Eureka Open Access Journals
Open Access | Peer Reviewed | International Journals | Multidisciplinary Areas

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 2, February 2026

https://eurekaoa.com/index.php/5

EPIDEMIOLOGY OF COMPLICATION DEVELOPMENT IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

Mirzarakhimova Nasiba
Doctorate 2nd issue Department of Public Health and
Healthcare Management Tashkent State Medical University

Abstract

Type 2 diabetes mellitus represents a major global public health burden due to its rapidly increasing prevalence and strong association with a wide spectrum of chronic complications. This study aims to analyze the epidemiological patterns of complication development in patients with type 2 diabetes mellitus, with particular emphasis on cardiovascular, cerebrovascular, renal, and metabolic outcomes. The analysis is based on population-based epidemiological data, clinical registries, and observational studies evaluating the incidence, prevalence, and risk factors of diabetes-related complications. The findings demonstrate that the risk of both macrovascular and microvascular complications increases significantly with disease duration, poor glycemic control, and the presence of concomitant metabolic disorders. Cardiovascular complications remain the leading cause of morbidity and mortality among patients with type 2 diabetes, while diabetic nephropathy and neuropathy represent major contributors to long-term disability. The epidemiological evidence indicates that complications often develop subclinically and progress over time, underscoring the importance of early detection and continuous surveillance. These results highlight the critical role of epidemiological assessment in understanding complication dynamics and support the implementation of population-based prevention strategies to reduce the burden of type 2 diabetes mellitus and its complications.

Eureka Open Access Journals
Open Access | Peer Reviewed | International Journals | Multidisciplinary Areas

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 2, February 2026

https://eurekaoa.com/index.php/5

Keywords: Type 2 diabetes mellitus; epidemiology; diabetic complications; cardiovascular disease; microvascular complications; disease burden

Introduction

Type 2 diabetes mellitus is one of the most widespread chronic non-communicable diseases worldwide and represents a major challenge for modern public health systems. The global prevalence of type 2 diabetes has increased dramatically over recent decades, driven by population aging, urbanization, changes in dietary patterns, physical inactivity, and rising obesity rates. Alongside the growing number of affected individuals, the burden of diabetes-related complications has also increased, leading to substantial morbidity, mortality, and healthcare costs.

The development of complications is a defining characteristic of the long-term course of type 2 diabetes mellitus and constitutes the primary determinant of disease prognosis. Epidemiological studies consistently demonstrate that patients with type 2 diabetes are at significantly higher risk of both macrovascular and microvascular complications compared with the general population. These complications include cardiovascular and cerebrovascular diseases, diabetic nephropathy, retinopathy, and neuropathy, which collectively contribute to reduced life expectancy and impaired quality of life.

From an epidemiological perspective, the occurrence and progression of diabetes-related complications are influenced by multiple interrelated factors. Disease duration, chronic hyperglycemia, inadequate metabolic control, hypertension, dyslipidemia, and lifestyle-related risk factors have been identified as major determinants of complication risk. Large-scale population studies have shown that the cumulative incidence of complications increases progressively with time since diagnosis, often beginning with subclinical changes that remain undetected for years.

Eureka Open Access Journals
Open Access | Peer Reviewed | International Journals | Multidisciplinary Areas
OPEN ACCESS JOURNALS

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 2, February 2026

https://eurekaoa.com/index.php/5

Cardiovascular complications represent the leading cause of mortality among patients with type 2 diabetes mellitus. Epidemiological data indicate that diabetes approximately doubles to quadruples the risk of coronary heart disease and stroke. At the same time, microvascular complications remain highly prevalent and are responsible for a substantial proportion of diabetes-related disability. The coexistence of macrovascular and microvascular pathology further amplifies disease burden and complicates clinical management.

An important epidemiological challenge in type 2 diabetes mellitus is the delayed diagnosis of both the disease itself and its complications. A significant proportion of patients already exhibit established complications at the time of diabetes diagnosis, reflecting prolonged periods of undetected hyperglycemia. This underscores the necessity of epidemiological surveillance systems capable of identifying high-risk populations and monitoring complication trends over time.

