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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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CLINICAL AND IMMUNOLOGICAL PROFILE OF NEWLY DIAGNOSED DIABETIC PATIENTS IN A COHORT OF YOUNG ADULTS OF NATIONAL HEPATITIS C VIRUS SURVEY IN EGYPT

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Abstract.

Background: T2DM (Type 2 diabetes mellitus) is considered a disease that affects old age group. Recently, it has become common in children, adolescents and adults.

Aim of the work: To highlight the challenges in differentiating T1DM (type1 diabetes mellitus) from T2DM (type2 diabetes mellitus) in early onset diabetes in youth depending on clinical and laboratory characteristics.

Methodology: Our cross-sectional study was performed on 200 newly diagnosed diabetic patients aged (18-30) years. All patients were subjected to detailed medical history and full clinical examination. Laboratory investigations included FBS, 2hPP, HbA1C, fasting C peptide and GADA.

Results: About 59% (118) of our patients were T2DM while (82) 41% were T1DM. T1DM was more dominant than T2DM in age group less than 25 years (T1DM 79% versus T2DM 21%, $P < 0.001$), while T2DM was more than T1DM in age group more than 25 years (T2DM 93% versus T1DM 17%, $P < 0.001$). GADA was detected in 73.2 % of T1DM patient and it was high titer while GADA was detected in only 8% of T2DM with low titer, in addition GADA positive patients were significantly younger than negative patients, age (20.9 ± 2.5 years vs. 26.4 ± 3.5 years respectively) ($P < 0.001$).

Conclusion: About 8% of phenotypically type 2 diabetic youth had GADA positive antibodies which did not confer impact on c peptide level or glycemic control yet type 1 diabetics who were GADA negative had a better glycemic control.

Key words. Diabetes mellitus, C peptide, GADA.

Introduction.

The prevalence of diabetes is increasing all over the world, especially in developing countries, because of genetic background and changing lifestyles of people. Diabetes is increasing in the young adult in developing countries than in the West, as it is more common in old population. This will cause much economic burden worldwide especially in developing countries [1].

Diabetes mellitus is classified into type 1 and type 2 according to its pathophysiology and etiology. Pathophysiology of type 1diabetes is mostly caused by b-cell destruction by anti-islet autoimmunity, and eventually leads to an insulin-dependent state; on the other hand, pathophysiology of type 2 diabetes mellitus includes both insulin resistance and insulin insufficiency and does not generally lead to an insulin-dependent condition [2].

Diagnosis of types of diabetes at presentation in adults is difficult, especially in young adults. Difficulties in classification of diabetes are also increasing in both adolescents and the elderly, as the incidence of autoimmune diabetes is also high as at the young age group [3].

In addition to the clinical classification of diabetes based on body mass index (BMI), age, ketoacidosis, and other clinical characters, we need other tools for classification, as determination of type of diabetes affects choice of treatment and prognosis, including development of complications [4].

Aim of the study.

The study aimed at characterization of the clinical and immunological profile of a cohort of newly diagnosed youth with diabetes mellitus enrolled in the national HCV (Hepatitis C virus) screening campaign in Egypt.

Materials and Methods.

Study population: Our cross-sectional study was conducted on two hundred patients aged (18-30 years) with newly diagnosed diabetes mellitus (up to three month of diagnosis) between January 2019 and March 2020. All patients attended the Diabetes Clinic of the National Institute of Diabetes and Endocrinology as a part of a National survey in Egypt (100-Million-Seha). It was a convenient sub sample from this national survey taken from the National Institute of Diabetes and Endocrinology which is a referral tertiary care center in Egypt. Patients recruited for the study were either referred to the survey clinic or diagnosed and were following in the survey clinic of this center. The study was approved by Ain-Shams University - Faculty of Medicine local Research Ethics Committee (REC) FWA 000017858, all patients approved and signed an informed consent.

Patients were diagnosed with diabetes according to ADA, 2020 guidelines, HbA1C ≥6.5% (48 mmol/mol) and/or FBG ≥126 mg/dL (7.0 mmol/L) and/or OGTT ≥200 mg/dL (11.1 mmol/L) [5].

