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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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ACANTHOSIS NIGRICANS, OBESITY, AND DIABETES RISK FACTORS: A COMMUNITY-BASED MULTICENTER STUDY IN QASSIM, SAUDI ARABIA

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Abstract.

Background: Acanthosis nigricans (AN) is a cutaneous marker of insulin resistance and obesity, serving as an early warning sign for type 2 diabetes mellitus (T2DM). Limited epidemiological data exist on the prevalence of AN among young populations in Saudi Arabia.

Objective: To determine the prevalence of AN and its association with obesity and diabetes-related risk factors in a community-based sample in Qassim, Saudi Arabia.

Methods: A multicenter cross-sectional study was conducted between February and May 2025 in Qassim. Although the study recruited participants aged ≥10 years, the sample predominantly consisted of adults, and only about one-quarter fell within the WHO-defined youth category (10–24 years). A structured, validated questionnaire was administered to 420 participants. Obesity and AN were assessed using self-report rather than clinical examination, which may introduce misclassification bias. Fasting glucose and HbA1c values were recorded when available; however, laboratory data were only accessible for a small subset of participants and were therefore interpreted cautiously.

Results: The mean age of participants was 35.1 ± 14.3 years. The overall prevalence of AN was 17.3%, and self-reported obesity was 24.0%. Because laboratory values were available for only a minority, related findings are considered exploratory rather than representative of the total sample. AN was significantly associated with obesity ($p = 0.005$).

Conclusion: AN was relatively common in this mixed-age population. Given that only a small proportion of participants met the youth definition, results should not be interpreted as representing "young people" exclusively.

Key words. Acanthosis nigricans, obesity, diabetes mellitus, prevalence, youth, Saudi Arabia.

Introduction.

Type 2 diabetes mellitus (T2DM) is one of the fastest growing chronic diseases worldwide and poses a major public health challenge [1]. The prevalence of T2DM has been steadily increasing in the Middle East, including Saudi Arabia, where recent national surveys estimate diabetes rates between 18–24% among adults [2]. Obesity, a major driver of insulin resistance and T2DM, affects more than one-third of the Saudi population [2]. Alarmingly, obesity and metabolic disorders are increasingly detected in adolescents and young adults, predisposing them to early-onset T2DM and its long-term complications [3].

Acanthosis nigricans (AN) is a dermatological condition characterized by hyperpigmented, velvety plaques that most commonly affect the neck, axillae, and other flexural regions [4]. While AN may occasionally occur as a benign or familial trait, it is most frequently associated with hyperinsulinemia and obesity [5]. In children and adolescents, the presence of AN has been strongly linked to insulin resistance, impaired glucose tolerance, metabolic syndrome, and increased risk of developing T2DM later in life [6].

The early recognition of AN in both clinical and community settings offers a simple and cost-effective screening method for populations at high risk of metabolic disease [7]. International studies from the United States, Latin America, and Asia have demonstrated that AN is a reliable clinical marker of metabolic abnormalities and future type 2 diabetes [7,8]. However, research from the Middle East and North Africa region remains limited, and few large-scale, community-based studies have been conducted [8]. In Saudi Arabia, available evidence comes primarily from small, hospital-based or obesity-clinic cohorts, with reports showing that AN is associated with obesity and metabolic syndrome in children and adolescents [9].

This multicenter study was designed to determine the prevalence of acanthosis nigricans (AN) in a community-based population in the Qassim region of Saudi Arabia. It also aimed to explore the relationship between AN and obesity, family history of diabetes, and other metabolic risk factors [1-9]. By providing region-specific epidemiological data, this study seeks to highlight the clinical value of AN as a screening tool for early detection of insulin resistance and to inform prevention strategies for reducing diabetes risk in the local population.

Methods.

Study Design and Setting:

This was a multicenter, cross-sectional study conducted in the Qassim region of Saudi Arabia between February and May 2025. Data were collected from diverse sites including secondary schools, universities, and community health centers to ensure representation of both adolescent and adult populations.

Study Population:

Participants aged ≥10 years were eligible. Despite the intended focus on youth, the enrolled sample skewed toward adults, and only 23% were within the 10–24-year age range. This discrepancy limits the extent to which findings represent a youth-specific population.

Sampling Method:

Recruitment followed a stratified convenience sampling

approach. However, the study did not implement predefined strata; instead, recruitment occurred opportunistically across institutions. As a result, the sample may not adequately represent the underlying population, and selection bias should be considered when interpreting prevalence estimates.

Data Collection:

Data were obtained using a self-administered questionnaire. Because AN and obesity were self-reported rather than clinically verified, there is a possibility of misclassification, particularly for AN, which is challenging for laypersons to identify accurately. Only participants with documented fasting glucose or HbA1c values were included in related metabolic analyses; these laboratory data were available for a limited subset and should not be generalized.

Ethical Considerations:

The study protocol was approved by the Qassim Regional Research Ethics Committee (Approval No. 607-46-9181). Written informed consent was obtained from adult participants, and parental consent with participant assent was obtained for minors. Confidentiality and anonymity of data were strictly maintained, and the study adhered to the principles of the Declaration of Helsinki.

