



LETTER

Letter to the Editor Regarding “Nationwide Prevalence of Diabetes and Prediabetes and Associated Risk Factors Among Iranian Adults: Analysis of Data from PERSIAN Cohort Study”

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Dear Editor,

We read with interest the recent article by Khamseh et al. [1] regarding data from the PERSIAN Cohort Study, a valuable nationwide population-based study aiming to assess the epidemiology of noncommunicable diseases and the associated factors.

Khamseh et al. [1] reported the nationwide prevalence of diabetes and prediabetes and associated risk factors among Iranian adults. In their study, using fasting blood sugar criteria, they found that about 40.40% of the participants had dysglycemia (i.e., impaired fasting plasma glucose or diabetes). This finding is supported by our recent study performed in the metropolitan city of Tehran between 2008 and 2011, which showed that only 62.20% of

Tehranian adults had normal glucose tolerance, based on strict criteria [2].

A comparison of the prevalence of diabetes and prediabetes in the PERSIAN cohort with the prevalence indicated by the national Surveillance of Risk Factors of Non-communicable Diseases (SuRFNCD) is not straightforward because of different sampling methods and age ranges; the age range in the PERSIAN cohort is 35–70 years, while it is 25–70 years in SuRFNCD surveys. The prevalence of diabetes based on the 2011 SuRFNCD survey was 9.90% in men and 12.86% in women [3], and the corresponding values in the 2016 SuRFNCD survey were 10.01% and 11.55% [4]. Furthermore, the prevalence of dysglycemia was 25.00% in men and 25.80% in women in 2011 vs. 25.30% in men and 23.60% in women in 2016 [5]. It is therefore not possible to conclude that dysglycemia has become increasingly prevalent in recent years in Iran and needs to be investigated with more precision using the recent survey.

In the PERSIAN cohort study, multivariable-adjusted analysis showed that in comparison with people of Fars ethnicity, Balouch and Zaboli people were more likely to have diabetes. However, Zaboli people were associated with significantly lower odds of prediabetes. Furthermore, there were discrepant results regarding the impact of sex on dysglycemia; according to the results, women had a 10.00% higher risk of having diabetes but a 31.00% lower risk of

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having prediabetes than men. These contrasting results may be related to the statistical method applied in the study. Diabetes and prediabetes are different stages in the spectrum of a common disease (dysglycemia) and are better evaluated using a single polytomous model (e.g., an ordinal or multinomial logistic model as appropriate) [6]. We are writing to highlight the fact that among the Balouch and Zaboli, more than 50.00% of marriages are reportedly consanguineous [7]. Regardless of the social, economic, or cultural reasons for them, such marriages increase the probability of familial diseases (e.g., diabetes) being passed from one generation to the next. Therefore, although adjusting for a family history of diabetes (an important potential risk factor for diabetes [8, 9]) may decrease the effect of genetics hidden in ethnicity, this adjustment is necessary for clarification. Hypertension [8, 10, 11] is another main risk factor for diabetes that was not considered in the multivariable analysis.

Also, the authors mentioned that “participants with a high waist to hip ratio (WHR) were more likely to be aware of their diabetes compared to those with normal WHR,” but they concluded that “participants who were overweight and obese were less likely to be aware of their diabetes compared to those with normal body mass index.” These discrepant findings for central and general obesity need to be discussed. Maybe multicollinearity among covariates, including general and central obesity and other metabolic factors, resulted in this discordance [12, 13]. Insufficient adjustment for the main risk factors for diabetes and overadjustment for some other factors are therefore among the concerns regarding the interpretation of the results. Moreover, the cross-sectional design of this study limits the explanation of causes.

Finally, the baseline characteristics of the population study, missing data, and the number of individuals in the tables are not reported, making it difficult to unify the results. As emphasized by guidelines for reporting observational studies, reporting the baseline characteristics of study participants allows readers to evaluate how generalizable the results are [14].

While we wish to thank the authors for providing this important paper, due to a variety

of issues, any conclusions drawn from this study about the prevalence of diabetes and prediabetes in the country, and about the effects of risk factors such as ethnicity on this prevalence, should be approached with caution.

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Compliance with Ethics Guidelines. This article is based on previously conducted studies and does not contain any new studies with human participants or animals performed by any of the authors.

Data Availability. Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

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REFERENCES

1. Khamseh ME, Sepanlou SG, Hashemi-Madani N, Joukar F, Mehrparvar AH, Faramarzi E, et al. Nationwide prevalence of diabetes and prediabetes and associated risk factors among Iranian adults: analysis of data from PERSIAN cohort study. *Diabetes Ther.* 2021. <https://doi.org/10.1007/s13300-021-01152-5>.
2. Moazzeni SS, Ghafelehbashi H, Hashemina M, Parizadeh D, Ghanbarian A, Azizi F, et al. Sex-specific prevalence of coronary heart disease among Tehranian adult population across different glycemic status: Tehran lipid and glucose study, 2008–2011. *BMC Public Health.* 2020;20(1):1–9.
3. Esteghamati A, Etemad K, Koohpayehzadeh J, Abbasi M, Meysamie A, Noshad S, et al. Trends in the prevalence of diabetes and impaired fasting glucose in association with obesity in Iran: 2005–2011. *Diabetes Res Clin Pract.* 2014;103(2): 319–27.
4. Farzadfar F. Distribution of diabetes based on FPG: STEPS 2016. <https://vizit.report/panel/steps/en/main.html#/forestSex>. Accessed 14 Oct 2021.
5. Rahmani F, Asgari S, Khalili D, Moeini ASH, Tohidi M, Azizi F, et al. National trends in cardiovascular health metrics among Iranian adults using results of three cross-sectional STEPwise approaches to surveillance surveys. *Sci Rep.* 2021;11(1):1–11.
6. Okwechime IO, Roberson S, Odoi A. Prevalence and predictors of pre-diabetes and diabetes among adults 18 years or older in Florida: a multinomial logistic modeling approach. *PLoS ONE.* 2015;10(12): e0145781.
7. Saadat M, Ansari-Lari M, Farhud D. Short report. Consanguineous marriage in Iran. *Ann Hum Biol.* 2004;31(2):263–9.
8. Asgari S, Khalili D, Hosseinpanah F, Hadaegh F. Prediction models for type 2 diabetes risk in the general population: a systematic review of observational studies. *Int J Endocrinol Metab.* 2021;19(3):e109206.
9. Derakhshan A, Sardarina M, Khalili D, Momenan AA, Azizi F, Hadaegh F. Sex specific incidence rates of type 2 diabetes and its risk factors over 9 years of follow-up: Tehran Lipid and Glucose Study. *PLoS ONE.* 2014;9(7):e102563.
10. American Diabetes Association. 2. Classification and diagnosis of diabetes: standards of medical care in diabetes—2021. *Diabetes Care.* 2021;44(Supplement 1):S15–S33.
11. Collins GS, Mallett S, Omar O, Yu L-M. Developing risk prediction models for type 2 diabetes: a systematic review of methodology and reporting. *BMC Med.* 2011;9(1):1–14.
12. Vatcheva KP, Lee M, McCormick JB, Rahbar MH. Multicollinearity in regression analyses conducted in epidemiologic studies. *Epidemiology.* 2016;6: 227. <https://doi.org/10.4172/2161-1165.1000227>.
13. Wissmann M, Toutenburg H. Role of categorical variables in multicollinearity in the linear regression model. Tech. Rep. no. 008. Munich: Dept. of Statistics, Univ. of Munich; 2007.
14. Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Bull World Health Organ.* 2007;85:867–72.