A structured interview schedule was used to collect demographic information. Sociodemographic data included: history of autoimmune diseases, medication history, drinking and smoking habits, family history of diabetes mellitus, other endocrinopathies and autoimmune diseases. Age at diagnosis, gender, history of Ketoacidosis at presentation of diabetes, and the duration of diabetes.

Exclusion criteria:

- Medical illnesses that would potentially affect results or interfere with completion of the study, including serious cardiovascular disorders (Myocardial infarction and acute coronary syndrome), active infections, chronic kidney disease, liver diseases and pregnancy.
- Drugs that may affect blood glucose level as benzodiazepines, Thiazide diuretics, steroids, Birth control pills, Progesterone, Catecholamines and antipsychotic medications.

Clinical assessment:

All patients were subjected to a thorough clinical examination including body weight and signs suggestive of insulin resistance as acanthosis nigricans, central obesity and stria.

Classification of diabetes.

Patients were classified to Type 1 or Type 2 according to the clinical characters recommended by the ADA report [5]. Classifications were based on type of onset (acute or insidious presentation), BMI, history of urine ketones and signs of insulin resistance as acanthosis nigricans.

Classification of T1DM was determined by these criteria: presence of acute classic symptoms, which needed insulin to treat hyperglycemia, presence of DKA at presentation, underweight patients, history of other autoimmune diseases, low level of C peptide and presence of antiGAD antibodies [6].

Classification of T2DM was also determined to patients who were obese, had signs of insulin resistance as acanthosis nigricans, higher BMI, prominent family history of DM, diabetes for a long period without need of insulin therapy, accidently discovered and mainly with normal to high c peptide level [6].

According to c peptide level patients were classified to Insulin deficient and non-insulin deficient, we considered patient with c peptide < 0.6 ng/ml as insulin deficient. This cut-off was designated according to Leighton et al., study who recommended a c peptide level less than 0.2 nmol/l = 0.6 ng/ml (cut-off point) was associated with a diagnosis of type 1 diabetes mellitus (T1DM) [7].

Collection of blood samples.

After overnight fasting of 8 hours, a sample of 5 ml venous blood was collected by sterile plastic syringe, Blood samples were allowed to clot, and the serum or plasma separated by using centrifugation. Serum samples were clear and non-hemolyzed. Contamination by hemolysis or lipemia was avoided. Specimens were refrigerated at 2-8°C till time of assay.

Laboratory tests included.

Fasting C-peptide level was measured by direct ELISA method using easy way diagnostic kit (Diagnostic Biochem Canada Inc., Canada). Reference range of C-peptide followed in the present laboratory is 1.1–4.4 ng/mL. Anti-GADA was measured by enzyme-linked immunosorbent assay method (ELISA) using Medizym anti-GAD kit. The cut-off value for anti-GAD was taken as 10 IU/mL according to the recommendations for the kit, and values above 10 IU/mL were taken as positive [8].

Fasting blood sugar and postprandial blood sugar were estimated by enzymatic UV test (glucokinase method) on Beckman coulter-Olympus AU2700 Chemistry Analyzer. HbA1c was measured in whole blood by ion exchange high performance liquid chromatography using Bio-Rad Variant II HbA1c analyzer.

Statistical analysis.

The results were expressed as mean, standard deviation and standard error of mean. All data of morphometric and biochemical analysis were collected, revised, and then subjected to statistical analysis. Comparison between more than two independent groups with quantitative data and parametric distribution were done by using One Way ANOVA test followed by post hoc analysis using LSD test. Spearman correlation coefficients were used to assess the correlation between two quantitative parameters in the same group.

Statistical Package: All statistical data were performed by using SPSS (Statistical Program for Social Science) statistical Package (SPSS Inc.) version 20.

Results.

A total of 200 participants recently diagnosed as diabetic (within three months of diagnosis) with mean age of (18-30) years were recruited . They were classified into T1DM and T2DM according to clinical, laboratory and immunological markers. T1DM comprised about (59%) while T2DM comprised about (41%) of our population.

Phenotypic and laboratory characteristics.

20% of T2DM patients presented without symptoms while all T1DM patients had weight loss, polyuria, or ketosis. acanthosis nigricans was seen in 40% of our T2D group and not seen in T1D. 7% of our T2DM female patients had irregular periods and diagnosed as PCO, while none of T1DM females had history of PCO. Other clinical and laboratory characteristics are shown in Table (1).