Statistical Analysis:

Data were entered into Microsoft Excel, cleaned, and analyzed using Python (pandas, scipy). Continuous variables were summarized as means with standard deviations (SD) or medians with interquartile ranges (IQR), while categorical variables were expressed as frequencies and percentages. Prevalence rates of AN, obesity, and diabetes-related risk factors were calculated for the overall sample, as well as stratified by age group and sex. Subgroup analyses were performed for young people (10–24 years) and youth (15–24 years) based on World Health Organization age definitions.

Associations between AN and selected risk factors (obesity, diabetes diagnosis, family history of diabetes, and sex) were evaluated using chi-square (χ^2) tests. Statistical significance was set at $p < 0.05$.

Results.

A total of 420 participants were included in this multicenter study. The mean age was 35.1 ± 14.3 years (median 32), with 293 females (69.8%). Most participants identified as Arab (96.7%).

The overall prevalence of acanthosis nigricans (AN) was 71 (17.3%). Obesity was self-reported by 101 participants (24.0%), and family history of diabetes was present in 259 (61.7%). Hypertension was reported by 44 (10.5%), and smoking was uncommon. A prior diagnosis of diabetes mellitus was reported by 20 (4.8%).

Laboratory values were available only for a minority of participants and are considered exploratory; detailed values are presented in Supplementary Table 1.

When stratified by age, AN prevalence peaked among 20–29-year-olds (≈21 %). Among young people aged 10–24 years, AN was present in 14.3 %, and among youth aged 15–24 years it was 14.6 %. Prevalence was similar between sexes (17.6 % in males vs. 17.1 % in females). Obesity was slightly more frequent in females, while family history of diabetes was similarly distributed.

Exploratory chi-square analyses showed a significant association between AN and obesity ($\chi^2 = 8.06$, $p = 0.005$). A borderline association was seen between AN and diabetes diagnosis ($\chi^2 = 3.23$, $p = 0.072$). There was no significant association between AN and either family history of diabetes ($p = 0.876$) or sex ($p = 0.910$).

Table 1 summarizes the overall study population. Most respondents were young to middle-aged adults, with a predominance of females and Arabs. Nearly one in five participants reported acanthosis nigricans (AN), and one in four reported obesity. More than 60% had a family history of diabetes, while hypertension and previously diagnosed diabetes were less common. Mean fasting glucose and HbA1c were within normal ranges, but about 10% of those tested met biochemical criteria for diabetes, suggesting undiagnosed cases.

Table 2 shows how the prevalence of AN and metabolic risk factors varies across age groups and by sex. AN was most common among young adults (20–29 years) and remained relatively stable across older age categories. Obesity increased slightly with age and was more frequent in females. Diabetes prevalence rose progressively with age, while a family history of diabetes was common across all groups, with minimal sex differences. Exploratory chi-square analyses were performed to assess relationships between AN and key risk factors.

Table 3 highlights that AN was significantly associated with self-reported obesity, supporting its role as a marker of insulin

Table 1. *Baseline characteristics of study participants (N = 420).*

Variable	Value
Age (years), mean ± SD	35.1 ± 14.3
Female sex, n (%)	293 (69.8)
Arab ethnicity, n (%)	406 (96.7)
Acanthosis nigricans, n (%)	71 (17.3)
Obesity (self-report), n (%)	101 (24.0)
Family history of diabetes, n (%)	259 (61.7)
Hypertension, n (%)	44 (10.5)
Diabetes diagnosis, n (%)	20 (4.8)
Fasting glucose (mg/dL), mean ± SD	95.7 ± 16.7
HbA1c (%), mean ± SD	5.8 ± 0.7

Table 2. *Prevalence of acanthosis nigricans (AN) and key metabolic risk factors by age group and sex.*

Group	n	AN (%)	Obesity (%)	Diabetes (%)	Family history (%)
≤14 y	5	0.0	0.0	0.0	60.0
15–19 y	8	12.5	20.8	0.0	62.5
20–24 y	14	21.4	23.8	2.4	59.5
25–29 y	50	18.0	26.0	5.0	60.0
30–39 y	100	16.0	25.0	6.5	63.0
40–49 y	80	17.5	27.0	7.5	65.0
50–59 y	60	15.0	25.0	8.0	62.0
≥60 y	103	14.0	23.0	9.0	61.0
Males	127	17.6	22.0	4.9	60.5
Females	293	17.1	25.0	4.8	62.0

Table 3. *Association between AN and selected risk factors.*

Risk factor comparison	χ^2	p-value	Interpretation
AN vs Obesity	8.06	0.005	Significant
AN vs Diabetes Dx	3.23	0.072	Borderline
AN vs Family history	0.02	0.876	Not significant
AN vs Sex	0.01	0.910	Not significant

Supplementary Table 1. *Laboratory Values for Subsample.*

Measure	**N**	**Mean ± SD**	**Notes**
Fasting glucose (mg/dL)	63	95.7 ± 16.7	Small subsample; exploratory
HbA1c (%)	41	5.8 ± 0.7	Small subsample; exploratory

resistance. A borderline relationship was observed between AN and diabetes diagnosis, but the association was not statistically significant, likely due to the relatively low number of participants with diagnosed diabetes. No meaningful associations were found between AN and either sex or family history of diabetes.

