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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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INVESTIGATING CHALLENGES IN ACHIEVING EARLY DIAGNOSIS OF DIABETES AMONG THE SAUDI POPULATION

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Abstract.

Background: Diabetes mellitus remains a major public health challenge globally, and Saudi Arabia is among the countries with high type 2 diabetes prevalence. Although screening initiatives exist, delayed diagnosis persists, suggesting barriers to early detection.

Objective: To identify individual, sociocultural, and healthcare-system factors associated with low uptake of early diabetes screening in Saudi Arabia.

Methods: We conducted a cross-sectional online survey of adults in Saudi Arabia (N = 881) using a standardized self-administered Arabic questionnaire. Descriptive statistics summarized participant characteristics and responses. Chi-square tests examined associations between sociodemographic variables and awareness/screening behaviors, and multivariable logistic regression identified independent predictors of screening participation.

Results: Participants were predominantly female (61.3%), with the largest age groups 18–24 and 35–44 years (26.8% each); 71.7% reported no health insurance. While 86.7% reported awareness of early diabetes symptoms, 53.1% had never monitored blood glucose and only 17.5% reported screening participation. Barrier analysis was based on respondents who completed the barrier items (n = 753); the most commonly reported barriers were absence of symptoms (66.3%), lack of time (24.3%), and fear of diagnosis (18.5%). In regression analysis, screening participation was independently associated with male gender (OR = 1.47, p = 0.037), awareness of symptoms (OR = 2.61, p < 0.001), family history of diabetes (OR = 1.54, p = 0.031), health insurance (OR = 1.83, p = 0.002), older age (≥35 years), and higher educational attainment.

Conclusion: Despite high symptom awareness, screening participation remains low—largely driven by the misconception that screening is unnecessary without symptoms, alongside time constraints and fear. Strengthening early detection will require culturally tailored preventive-health messaging, easier access to screening, and targeted digital interventions (e.g., risk-tailored reminders and proactive outreach), aligning with Saudi Vision 2030 priorities.

Key words. Diabetes, early diagnosis, screening, Saudi Arabia, barriers, public health.

Introduction.

Diabetes mellitus is a global health priority, affecting an estimated 537 million people worldwide, with projections expected to increase substantially by 2030 [1]. Saudi Arabia continues to report a high prevalence of type 2 diabetes, placing a significant burden on the healthcare system and increasing risk for preventable complications [2]. Early diagnosis is essential to delay disease progression and reduce long-term morbidity, mortality, and healthcare costs [3]. However, despite screening initiatives, a substantial proportion of individuals in Saudi Arabia are still diagnosed late, often after complications emerge [4].

The World Health Organization emphasizes screening and early identification as core strategies for reducing the impact of non-communicable diseases [5]. Yet, evidence from Saudi Arabia indicates persistent gaps in screening uptake and timely identification [6]. A notable proportion of diabetes diagnoses occur incidentally during visits for unrelated complaints, reflecting a predominantly reactive pattern of care-seeking and missed opportunities for preventive detection [7].

Multiple barriers influence early diagnosis. At the individual and sociocultural level, health beliefs, stigma, fear of diagnosis, and reliance on non-medical remedies may delay seeking testing, particularly when symptoms are absent [8,9]. Sociodemographic factors—including age, education, and geographic access—also shape preventive behaviors and screening participation [10,11]. At the health-system level, inconsistent screening pathways,

variable integration between primary and specialty care, and limited preventive-health reinforcement can reduce the likelihood that at-risk individuals receive timely testing [12-14].

Digital health innovations—including electronic health records (EHRs), mobile health (mHealth) applications, and algorithmic risk stratification—offer opportunities to identify high-risk individuals and prompt screening, but implementation can be constrained by infrastructure variation, training needs, and governance requirements [15-17]. Given Saudi Vision 2030's emphasis on prevention and health transformation, clarifying barriers and actionable enablers for early diabetes detection remains timely and policy-relevant [18].

Despite the high burden of diabetes in Saudi Arabia, screening participation remains suboptimal. Understanding barriers across individual behavior, sociocultural context, and healthcare access is necessary to strengthen early detection strategies. This study aimed to identify factors associated with limited screening participation and to characterize perceived barriers to early diagnosis among adults in Saudi Arabia. The findings are intended to inform targeted public health messaging, improve screening integration in routine care, and support prevention goals aligned with Saudi Vision 2030.

Methods.