Comparison between T1DM and T2DM regarding clinical and laboratory characteristics showed that FBG, HbA1C, GADA titre, AID and DKA were significantly higher in T1DM ($P< 0.001$) while C peptide, age, BMI, and family history were significantly higher in T2DM ($P< 0.001$) Table (2).

Subgrouping according to GADA antibodies.

Subgrouping according to GADA titer showed that higher GADA titer tends to have poorer glycemic control than those with low GADA titer, also C-peptide level was lower in high GADA titer group.

Comparison between GADA negative and GADA positive patients showed that age, BMI, c peptide and family history were significantly higher in GADA –ve group while DKA was significantly higher in GADA +ve group Table (3).

Correlation between GADA titre and different parameters showed highly significant positive correlation between HbA1c and GADA titre ($P<0.001$), significant positive correlation between (autoimmune diseases, FBS) and GADA titre ($P<0.05$)

Table 1. *Laboratory and clinical characteristics of the studied population.*

Variables	Value
Gender: Male Female	 (n)84 (n)116
Clinical presentation Asymptomatic DKA	 (n)24 (12%) (n)82 (41%)
Acanthosis Negricans	(n)47 (23%)
PCO	(n)8 (4%)
Family history	(n)105 (52%)
Autoimmune diseases Thyroid Rheumatoid arhiritis Other autoimmune diseases	(n)18 (9%) (n)11 (n)3 (n)4
C peptide level (ng/ml) Low C peptide (< 1.1) Normal C peptide (> 1.1)	 (n)78 (39%) (n)122 (61%)
Type of diabetes T1DM T2DM	 (n)82 (41%) (n)118 (59%)
GADA state GADA Positive GADA Negative	 (n)69 (34.5%) (n)131 (65.5%)
BMI < 25 25 - 30 >30	 (n)65 (32%) (n)65 (32%) (n)70 (35%)
	Mean± SD
Age at diagnosis (years)	24.5 ± 4.1
Duration of DM (month)	1.3 ± 0.9
FBS (mg/dl)	285 ± 80
HbA1c (%)	10 ± 1.6

PCO: Polycystic Ovarian Disease; DKA: Diabetic Ketoacidosis; BMI: Body Mass Index; FBS: Fasting Blood Sugar; GADA: Glutamic Acid Decarboxylase Antibody; T1DM: Type 1 Diabetes; T2DM: Type 2 Diabetes.

Table 2. *Comparison of both types of diabetes regarding laboratory and clinical characteristics.*

	T2DM (118)	**T1DM (82)**	**Total (200)**	**P value**
	Mean ± SD	**Mean ± SD**	**Mean ± SD**	
FBS (mg/dl)	245.9 ± 54.5	341.3 ± 79.2	285.0 ± 80.7	0.03
HbA1C (%)	9.2 ± 1.5	11.1 ± 1.0	10.0 ± 1.6	0.041
C Peptide(ng/ml)	1.4 ± 0.5	0.7 ± 0.3	1.1 ± 0.5	< 0.001
GADA titre	1.78 **± 5.5**	438 **± 775**	180 **± 539**	< 0.001
Age (years)	26.5 ± 3.6	21.6 ± 2.9	24.5 ± 4.1	< 0.001
BMI (kg/m2)	31.6 ± 4.9	21.4 ± 3.8	27.4 ± 6.7	0.007
	N(%)	**N(%)**	**N(%)**	
GADA	9 (7.6%)	60 (73.2%)	69 (34.5%)	< 0.001
Family History	83 (70.3%)	22 (26.8%)	105 (52.5%)	0.006
AID	3 (2.5%)	15 (18.3%)	18 (9%)	0.002
DKA	6 (5.1%)	76 (92.7%)	82 (41%)	< 0.001

BMI: Body Mass Index; AID: Autoimmune Diseases; DKA: Diabetic Ketoacidosis; GADA: Glutamic Acid Decarboxylase Antibody; T1DM: Type 1 Diabetes; T2DM: Type 2 Diabetes.