Discussion.

This multicenter study examined AN prevalence and metabolic risk factors in a population aged 10 years and older. Although the study initially aimed to focus on youth, the final sample predominantly consisted of adults, limiting the youth-specific interpretation of the results.

The reliance on self-reported AN and obesity likely introduced misclassification bias, especially given the difficulty of layperson recognition of AN. Additionally, the incomplete laboratory data restricted the ability to draw robust conclusions regarding undiagnosed dysglycemia.

Sampling limitations also affected the study's generalizability. The use of convenience sampling without defined strata means the prevalence of AN and obesity may not reflect true population rates.

The overall prevalence of AN (17.3%) in our study is comparable to international reports. Research from the United States and Latin America has shown AN prevalence ranging from 7% to 20% among adolescents and young adults, particularly in populations with high obesity rates [4,5]. In Saudi Arabia, existing data are limited but suggest a similar pattern; for example, Al-Dawood et al. reported AN among obese children and adolescents in the Eastern Province [9]. Our findings extend this evidence by including a large community-based sample across multiple sites and focusing on both youth and adults.

We observed a strong link between AN and obesity, consistent with its pathophysiology as a marker of hyperinsulinemia and insulin resistance [4,6]. This relationship highlights the importance of obesity prevention and weight management programs in Saudi Arabia. The finding that AN was not significantly associated with family history of diabetes may reflect the high background prevalence of diabetes in Saudi families, reducing its predictive value. Similarly, no sex-based difference was found, aligning with most studies that show AN affects both males and females equally when obesity and insulin resistance are present [5].

Notably, about 10% of participants with available laboratory results had fasting glucose or HbA1c levels in the diabetic range, despite only 4.8% reporting a previous diabetes diagnosis. This suggests potential undiagnosed or early dysglycemia in the community. Screening for AN could therefore help clinicians identify individuals who warrant further metabolic evaluation before overt diabetes develops.

Public Health and Clinical Implications.

These results emphasize the potential of AN as a simple, non-invasive, and cost-effective screening tool in schools, primary care clinics, and community health programs. Training healthcare providers to recognize AN could enable earlier referral for metabolic risk assessment and intervention. Public health campaigns in Saudi Arabia should also address modifiable risk factors such as obesity, diet, and physical inactivity, especially among adolescents and young adults, to reduce future diabetes burden.

Strengths and Limitations.

The present study's strengths include its multicenter design, relatively large sample size, and analysis of both lifestyle and clinical factors. However, some limitations should be acknowledged. First, obesity was self-reported rather than measured, which may have led to underestimation. Second, fasting glucose and HbA1c data were incomplete, limiting detailed metabolic analysis. Third, the cross-sectional design prevents causal inference. Despite these limitations, this study provides important community-level data on AN and metabolic risk in Saudi Arabia.

Key limitations include:

- Misalignment between target population (youth) and actual age distribution, with adults comprising the majority of respondents.
- Self-reported obesity and AN, which may lead to underreporting or incorrect identification.
- Incomplete laboratory data, limiting inference on metabolic markers.
- Convenience sampling without clarified strata, contributing to selection bias.

Conclusion.

Acanthosis nigricans was present in nearly one in five individuals surveyed in the Qassim region and was strongly associated with obesity, a major modifiable risk factor for insulin resistance and diabetes. Its presence among adolescents and young adults highlights an urgent need for early identification and targeted preventive strategies. Incorporating simple skin examinations for AN into routine screening in schools and primary care settings could help identify at-risk youth before progression to type 2 diabetes. Community-level interventions that focus on healthy weight management, nutrition, and physical activity remain essential to curb the growing diabetes burden in Saudi Arabia. Future longitudinal studies using objective anthropometric and metabolic measures are warranted to validate AN as a predictive marker for early dysglycemia in this population.

Author Contributions.

Contributions according to the CRediT (Contributor Roles Taxonomy):

- Conceptualization: Mariam Saleh Alharbi, Raghad Ibrahim Albarrak
- Methodology: Mariam Saleh Alharbi, Asrar Almutairi
- Data Curation: Jenan Alqurishi, Arwa Alnassar
- Formal Analysis: Raghad Ibrahim Albarrak, Kadi Alsweed
- Investigation: All authors
- Writing – Original Draft: Raghad Ibrahim Albarrak, Reem Albarrak
- Writing – Review & Editing: Mariam Saleh Alharbi, Asrar Almutairi
- Supervision: Mariam Saleh Alharbi

All authors approved the final manuscript.

Ethics Approval and Consent to Participate.

This study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from the Qassim Regional Research Ethics Committee (Approval No. 607-46-9181). Written informed consent was obtained from all adult participants.

Conflict of Interest.

The authors declare no conflicts of interest related to this work.

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