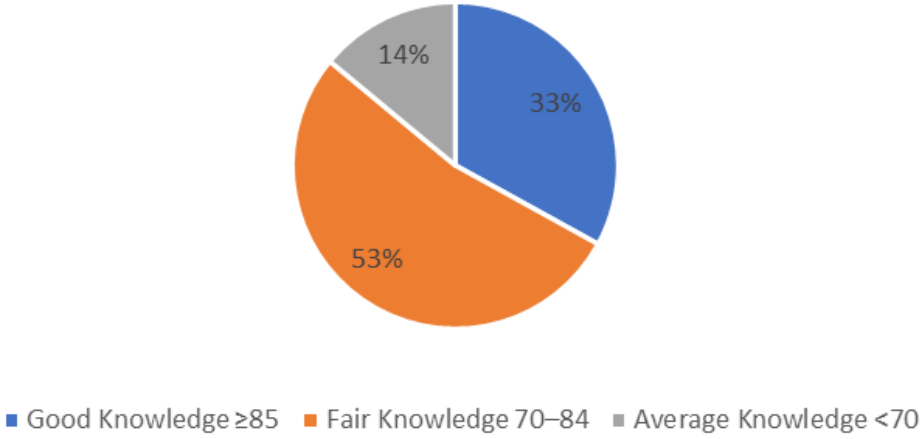
| Demographic Variable | Category | Good Knowledge (%) |
|---|---|---|
| Gender | Male | 35% |
| | Female | 30% |
| Year of Study | 1st Year | 20% |
| | 2nd Year | 40% |
| | 3rd Year | 33% |
| Age Group | 18–22 years | 34% |
| | 23–26 years | 29% |
| | 27–30 years | 25% |

**Table 5: Chi-Square Test: Age-Wise Comparison**

| Age Group | Total Participants | Good Knowledge (n) | Not Good Knowledge (n) | Expected (Good Knowledge) | Expected (Not Good Knowledge) |
|---|---|---|---|---|---|
| 18-22 years | 111 | 38 | 73 | 36.51 | 74.49 |
| 23-26 years | 38 | 11 | 27 | 12.5 | 25.5 |
| 27-30 years | 3 | 1 | 2 | 0.99 | 2.01 |
| Chi-square Statistic | 0.359 | p-value | 0.836 | | |






## DISCUSSION

The findings of this study offered valuable insights into the knowledge levels of nursing students regarding early-onset diabetes, while revealing notable associations with gender, academic year, and age. Although male students demonstrated a slightly higher proportion of good knowledge (35%) compared to female students (30%), the difference was not statistically significant. This trend reflects similar observations in previous academic research, where male students were found to perform better in structured, simulation-based environments, which often promote immediate application and retention of clinical knowledge. Meanwhile, the dominance of female students in the fair knowledge category (57%) may reflect an untapped learning potential that could be better harnessed through collaborative, discussion-based, and peer-assisted learning approaches, which have shown particular benefit in enhancing conceptual understanding among female nursing students (16). Academic year emerged as a significant predictor of knowledge level. Second-year students had the highest proportion of good knowledge (40%), compared to 33% in third year and 20% in first year. This distribution reflects the critical role of curricular structure and timing, as second-year students are often positioned at a point in their training where theoretical knowledge is well-integrated with early clinical exposure (17). The relatively lower scores among first-year students can be attributed to limited exposure to clinical settings and foundational content, which is consistent with known learning curves in early

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

nursing education. For third-year students, the slight decline in theoretical performance could be explained by the shift toward intensive clinical rotations, which may divert focus away from reinforcing theoretical content. Integrating case-based or problem-based learning in the later years may help sustain theoretical engagement without compromising practical skill development (18).