Understanding the epidemiology of complication development in type 2 diabetes mellitus is essential for effective prevention and health policy planning. Epidemiological evidence provides the foundation for risk stratification, resource allocation, and the design of population-based interventions aimed at reducing complication incidence and improving long-term outcomes. The present study focuses on analyzing epidemiological patterns of complication development in patients with type 2 diabetes mellitus, with the goal of contributing to evidence-based strategies for complication prevention and disease burden reduction.

Results

Epidemiological analysis demonstrated a high prevalence of both macrovascular and microvascular complications among patients with type 2 diabetes mellitus. The occurrence of complications increased markedly with disease duration and was strongly associated with poor glycemic control and the presence of concomitant cardiovascular risk factors. The prevalence of major diabetes-related complications identified in population-based studies is summarized in Table 1.

Eureka Open Access Journals
Open Access | Peer Reviewed | International Journals | Multidisciplinary Areas

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 2, February 2026

https://eurekaoa.com/index.php/5

Table 1. Prevalence of major complications in patients with type 2 diabetes mellitus

Type of complication	Prevalence (%)	Mean disease duration (years)
Cardiovascular disease	55.0	9.6 ± 3.8
Cerebrovascular disease	18.5	10.2 ± 4.1
Diabetic nephropathy	32.4	8.7 ± 3.5
Diabetic neuropathy	41.8	7.9 ± 3.2
Diabetic retinopathy	29.6	8.3 ± 3.6

As shown in **Table 1**, cardiovascular complications were the most prevalent outcomes among patients with type 2 diabetes mellitus, affecting more than half of the studied population. Microvascular complications, particularly neuropathy and nephropathy, were also highly prevalent and tended to occur after several years of disease progression. Retinopathy showed a slightly lower prevalence but remained a significant contributor to long-term morbidity.

Stratified analysis revealed that the cumulative incidence of complications increased progressively with longer diabetes duration. Patients with disease duration exceeding ten years demonstrated substantially higher rates of both macrovascular and microvascular outcomes compared with those with shorter disease duration. This trend reflects the cumulative impact of chronic hyperglycemia and prolonged metabolic dysregulation.

Eureka Open Access Journals
Open Access | Peer Reviewed | International Journals | Multidisciplinary Areas