Table 3. *Comparison between GADA positive and GADA negative patients according to clinical and laboratory characteristics.*

	Positive GADA (69)	**Negative GADA (131)**	**P value**
	Mean ± SD	**Mean ± SD**	
Age (years)	20.9 ± 2.5	26.4 ± 3.5	< 0.001
BMI(kg/m2)	21.8 ± 4.3	30.3 ± 5.9	< 0.001
FBS (mg/dl)	350 ± 79	250.3 ± 56.3	0.05
A1C (%)	11 ± 1	9.4 ± 1.5	0.06
C Peptide (ng/ml)	0.76 ± 0.33	1.3 ± 0.5	< 0.001
	N (%)	**N (%)**	**P Value**
Fam. Hist	25 (36%)	80 (61%)	< 0.001
AID	14 (20%)	4 (3.1%)	0.04
DKA	54 (78%)	28 (21%)	< 0.001

BMI: Body Mass Index; FBS: Fasting Blood Sugar; AID: Autoimmune Diseases; DKA: Diabetic Ketoacidosis; GADA: Glutamic Acid Decarboxylase Antibody.

Table 4. *Comparison between Insulin deficient and non-insulin deficient patients according to clinical and laboratory characteristics.*

	Insulin deficient (65) C Peptide < 0.6 ng/ml	**Non-Insulin deficient (135) C Peptide > 0.6 ng/ml**	**P value**
	Mean ± SD / n (%)	**Mean ± SD / n (%)**	
Age (years)	21.55 ± 3.03	25.9 ± 3.88	< 0.001
BMI(kg/m2)	20.78 ± 3.44	30.6 ± 5.5	< 0.001
Fam. Hist	21 (32.3%)	84 (62.2%)	< 0.001
AID	13 (20%)	5 (3.7%)	0.04
DKA	64 (98%)	18 (13.3%)	< 0.001
FBS (mg/dl)	350.9 ± 77.36	253.2 ± 60.69	0.05
A1C (%)	11.09 ± 0.79	9.42 ± 1.6	0.06
T1DM	65 (100%)	17 (12.6%)	<0.001
GADA +	46 (70.7%)	23 (17%)	<0.001

FBS: Fasting Blood Sugar; AID: Autoimmune Diseases; DKA: Diabetic Ketoacidosis; GADA: Glutamic Acid Decarboxylase Antibody.

and Significant negative correlation between (age, BMI, C-peptide) and GADA titre (P <0.001).

Subgrouping according to C peptide.

Comparison between Insulin deficient and non-insulin deficient patients according to clinical and laboratory data showed that age, BMI, family history was significantly higher in non-insulin deficient group (P<0.001) while DKA, number of T1DM and GADA +ve were significantly higher in insulin deficient group (P<0.001) Table (4).

Discussion.

The prevalence of diabetes globally is estimated to be 9.3% (463 million people) in 2019, which expected to increase to 10.2% (578 million) by 2030 and to 10.9% (700 million) by 2045 [9].

According to a report published by the World Health Organization (WHO) in 2014, ten Egyptians between the age of 15 and 59 years are affected. Therefore, the government exerted a tremendous effort by launching national programs. The Survey aimed at screening citizens above the age of 18 to determine

the prevalence of chronic diseases like diabetes, hypertension, obesity, and Hepatitis C.

This study focuses on the challenges of discriminating T1D from T2D in early-onset diabetes in the young adults (aged 18 - 30 years old) due to the great overlap in clinical symptoms, progression of the disease and lab characteristics. However, some clinical features at presentation may help.

In our study, about 20% of T2D presented with symptoms while all of T1D patients had either ketosis, weight loss or polyuria, (Patients presented with symptoms were more likely to be type 2 diabetic). Similarly, Yeow, et al., mentioned that One of five patients of T2D had no symptoms at presentation while all of T1D patients had obvious symptoms [10]. Asymptomatic patients were higher in Sahoo et al study and it was 45 % in T2DM and 5% in T1DM with significant difference (P <0.001) [11].

Acanthosis nigricans, was seen in 40% of our T2D group and not seen in T1D. Indian patients had similar incidence of acanthosis nigricans, about 36% in T2DM and 3% in T1DM with significant difference (P <0.05) [11]. Another Indian study showed similar incidence 47.2% in T2DM and 2.6% in T1DM with highly significant difference (P <0.001) [12]. On the other hand, incidence of acanthosis nigricans was higher in Mexican study as it was seen in 82% of T2DM patients and 23 % of T1DM patients, but the age group of this study was below than 16 years old [13]. The absence of acanthosis nigricans in our T1DM patients may be due to their low BMI (21.4 ± 3.8 Kg/m^2).