Age-wise analysis showed that students aged 18–22 years demonstrated the highest levels of good knowledge (34%), followed by 29% in the 23–26 age group and 25% in those aged 27–30 years. These findings are consistent with cognitive learning theories, which highlight that, younger learners often retain and apply academic content more effectively due to their closer proximity to structured education. Older students may face competing priorities, such as family or employment responsibilities, which could compromise consistent academic engagement (19). Tailored interventions such as flexible scheduling, asynchronous e-learning platforms, or hybrid learning models may provide viable solutions for supporting this subgroup without compromising educational outcomes. The overall findings reflect a generally satisfactory level of awareness among the nursing students surveyed, particularly when considering that 86% of participants fell within either good or fair knowledge categories. This indicates a cumulative benefit of structured nursing education over time and emphasizes the importance of continuous curriculum reinforcement. Furthermore, the study supports the growing consensus that interactive teaching strategies, including group-based simulations and digital tools, are effective in closing minor knowledge gaps and building confidence among learners (15,16).

The strengths of the study lie in its focused analysis of academic-level variation and its use of both descriptive and inferential statistics to provide a multi-dimensional understanding of knowledge patterns. However, several limitations must be acknowledged. The representation of older students aged 27–30 years was notably low, limiting the generalizability of age-specific findings. Additionally, the study was conducted within a single institution, which may restrict the applicability of the results to broader academic or geographical contexts. A more diverse sample across multiple institutions and regions would enhance external validity and allow for greater comparative analysis. Future research should consider a longitudinal approach to monitor knowledge progression across academic years and evaluate the impact of specific instructional interventions. Moreover, analyzing domain-specific knowledge—such as awareness of risk factors, preventive strategies, and clinical management—would offer deeper insights into the strengths and gaps within nursing curricula. Expanding research to include nursing interns and recently graduated professionals could also inform post-academic transition preparedness, particularly in managing chronic diseases like diabetes that require early intervention and patient education (20). This study contributes to the existing body of knowledge by reinforcing the significance of academic exposure in shaping nursing students' understanding of early-onset diabetes and by identifying areas for pedagogical innovation and targeted support to enhance healthcare education outcomes.

## CONCLUSION

This study concluded that nursing students' knowledge of early-onset diabetes is significantly shaped by their academic progression, with second-year students demonstrating the highest levels of understanding. The results underscore the need for targeted educational strategies, including early foundational training for first-year students, consistent reinforcement of theoretical knowledge for senior students, and the integration of teaching methods that are sensitive to gender and age-related learning preferences. Simulation-based and problem-oriented learning approaches emerged as particularly effective in enhancing both knowledge retention and practical application. These findings hold valuable implications for curriculum development and teaching practices in nursing education and highlight the importance of equipping future nurses with the knowledge necessary to address the growing burden of early-onset diabetes.

**Author Contributions**

| Author | Contribution |
|---|---|
| Hafiz Muhmmad Awais Qadri* | Substantial Contribution to study design, analysis, acquisition of Data<br>Manuscript Writing<br>Has given Final Approval of the version to be published |
| Sadaqat Aftab | Substantial Contribution to study design, acquisition and interpretation of Data<br>Critical Review and Manuscript Writing<br>Has given Final Approval of the version to be published |
| Madiha Mukhtar | Substantial Contribution to acquisition and interpretation of Data<br>Has given Final Approval of the version to be published |

## REFERENCES

1. Broome DT, Pantalone KM, Kashyap SR, Philipson LH. Approach to the Patient with MODY-Monogenic Diabetes. J Clin Endocrinol Metab. 2021;106(1):237-50.

2. Ma CX, Ma XN, Guan CH, Li YD, Mauricio D, Fu SB. Cardiovascular disease in type 2 diabetes mellitus: progress toward personalized management. Cardiovasc Diabetol. 2022;21(1):74.

3. Teck J. Diabetes-Associated Comorbidities. Prim Care. 2022;49(2):275-86.

4. Kanaley JA, Colberg SR, Corcoran MH, Malin SK, Rodriguez NR, Crespo CJ, et al. Exercise/Physical Activity in Individuals with Type 2 Diabetes: A Consensus Statement from the American College of Sports Medicine. Med Sci Sports Exerc. 2022;54(2):353-68.