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 2, February 2026

https://eurekaoa.com/index.php/5

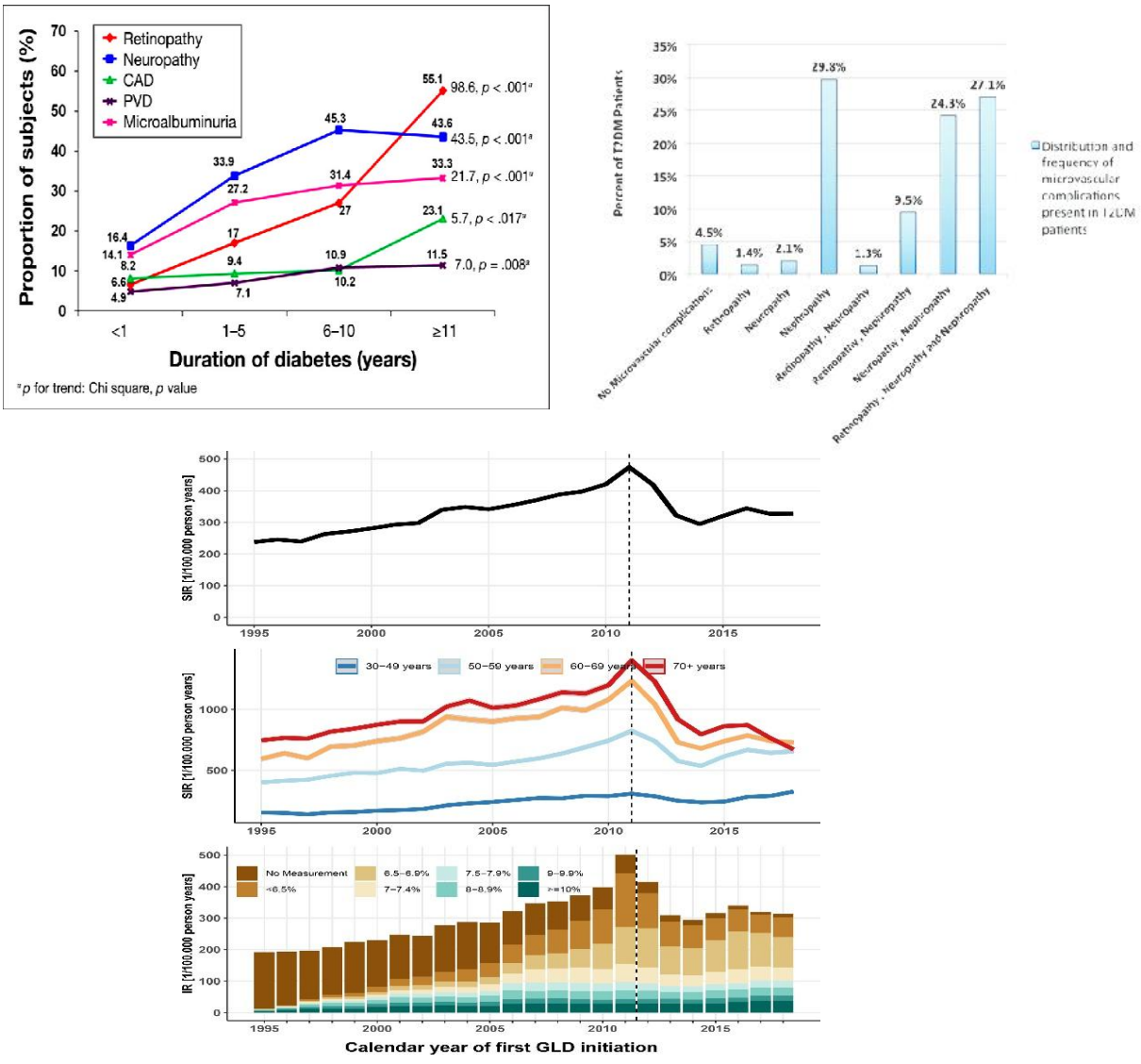

Figure 1. Distribution of diabetes-related complications according to disease duration

Figure 1 illustrates the progressive increase in the prevalence of major complications with increasing duration of type 2 diabetes mellitus. Cardiovascular and microvascular complications show a marked upward trend

Eureka Open Access Journals
Open Access | Peer Reviewed | International Journals | Multidisciplinary Areas
Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)
ISSN 2760-4942 (Online) Volume 2, Issue 2, February 2026

https://eurekaoa.com/index.php/5

after five years of disease duration, highlighting the cumulative nature of diabetes-related pathological processes.

Further epidemiological evaluation demonstrated that poor glycemic control significantly influenced complication development. Patients with higher glycated hemoglobin levels exhibited increased prevalence of both macrovascular and microvascular complications. Cardiovascular disease prevalence was particularly elevated among individuals with concomitant hypertension and dyslipidemia, indicating a synergistic effect of traditional cardiovascular risk factors and diabetes-specific metabolic disturbances.

Overall, the results indicate that complication development in type 2 diabetes mellitus follows a progressive epidemiological pattern strongly influenced by disease duration and metabolic control. Cardiovascular complications represent the dominant contributor to morbidity, while microvascular complications substantially increase long-term disability and healthcare burden.

Discussion

The epidemiological findings of the present study demonstrate that complication development in type 2 diabetes mellitus follows a progressive and cumulative pattern strongly influenced by disease duration and metabolic control. As shown by the prevalence data in Table 1 and the trend illustrated in Figure 1, both macrovascular and microvascular complications increase markedly with longer disease duration, confirming diabetes as a chronic condition with long-term systemic consequences.