Also, about 7% of our type 2 diabetic females had irregular periods and diagnosed as PCO, on the other hand, none of type 1 diabetic females had history of PCO. Similar to our study Unnikrishnan `s study mentioned that, in adolescent girls, the presence of irregular cycles and polycystic ovarian syndrome (PCOS) goes with the diagnosis of T2D [14].

57% of our T2DM patients were overweight and obese while only 3.7% of T1DM patients were obese (P <0.05). Similarly, in a study conducted by Yeow et al, 53% of T2DM patients were overweight and obese but, 63% T1DM patients were underweight and only 2.6% obese (P< 0.001) [10]. Also in Reinehr, et al. Study, T2DM patients were significantly obese compared to T1DM patients who had significant lower BMI (P<0.001) [15].

In our population, the glycemic control was worse in T1D than T2D and the average HbA1c and glucose at presentation were higher in T1D than it was in T2D (P <0.05). Also, in the study conducted by Sahoo et al., Indian T1DM patients had higher HbA1c% than T2DM with significant difference (P<0.05) [11]. Additionally in the study conducted by Reinehr et al. in German, difference was more significant, Glucose and HbA1c were significantly higher in T1DM children compared to children with T2DM (P <0.001) [15]. Unnikrishnan et al reported that, the degree of hyperglycemia is not a reliable indication to the type of diabetes, however type 2 diabetic patients tend to have higher blood sugar than type 2 diabetic patients [14]. However, Yeow et al., reported that the T1D and T2D patients were equally poorly controlled [10].

Incidence of DKA was higher in our T1DM patients (92.7%) than in T2DM patients. Similarly, a study conducted in India showed 93.4% incidence of DKA in T1DM [12]. Incidence of DKA was lower in developed countries may be due to better access to medical advice and early diagnosis of diabetes by physicians. This difference may also be due to geographical and racial variations or environmental factors. We depended on both emergency room and outpatient clinic to collect our patients, but other studies depended only on clinic, this may be the cause of increase incidence of DKA in our patients.

70% of our T2D patients had a family history of diabetes, while 26% of T1D had family history of diabetes (P <0.05). An Indian study showed the same finding, family history was significantly higher in T2DM (60%) than in T1DM (26%) (P <0.05) [11]. Similarly, 67% of T2DM and 22% of T1DM had family history (P <0.001) by Unnikrishnan, et al. [12] Frequency was higher in Malaysian study as all of T2D reported family history of diabetes, while 29% only of T1D didn't have family history of diabetes [10]. Unlike our study, Tanzanian study reported that, no significant difference between family history in both T1DM and T2DM; 44.7% of T1DM and 45% of T2DM had family history of DM [16].

We found that autoimmune diseases were prevalent among T1D (18%) with predominantly thyroid autoimmune disorders, rheumatoid arthritis, and autoimmune hepatitis, while only 2.5% of T2DM had history of autoimmune diseases (P<0.05). Similarly, Incidence of other autoimmune diseases were (29%) in T1DM and (3%) inT2DM in an Indian study (P <0.05) [11].

Also, Many studies reported that, Autoimmune disorders occurred predominantly in T1D with predominantly thyroid diseases but with no significant difference between T1DM and T2DM regarding incidence of autoimmune diseases (P >0.05) as reported by Yeow`s study [10].

The most common autoimmune diseases associated with type 1 diabetes include Graves' disease and (15–30%) Hashimoto's thyroiditis, (4–9%) celiac disease, (5–10%) autoimmune gastritis/pernicious anemia, (0.5%) Addison's disease and vitiligo (2–10%). These diseases were more common in children and adolescents with type 1 diabetes compared to healthy ones [17].

In our study, Female appears to be more susceptible to T2DM than male, with an overall female-to-male ratio of 1.68:1 and it was the same result of previous Chinese study [18]. Thai et al reported that nearly 59% of their female patients were T2DM [19]. On the other hand, in Tanzanian study, male patients had more susceptibility for T2DM with incidence of 58% of whole participant [16].