5. Zhai L, Wu J, Lam YY, Kwan HY, Bian ZX, Wong HLX. Gut-Microbial Metabolites, Probiotics and Their Roles in Type 2 Diabetes. Int J Mol Sci. 2021;22(23).

6. Pollakova D, Andreadi A, Pacifici F, Della-Morte D, Lauro D, Tubili C. The Impact of Vegan Diet in the Prevention and Treatment of Type 2 Diabetes: A Systematic Review. Nutrients. 2021;13(6).

7. Bonnefond A, Unnikrishnan R, Doria A, Vaxillaire M, Kulkarni RN, Mohan V, et al. Monogenic diabetes. Nat Rev Dis Primers. 2023;9(1):12.

8. Taylor R, Ramachandran A, Yancy WS, Jr., Forouhi NG. Nutritional basis of type 2 diabetes remission. Bmj. 2021;374:n1449.

9. Tosur M, Philipson LH. Precision diabetes: Lessons learned from maturity-onset diabetes of the young (MODY). J Diabetes Investig. 2022;13(9):1465-71.

10. Nauck MA, Wefers J, Meier JJ. Treatment of type 2 diabetes: challenges, hopes, and anticipated successes. Lancet Diabetes Endocrinol. 2021;9(8):525-44.

11. Srikanth V, Sinclair AJ, Hill-Briggs F, Moran C, Biessels GJ. Type 2 diabetes and cognitive dysfunction-towards effective management of both comorbidities. Lancet Diabetes Endocrinol. 2020;8(6):535-45.

12. Tinajero MG, Malik VS. An Update on the Epidemiology of Type 2 Diabetes: A Global Perspective. Endocrinol Metab Clin North Am. 2021;50(3):337-55.

13. Khosla S, Samakkarnthai P, Monroe DG, Farr JN. Update on the pathogenesis and treatment of skeletal fragility in type 2 diabetes mellitus. Nat Rev Endocrinol. 2021;17(11):685-97.

14. Alzaben, A. S., Bakry, H. M., Alnashwan, N. I., Alatr, A. A., Alneghamshi, N. A., Alshatowy, A., Alshimali, N., & Bawazeer, N. M. (2023). The influence of a diabetes awareness program on diabetes knowledge, risk perception, and practices among university students. Primary Care Diabetes, 17(4), 327–333.

15. Gulzar SID, S., Fraser, J. R., Professor Nursing Sue Randall, A., & Professor Primary Health Care, A. (2021). Thesis-Adolescents' Physical Activity Physical Activity Levels among Young Adolescent Students in Urban Karachi, Pakistan Thesis-Adolescents' Physical Activity.

16. Hussen Allawi, R. H., & Ahmed, M. M. (2023). Assessment of Nurses' Practices Towards Children with Diabetic ketoacidosis. Pakistan Journal of Medical and Health Sciences, 17(4), 444–445.

17. Orok, E., Kabiawu, Y., Aderohunmu, Z., & Obiwulu, D. (2024). Knowledge, attitude, and perceived risks related to diabetes mellitus among university students in Southwestern Nigeria. Heliyon, 10(4).

18. Shaban Hassan, S., & Sayed Bayomi, S. (2024). Knowledge and Reported Practice about Type 1 Diabetes Mellitus among Preparatory Schools Students at Aswan City, Upper Egypt. In Original Article Egyptian Journal of Health Care (Vol. 15, Issue 3).

19. Shah, S. Q., Maheshwari, B. K., Lanjwani, A. H., Bibi, A., Maheshwari, M., & Khushk, I. A. (2023). Diabetes Mellitus: Assessment of Knowledge about Disease Before and after Implementing an Education Program. Pakistan Journal of Public Health, 13(1), 7–10.

20. Stefanowicz-Bielska, A., Słomion, M., & Rąpała, M. (2022). Knowledge of School Nurses on the Basic Principles of Type 1 Diabetes Mellitus Self-Control and Treatment in Children. International Journal of Environmental Research and Public Health, 19(24).