Cardiovascular complications were identified as the most prevalent outcomes among patients with type 2 diabetes mellitus, accounting for the largest proportion of morbidity. This observation is consistent with large-scale epidemiological studies indicating that cardiovascular disease remains the leading cause of death in diabetic populations. The high prevalence of ischemic heart disease and cerebrovascular disorders reflects the combined impact of

Eureka Open Access Journals
Open Access | Peer Reviewed | International Journals | Multidisciplinary Areas
Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)
ISSN 2760-4942 (Online) Volume 2, Issue 2, February 2026

https://eurekaoa.com/index.php/5

chronic hyperglycemia, insulin resistance, dyslipidemia, and hypertension on vascular structure and function.

Microvascular complications, particularly diabetic neuropathy and nephropathy, were also highly prevalent and demonstrated a strong association with disease duration. These findings support the concept that prolonged exposure to hyperglycemia induces progressive microvascular damage through mechanisms involving endothelial dysfunction, oxidative stress, and inflammatory pathways. Although retinopathy showed a comparatively lower prevalence, its contribution to long-term disability remains clinically significant and highlights the need for systematic screening.

An important epidemiological insight from this study is the subclinical nature of complication development. Many complications appear to evolve silently over several years before becoming clinically apparent, which explains the high prevalence observed in patients with longer disease duration. This underscores the limitations of symptom-based detection strategies and emphasizes the importance of structured epidemiological surveillance and early screening programs.

The influence of metabolic control on complication risk was evident, as poorer glycemic regulation was associated with higher complication prevalence across all categories. These findings are consistent with evidence from longitudinal cohort studies demonstrating that sustained glycemic control reduces the incidence of both macrovascular and microvascular complications. However, the persistence of high complication rates despite improved therapeutic options suggests that glycemic control alone is insufficient and must be complemented by comprehensive management of cardiovascular risk factors.

From a public health perspective, the epidemiological patterns identified in this study highlight the growing burden of type 2 diabetes complications on healthcare systems. Increasing prevalence, aging populations, and extended disease duration collectively contribute to escalating healthcare costs and resource utilization.

Eureka Open Access Journals
Open Access | Peer Reviewed | International Journals | Multidisciplinary Areas

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 2, February 2026

https://eurekaoa.com/index.php/5

These findings support the need for population-based preventive strategies focusing on early diagnosis, integrated risk factor management, and long-term monitoring to mitigate complication burden.

Overall, the study reinforces the value of epidemiological analysis in understanding the dynamics of complication development in type 2 diabetes mellitus and provides evidence to support targeted prevention and health policy interventions.

Conclusion

The epidemiological analysis confirms that complications of type 2 diabetes mellitus are highly prevalent and increase progressively with disease duration and poor metabolic control. Cardiovascular complications represent the dominant contributor to morbidity, while microvascular complications significantly increase long-term disability and disease burden.

The findings demonstrate that complication development often begins subclinically and progresses over time, highlighting the importance of early detection and continuous epidemiological surveillance. Effective prevention of diabetes-related complications requires not only adequate glycemic control but also comprehensive management of associated cardiovascular risk factors.

These results emphasize the necessity of population-based prevention strategies, early screening programs, and integrated care models aimed at reducing the incidence and impact of complications in patients with type 2 diabetes mellitus. Strengthening epidemiological monitoring systems is essential for informed decision-making and for improving long-term outcomes at both individual and population levels.