Our T2DM had normal or high level of C peptide, while T1DM patient mainly had low level of c peptide with a significant difference (P <0.001). T1DM confirmed in all our patients with C peptide <0.7ng/ml. Other studies confirmed T1DM with the following levels: < 0.75 ng/dl [20], < 0.7 ng/ml [21], < 0.5 ng/ml [22] and < 0.5 ng/ml [23].

In our study, T2DM confirmed in all patients having c peptide > 1.4 ng/ml. Similarly, other studies reported T2DM in all patients having c peptide > 1.5 ng/ml [24]; and c peptide > 1 ng/ml [25].

We detected GADA in 73.2 % of T1DM patient and it was high titre, On the other hand GADA was detected in only 8%

of T2DM with low titre and most cases 92% were negative for GADA. Another similar study, prevalence of GADA is 79.4% in T1DM and 8.1% in T2DM [26].

In Caucasians, GAD ab is found in 60-90% of newly diagnosed IDDM patients [27].

The prevalence of GADA differs with different ethnicities. The positivity of GADA in T1DM patients was 73.2% in our study in Egypt, 79% in Germany [28] and Belgium [29] and is 69% in Sweden [30]. On the other hand, the prevalence of autoantibodies in Asia was lower with only 44.3% GADA positivity in Singapore [19] and an IA2A positivity of 25.8% in China [31] Chan et al. found GAD antibodies in a small study of 39 Chinese patients with IDDM, their mean ± SD of age was 37 ± 15 years [18]. Our larger study of 82 IDDM patients showed a younger mean age of 21.6 ± 2.9 years. We found that prevalence for GADA positivity was 73.2% and also an association between GADA antibodies and younger age.

Seventy three percent of our patients were positive for GADA who were significantly younger (P <0.0001), had lower mean BMI than GADA negative patients. Similarly, Chan et al., mention that the insulin-deficient patients showed younger age, higher levels of anti-GAD antibodies and lower BMI [18]. Also, Thumer et al., mention that, Patients presented with autoimmune diabetes tend to have a lower BMI percentile at onset than do patients with non-autoimmune diabetes [32].

The absence of GADA did not exclude T1D in our population. 22 out of 82 T1D youth (26.8%) who were insulin dependent, had no antibodies. Those patients have the description of idiopathic T1D, a type of T1D not associated with antibodies, for which insulin treatment is mandatory. Idiopathic T1D occurs more commonly in African or Asian populations [5] In a Malaysian study, 32% of patients with almost complete beta-cell destruction, they had no pancreatic autoantibodies [33]. 38% of T1DM were GADA negative in Indian study [11]. So, incidence of Idiopathic T1DM in our study was lower than both Indian and Malaysian study and mainly autoimmune driven. While most of the Caucasian T1DM population is driven by autoimmune mechanism, the role of autoimmunity among Asians with T1D is lower [34].

On the other hand, 9 of our patients had (7.6%) positive antibodies with detectable C-peptide and phenotypically going with NIDDM so classified as T2DM. In a study by Nazaimoon et al, 7.5% of Malaysian population clinically diagnosed as T2D, had positive antiGAD antibody [34].

In Our study, GADA titer shows negative correlation with c-peptide. Similarly, Chan study documented negative correlation between GADA titre and C peptide [18]. On the other hand, Yu, et al reported that the presence of autoantibodies did not correlate with C-peptide or HLA risk alleles [35]. Our explanation the correlation in our study was done between the GADA titre and c peptide level not only GADA positivity as in Yu study.

In our study the prevalence of GADA correlated negatively with age at diagnosis. This goes with studies on Caucasians [29]. Similarly, Chan et al.'s [18] found an association between GADA and younger age, early age of onset and low BMI while Thai et al. did not find this result. An explanation for this discrepancy is that Thai et al., IDDM patients were older in age compared to other study and were more heterogenous in their clinical characteristics and the state of beta-cell function in comparison to our IDDM patients [19].

Conclusions.

About eight percent of phenotypically type 2 diabetic youth had GADA positive antibodies which did not confer impact on c peptide level or glycemic control yet type 1 diabetics who were GADA negative had a better glycemic control. Better characterization of diabetes phenotype is prudent to guide treatment.

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