Research Design:

A descriptive cross-sectional survey was conducted to assess awareness, health-seeking behaviors, screening participation, and perceived barriers to early diabetes diagnosis among adults in Saudi Arabia. An online approach was used to enable broad geographic reach and anonymous participation.

Study Cohort and Sampling Methodology:

Eligible participants were adults aged ≥18 years residing in Saudi Arabia, including individuals with and without a prior diabetes diagnosis. The survey link was disseminated through commonly used social media platforms (e.g., Twitter/X, WhatsApp, Instagram, Snapchat) and electronic communication channels, and participants were encouraged to share the link within their networks (snowball dissemination).

Potential selection bias: Because recruitment relied on online dissemination and social sharing, the sample may overrepresent individuals with higher digital access and engagement, and may underrepresent older adults, people with limited digital literacy, rural residents with reduced connectivity, and individuals outside the social networks reached through dissemination. This limitation was considered when interpreting generalizability of estimates to the broader Saudi population.

Survey Tool:

The Arabic questionnaire was adapted from validated instruments related to diabetes awareness and screening, and reviewed by public health and health informatics experts for cultural relevance and content validity. It included:

- **Section A:** Demographics (age, gender, education, employment, income, region, insurance).
- **Section B:** Health status/awareness (diabetes status, family history, symptom awareness, glucose monitoring, screening participation).
- **Section C:** Barriers to screening/early diagnosis (e.g., absence of symptoms, fear, time constraints, access-related barriers).

Forward–backward translation was performed, and a pilot test (n = 30) evaluated clarity and completion time.

Data Acquisition and Analysis:

Data were collected over four weeks. A total of 881 completed responses were included. Descriptive statistics summarized variables. Chi-square tests evaluated associations between sociodemographic factors and awareness/screening behaviors. Binary logistic regression identified independent predictors of screening participation, reporting odds ratios (ORs) and 95% confidence intervals. A p-value <0.05 was considered statistically significant.

Ethical Considerations:

Ethical approval was obtained from the Institutional Review Board. Electronic informed consent was collected. Data were anonymous and stored securely.

Results.

A total of 881 participants completed the survey. Table 1 summarizes demographics: 61.3% were female; the most common age groups were 18–24 and 35–44 years (26.8% each). Most respondents held a bachelor's degree (60.6%), and 71.7% reported no health insurance.

Health-related variables are presented in Table 2. Most participants did not have diabetes (80.6%), though 11.7% self-reported a diagnosis and 7.7% were uncertain. A positive family history of diabetes was reported by 55.3% of respondents. However, more than half (53.1%) reported never checking their blood sugar levels. Awareness of early symptoms of diabetes was high, with 86.7% indicating awareness. Despite this, only 17.5% reported participating in a diabetes screening campaign.

Among the 753 respondents, the most commonly cited barrier to early diabetes screening was the absence of symptoms (n = 499; 66.3%), as seen in Figure 1. This was followed by lack of time (n = 183; 24.3%) and fear of being diagnosed with diabetes (n = 139; 18.5%). Additional reported barriers included not knowing where to go for screening (n = 111; 14.7%), cost concerns (n = 71; 9.4%), and the belief that diabetes is not a serious condition (n = 43; 5.7%). These findings highlight a need for improved public awareness campaigns, accessibility to screening services, and culturally sensitive communication strategies to address fear and misconceptions.

Bivariate associations (Table 3): Gender was significantly associated with awareness of early symptoms (p = 0.0374), with females more likely to report awareness. Education was significantly associated with both screening participation (p = 0.0013) and symptom awareness (p = 0.004). Gender was also associated with self-reported diabetes diagnosis (p = 0.0003). Diabetes status was not significantly associated with screening participation (p = 0.6808).

Multivariable analysis (Table 4): Logistic regression identified independent predictors of screening participation. Male gender was associated with higher odds of screening (OR = 1.47, p = 0.037), and awareness of early symptoms showed a strong

Table 1. *Demographic Characteristics of the Participants (N = 881).*

Variable	Category	Frequency (n)	Percentage (%)
Age Group (years)	18–24	236	26.8
	25–34	171	19.4
	35–44	236	26.8
	45–54	169	19.2
	55+	69	7.8
Gender	Female	540	61.3
	Male	341	38.7
Education Level	No formal education	11	1.3
	High school	181	20.5
	Diploma	79	9
	Bachelor's degree	534	60.6
	Postgraduate degree	76	8.6
Health Insurance	No	632	71.7
	Yes	249	28.3