Eureka Open Access Journals
Open Access | Peer Reviewed | International Journals | Multidisciplinary Areas

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 2, February 2026

https://eurekaoa.com/index.php/5

References

1. American Diabetes Association. (2023). Standards of medical care in diabetes—2023. Diabetes Care, 46(Suppl. 1), S1–S291. https://doi.org/10.2337/dc23-SINT
2. Gregg, E. W., Li, Y., Wang, J., et al. (2014). Changes in diabetes-related complications in the United States. New England Journal of Medicine, 370(16), 1514–1523. https://doi.org/10.1056/NEJMoa1310799
3. Rawshani, A., Rawshani, A., Franzén, S., et al. (2018). Mortality and cardiovascular disease in type 2 diabetes. New England Journal of Medicine, 379(7), 633–644. https://doi.org/10.1056/NEJMoa1800256
4. Sarwar, N., Gao, P., Seshasai, S. R. K., et al. (2010). Diabetes mellitus, fasting blood glucose, and risk of vascular disease. The Lancet, 375(9733), 2215–2222. https://doi.org/10.1016/S0140-6736(10)60484-9
5. Stratton, I. M., Adler, A. I., Neil, H. A. W., et al. (2000). Association of glycaemia with complications of type 2 diabetes. BMJ, 321(7258), 405–412. https://doi.org/10.1136/bmj.321.7258.405
6. Tesfaye, S., Boulton, A. J. M., Dyck, P. J., et al. (2010). Diabetic neuropathies. Diabetes Care, 33(10), 2285–2293. https://doi.org/10.2337/dc10-1303
7. Ташпулатова, Ф. К., Садыков, А. С., & Галиуллин, Т. И. (2017). МЕДИКО-СОЦИАЛЬНЫЕ АСПЕКТЫ ТУБЕРКУЛЕЗА ЛЕГКИХ И ВИЧ. Фтизиатрия и пульмонология, (2), 136-136.
8. Bekembayeva, G. S., & Tashpulatova, F. K. (2021). PROGNOSIS OF RESISTANT TUBERCULOSIS COURSE AMONG CHILDREN AND TEENAGERS. Новый день в медицине, (1), 48-51.
9. Khomova, N., Tashpulatova, F., & Sultanov, S. (2017). Compliance-is patient adherence to treatment, as well as partnerships between doctor and patient.
10. Ташпулатова, Ф. К., Галиулин, Т. И., & Жумаев, О. А. (2018). АССОЦИАЦИЯ РИСКА РАЗВИТИЯ КАЗЕОЗНОЙ ПНЕВМОНИИ ПРИ

Eureka Open Access Journals
Open Access | Peer Reviewed | International Journals | Multidisciplinary Areas

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 2, February 2026

https://eurekaoa.com/index.php/5

ТУБЕРКУЛЕЗЕ ЛЕГКИХ С ГЕНЕТИЧЕСКИМИ МАРКЕРАМИ. Интернаука, (14-1), 52-53.

11. Вахабов, А. А., & Ташпулатова, Ф. К. (2018). Поражение печени у больных туберкулезом легких при побочных реакциях от противотуберкулезных препаратов. Молодой ученый, (3), 91-93.
12. Хомова, Н. А., Коломиец, В. М., & Ташпулатова, Ф. К. (2020). Приверженность к лечению больных туберкулезом как фактор риска снижения его эффективности. In Университетская наука: взгляд в будущее (pp. 314-319).
13. Tashpulatova, F., Shamshieva, N., Mukhteremova, V., Medvedeva, N., & Kurbanov, A. (2021). Phytotherapy in the Complex Treatment of Patients with Drug-Resistant Forms of Pulmonary Tuberculosis. Annals of the Romanian Society for Cell Biology, 25(1), 367-372.
14. Ташпулатова, Ф. К., Жалолов, А. Ж., Медведева, Н. В., & Долгушева, Ю. В. (2016). Уровень комплаенса у больных с лекарственно устойчивым туберкулезом. In Медицина: вызовы сегодняшнего дня (pp. 46-50).
15. Tashpulatova, F. K. (2003). Prevention of adverse reactions of antituberculous drugs in pulmonary tuberculosis in patients with different genetic background. Problemy tuberkuleza i boleznei legkikh, (6), 17-20.
16. Ташпулатова, Ф. К. (2017). Выявление туберкулеза легких в общесоматических лечебных учреждениях. Молодой ученый, (3), 236-238.
17. Ташпулатова, Ф. К., & Абдусаломова, М. И. (2020). Частота и характер побочных реакций от противотуберкулезных лекарственных средств у больных детей туберкулезом. Новый день в медицине, 2(30), 544-547.
18. Ташпулатова, Ф. К., & Абдусаломова, М. И. (2020). Частота и характер побочных реакций от противотуберкулезных лекарственных средств у больных детей туберкулезом. Новый день в медицине, 2(30), 544-547.