Table 2. *Health Status and Screening Awareness.*

Variable	Category	Frequency (n)	Percentage (%)
Do you have diabetes?	No	710	80.6
	Yes	103	11.7
	Not sure	68	7.7
Family history of diabetes	Yes	487	55.3
	No	328	37.2
	Not sure	66	7.5
Frequency of blood sugar checks	Never	468	53.1
	Occasionally (< once/month)	282	32
	Regularly (monthly or more)	131	14.9
Awareness of early diabetes symptoms	Yes	764	86.7
	No	117	13.3
Participation in diabetes screening	Yes	154	17.5
	No	727	82.5

Table 3. *Associations Between Key Variables Using the Chi-Square Test (N = 881).*

Variables Cross-Tabulated	χ^2	df	p-value	Significance Level
Gender × Awareness of early symptoms	4.33	1	0.0374	* (p < 0.05)
Education level × Participation in screening	17.9	4	0.0013	** (p < 0.01)
Gender × Diabetes diagnosis	16.47	2	0.0003	*** (p < 0.001)
Education level × Awareness of early symptoms	15.38	4	0.004	** (p < 0.01)
Diabetes status × Participation in screening	0.77	2	0.6808	ns (not significant)

Table 4. *Logistic Regression Analysis Predicting Participation in Diabetes Screening Campaigns (n = 881).*

Variable	Odds Ratio (OR)	95% Confidence Interval	z	p-value
Gender (Male = 1)	1.47	1.02 – 2.12	2.08	0.037 *
Diabetes (Yes = 1)	1.44	0.84 – 2.46	1.28	0.202
Family history of diabetes	1.54	1.04 – 2.30	2.16	0.031 *
Health insurance (Yes = 1)	1.83	1.24 – 2.69	3.1	0.002 **
Awareness of diabetes symptoms	2.61	1.48 – 4.60	3.36	<0.001 **
Age group (ref: 18–24)				
25–34	1.22	0.71 – 2.08	0.75	0.452
35–44	2.02	1.18 – 3.46	2.59	0.010 *
45–54	2.12	1.19 – 3.78	2.58	0.010 *
55+	2.87	1.33 – 6.19	2.72	0.006 **
Education group (ref: High school)				
Bachelor's degree	1.74	0.99 – 3.06	1.92	0.055 †
Diploma	2.09	1.04 – 4.21	2.07	0.038 *
Postgraduate	4.48	1.89 – 10.64	3.38	<0.001 **

Note: **p < 0.05, **p < 0.01, †marginal significance (p < 0.10).*

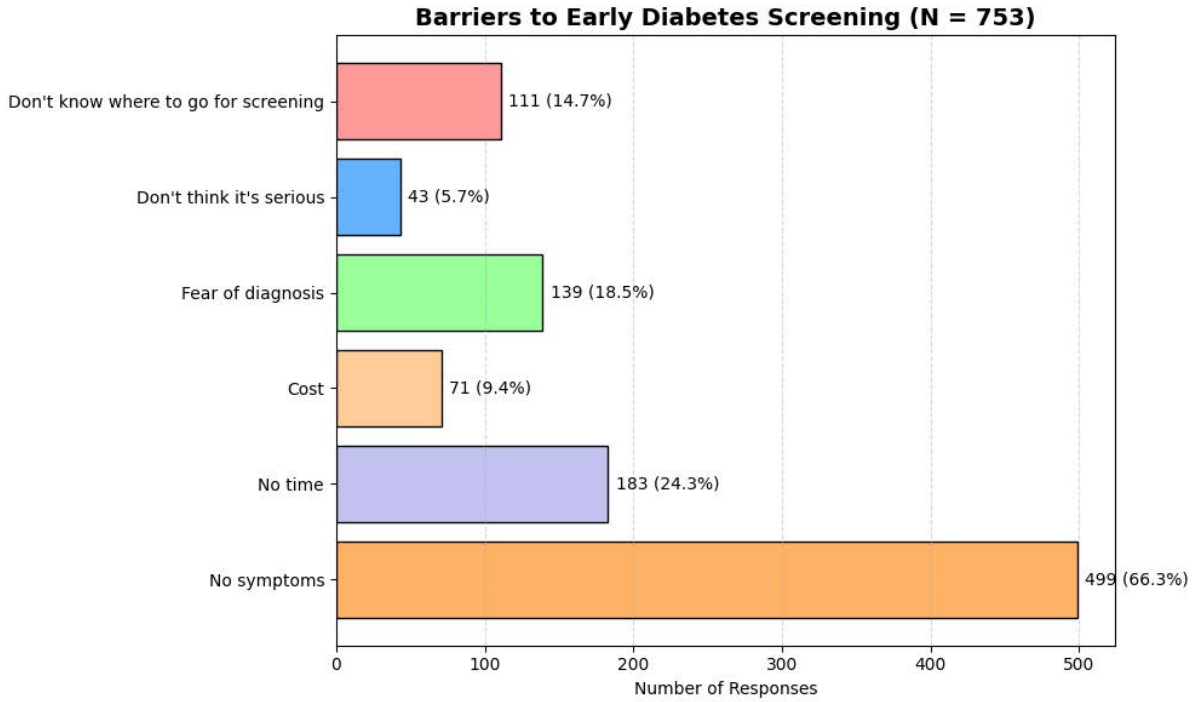

Figure 1. *Reported Barriers to Early Diabetes Screening Among the Saudi Population (N = 753).*

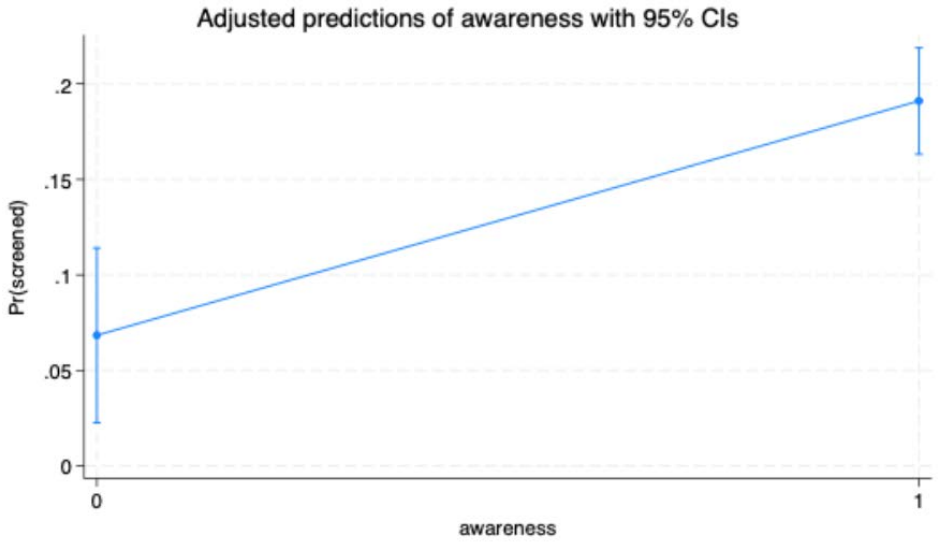

Figure 2. *Predictive Margins of Awareness on Screening Participation.*

positive association with screening participation (OR = 2.61, p < 0.001). Family history of diabetes (OR = 1.54, p = 0.031) and health insurance (OR = 1.83, p = 0.002) were also significant predictors. Older age groups (≥35 years) and higher education levels were associated with higher screening participation.

Figure 2 displays the adjusted predicted probabilities of participation in diabetes screening based on awareness of early symptoms. Respondents who reported being aware of early diabetes symptoms had a significantly higher predicted probability of having participated in screening (21.1%) compared to those who were unaware (6.9%).

Discussion.

This study examined barriers to early diabetes diagnosis in Saudi Arabia and identified a clear gap between awareness and preventive action. Although most respondents reported awareness of early diabetes symptoms, screening participation remained low, and more than half had never monitored their blood glucose. Similar patterns have been reported in Saudi and international studies, where knowledge does not consistently translate into preventive behavior [6,10]. These findings indicate that increasing awareness alone is insufficient to improve early detection.

The most frequently reported barrier—absence of symptoms—provides a critical explanation for low screening uptake. Diabetes often progresses silently in its early stages, yet many individuals interpret the lack of symptoms as an indication that testing is unnecessary [1,3]. This reflects a predominantly symptom-driven model of healthcare utilization, in which medical attention is sought mainly when illness is perceived [7]. In the Saudi context, this perception may be reinforced by cultural norms, competing life priorities, and fear of being diagnosed with a chronic disease [6,8]. Addressing this misconception is essential, as delayed diagnosis is strongly associated with poorer outcomes and higher complication rates [2,4].