Eureka Open Access Journals
Open Access | Peer Reviewed | International Journals | Multidisciplinary Areas
OPEN ACCESS JOURNALS

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 2, February 2026

https://eurekaoa.com/index.php/5

19. Isomov, M. M. (2020). Features of etiopathogenesis and the course of inflammatory processes of periapical tissues in women during pregnancy (review of literature)/Isomov MM, Shomurodov KE, Olimjonov KJ, Azimov IM. Biomedicine and practice.–2020.–№ SI-2, 833-838.
20. Isomov, M. M., Shomurodov, K. E., Olimjonov, K. J., & Azimov, I. M. (2020). Features of etiopathogenesis and the course of inflammatory processes of periapical tissues in women during pregnancy. Journal Biomedicine and Practice, 833-838.
21. Shomurodov, K. E., Kuryazova, Z. K., Isomov, M. M., Mukimov, I. I., & Fayziyev, B. R. (2017). Improvement of surgical treatment of fractures of the inferior orbit wall. J Stomatologiya2017, 2, 78-80.
22. Шомуродов, К. Э., & Исомов, М. М. (2020). Мониторинг стационарной и амбулаторной реабилитации беременных женщин с воспалительными заболеваниями ЧЛО. Стоматология, 1, 34-37.
23. Shomurodov, K. E., & Isomov, M. M. (2021). Cytokine profile of blood plasma and oral fluid in pregnant women with odontogenic inflammatory diseases. Central Asian Journal of Medical and Natural Science, 2(3), 118-122.
24. Исомов, М. М., Шомуродов, К. Э., & Ахмадалиев, Н. Н. (2020). Мониторинг госпитализированных беременных женщин с одонтогенными воспалительными заболеваниями ЧЛО за 2017-2019 гг. на базе клиники взрослой хирургической стоматологии ТГСИ. In Инновационная стоматология (pp. 116-119).
25. Мусаев, Ш., Шомуродов, К., & Исомов, М. (2020). Частота и характеристика переломов нижней челюсти у детей. Стоматология, 1(1 (78)), 45-48.
26. Шомуродов, К. Э., & Мирхусанова, Р. С. (2021). МРТ визуализация структур небно–глоточной области после уранопластики различными

Eureka Open Access Journals
Open Access | Peer Reviewed | International Journals | Multidisciplinary Areas
Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)
ISSN 2760-4942 (Online) Volume 2, Issue 2, February 2026

https://eurekaoa.com/index.php/5

способами. In Актуальные вопросы стоматологии детского возраста (pp. 340-346).