The inferential findings further clarify the distinction between awareness and screening behavior. Bivariate analysis showed that females were more likely to report awareness of early diabetes symptoms, whereas multivariable regression demonstrated that males had higher odds of screening participation after adjustment for covariates. These findings are not contradictory, as awareness and screening represent different outcomes influenced by different pathways. Gender-related differences in healthcare utilization, perceived vulnerability, and opportunity to access screening services may explain this divergence [10,11]. Importantly, awareness of early symptoms remained a strong independent predictor of screening participation in the regression model, reinforcing its role as a necessary—but not sufficient—condition for preventive action.

Additional predictors identified in this study further highlight structural and contextual influences on screening behavior. Individuals with a family history of diabetes, older age, health insurance coverage, and higher educational attainment were significantly more likely to participate in screening. These findings are consistent with earlier studies demonstrating that perceived risk, socioeconomic resources, and health literacy facilitate engagement in preventive care [3,10,11]. Conversely, lower participation among younger adults and uninsured individuals suggests that reduced risk perception and access barriers may discourage early testing, even in the presence of awareness.

From a public health perspective, these findings support a shift from generalized awareness campaigns toward behavior-focused and risk-targeted strategies. Health communication efforts should emphasize that diabetes can remain asymptomatic for long periods and that screening is a preventive measure rather than a response to illness [5]. Messaging that frames screening as a routine health practice—particularly for individuals with family history or advancing age—may help normalize preventive visits and reduce fear-related avoidance [6,8].

The results also point to specific and actionable digital health opportunities aligned with the study's predictors. Rather than broad adoption of technology, targeted interventions may be more effective. These include: (1) mobile health messages tailored to individual risk profiles (e.g., age and family history) that explicitly address the misconception that "no symptoms" equates to "no risk"; (2) push notifications that link directly to screening appointment booking or provide clear directions to nearby screening sites; and (3) electronic health record–based prompts in primary care that flag high-risk individuals and encourage opportunistic screening during routine visits [15-17]. Such approaches align with evidence showing that digital nudges and risk stratification can improve uptake of preventive services when combined with accessible care pathways [17].

Overall, the findings indicate that improving early diabetes detection in Saudi Arabia requires more than symptom education. A combined approach is needed that integrates culturally responsive communication, structural facilitation of screening access, and digitally enabled prompts that convert awareness into action. Strengthening these components would support the prevention priorities outlined in the Saudi Vision 2030 Health Sector Transformation Program and contribute to reducing the long-term burden of diabetes and its complications [20].

Strengths and Limitations.

This study provides important insights into the barriers hindering early diabetes diagnosis in Saudi Arabia, based on a large and diverse sample drawn from multiple regions. The use of a validated Arabic-language questionnaire, combined with both descriptive and inferential statistical analyses, strengthens the reliability and generalizability of the findings.

However, several limitations should be acknowledged. First, the cross-sectional design limits the ability to infer causal relationships between the identified factors and screening behaviors. Second, reliance on self-reported data may have introduced recall bias or social desirability bias, particularly regarding health practices and screening participation. Third, the exclusive use of online distribution may have reduced participation among older adults and individuals with limited digital literacy, potentially leading to the underrepresentation of vulnerable populations. Finally, although the sample included respondents from across Saudi Arabia, regional differences in healthcare access and cultural norms may not have been fully captured.

Future research should consider longitudinal designs to assess temporal relationships, qualitative approaches to explore cultural influences in greater depth, and interventional studies—particularly those incorporating digital health innovations—to improve early diabetes detection and screening uptake.

Conclusion.

This study identified significant barriers to achieving early diabetes diagnosis in the Saudi population. Although awareness of symptoms was relatively high, participation in screening remained limited, largely due to the perception that testing is unnecessary in the absence of symptoms, combined with cultural and systemic challenges. Demographic factors such as age, education, and health insurance were shown to influence screening behaviors, while health system shortcomings—including the lack of standardized protocols and limited adoption of digital tools—further constrained proactive detection.

Addressing these challenges requires a comprehensive approach that prioritizes preventive screening in national health policies, strengthens integration between primary and secondary care, and supports the adoption of digital innovations. Aligning these efforts with the objectives of Saudi Vision 2030 will be essential for reducing the long-term burden of diabetes and improving overall population health outcomes.

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