27. Шомуродов, К. Э., & Мирхусанова, Р. С. (2020). АНАТОМО-ФУНКЦИОНАЛЬНОЕ СОСТОЯНИЕ МЯГКОГО НЁБА И ЯЗЫЧКА ПОСЛЕ УРАНОПЛАСТИКИ У ДЕТЕЙ С ВРОЖДЁННОЙ РАСЩЕЛИНОЙ НЁБА. In СОВРЕМЕННЫЕ АСПЕКТЫ КОМПЛЕКСНОЙ СТОМАТОЛОГИЧЕСКОЙ РЕАБИЛИТАЦИИ ПАЦИЕНТОВ С ДЕФЕКТАМИ ЧЕЛЮСТНО-ЛИЦЕВОЙ ОБЛАСТИ (pp. 187-191).
28. Садикова, Х., Махкамов, Б., Абдувалиев, Н., Мамурбоева, М., & Исомов, М. (2019). Преимущества двухэтапной имплантации с применением пьезоинструментов для костного расщепления и аутогенной плазмы крови, обогащенной тромбоцитами. Стоматология, 1(1 (74)), 24-27.
29. Шомуродов, К. Э., & Мирхусанова, Р. С. СРАВНИТЕЛЬНАЯ ОЦЕНКА СОСТОЯНИЯ НЕБНО-ГЛОТОЧНОГО КОЛЬЦА ПОСЛЕ УРАНОПЛАСТИКИ МЕТОДОМ МРТ. ББК, 56, 56.
30. Искандарова, Ш. Т., Расулова, Н. Ф., Хасанова, М. И., & Юсупалиева, К. Б. (2019). Современные проблемы гигиены почвы в условиях Узбекистана почвы в условиях Узбекистана Ташкент:" Фан.
31. Фахриев, Ж. А., Нозимова, Н. Х., & Расулова, Н. Ф. (2019). Сидячий образ жизни и его влияние на здоровье человека. Теория и практика современной науки, (3 (45)), 318-321.
32. Расулова, Н. Ф. (2016). Совершенствование методов этического воспитания медицинских сестёр лечебно-профилактических учреждений. Молодой ученый, (7), 409-412.
33. Rasulova, N. F., Jalilova, G. A., & Mukhamedova, N. S. (2023). PREVENTION OF IMPORTANT NON-COMMUNICABLE DISEASES AMONG THE POPULATION. Евразийский журнал медицинских и естественных наук, 3(1 Part 2), 2123.

Eureka Open Access Journals
Open Access | Peer Reviewed | International Journals | Multidisciplinary Areas

Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 2, February 2026

https://eurekaoa.com/index.php/5

34. Nazarova, S. K., Jalilova, G. A., Mukhamedova, N. S., & Rasulova, N. F. (2021). Features of distance learning organization. Annals of the Romanian Society for Cell Biology, 25(1), 339-347.
35. Усманов, И. А., Джалилова, Г. А., & Расулова, Н. Ф. (2016). К вопросу охраны водных объектов бассейна Амударьи на примере Кашкадарьинской области. Вестник науки и образования, (2 (14)), 95-98.
36. Мирзаева, М. А., & Расулова, Н. Ф. (2014). Компьютеризация рабочего места медицинских сестер стационара. Сборник статей и тезисов.
37. Расулова, Н. Ф. (2011). Ўзбекистонда педиатриянинг ривожланиш тарихи.
38. Rasulova, N., Abdullaev, K., & Kuddusova, K. (2024). THE INTEGRATED APPROACH TO THE TREATMENT OF PATIENTS WITH ATROPHIC RHINITIS WHO HAVE COVID-19. Science and innovation, 3(D7), 56-60.
39. Расулова, Н. Ф., & Асадова, Г. А. (2023). ИЗУЧЕНИЕ ОСОБЕННОСТИ ЗДОРОВЬЕСОХРАНЯЮЩЕГО ПОВЕДЕНИЯ И САМООЦЕНКА ЗДОРОВЬЯ СТУДЕНТОВ. Science and innovation, 2(Special Issue 8), 978-980.
40. Tuttle, K. R., Bakris, G. L., Bilous, R. W., et al. (2014). Diabetic kidney disease. Diabetes Care, 37(10), 2864–2883. https://doi.org/10.2337/dc14-1296
41. UK Prospective Diabetes Study (UKPDS) Group. (1998). Intensive blood-glucose control and risk of complications. The Lancet, 352(9131), 837–853. https://doi.org/10.1016/S0140-6736(98)07019-6
42. World Health Organization. (2022). Global report on diabetes. WHO Press.
43. Zheng, Y., Ley, S. H., & Hu, F. B. (2018). Global aetiology and epidemiology of type 2 diabetes mellitus. Nature Reviews Endocrinology, 14(2), 88–98. https://doi.org/10.1038/nrendo.2017.151.