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PREVALENCE AND RISK FACTORS ASSOCIATED WITH PREDIABETES AMONG GENERAL POPULATION ASSOCIATED WITH IN RIYADH, SAUDI ARABIA

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INTRODUCTION
The World Health Organization (WHO) defines diabetes as a long-term metabolic disorder marked by high blood glucose levels with disturbances of carbohydrate, fat, and protein metabolic abnormalities caused by deficiencies. Diabetes mellitus is the most common chronic endocrine illness, affecting between 5% and 10% of the adult population in developed Western countries, Asia, Africa, Central America, and South America, and having a significant Prediabetes is the intermediate state between normal glucose hemostasis and diabetes. According to the National Diabetes Data Group, it occurs either due to 'impaired fasting glucose' or 'impaired glucose tolerance' or both. Therefore, prediabetes can be considered as a stage when the level of the glycemic variables is higher than the normal level of glycemic variables is higher than normal levels but not in the rangeofdiabetes.

Pre-diabetes is a term that is used when the blood sugar level is higher than normal, but not high enough to meet the diagnoses.

The global prevalence of diabetes in 2019 is measured to be 9.3% (463 million) people are suffering from diabetes, and it is predicted to continue rising to be 10.2% (578 million) by the year 2030 and 10.9% (700 million) by the end of 2045, worldwide people aged between (20–79) years measured 7.5% (374 million) are living with prediabetes. Out of the (463 million) people, approximately half (50.1%) are living with diabetes, and they are unaware of their.

In Saudi Arabia, the diabetes mellitus prevalence among the adult population had reached 23.7%, one of the highest percentages in insulin production, insulin action, or both social impact.

Type 2 diabetes has a high prevalence rate in the Gulf, according to data. Saudi Arabia, Kuwait, Lebanon, Qatar, Bahrain, and the United Arab Emirates are six of the top ten nations in the world for diabetes prevalence (percentage of population.(Diabetes has the highest relative prevalence in the region, at 11%. criteria of type II diabetes mellitus Illness across the globe.

Diabetes can affect anyone, but there are some risks and factors that raise the possibility, several studies found that Aging and Obesity are two factors that have the strongest connection with 6T2DM.

People with pre-diabetes by the time they will have T2DM, study shows approximately 70% of people would develop T2DM within 10 years, The prevalence of pre-diabetes is increasing worldwide and the risk of many diseases and complications are increasing too, therefore it is essential to detect and prevent such progression with appropriate management, many studies show that lifestyle modification and metformin are effective management to prevent If prediabetes is left untreated it will affect 37% of individuals with Prediabetes also imposes the potential burden of mortality upon the affected individuals due to its association with cardiovascular complications. In a population-based MESA study. Prediabetes was associated with lower right Ventricular mass and smaller RV volume but not with RV systolic function, while RV diastolic function was not It is worth mentioning that the conditions of up to 10% of prediabetics develop into diabetes each year.

One of the most important risk factors for Dm is Ageing, one study was conducted in Jeddah in 2016 to determine the risk of DM among Saudi residents, The study shows that Ageing was the strongest predictor, half of the people aged 50 years and above were diagnosed with DM, while 10–15% with prediabetes, and only a small proportion of participants with this age more than 50years On the other hand, Obesity also has a strong association with prediabetes and diabetes and plays an important role when diagnosis DM. One study was done in Al-Kharj in 2019 to estimate the Predictors of Prediabetes and Diabetic among Saudi Females, the

study shows approximately 23% of participants were overweight, and 22.57% were obese, almost half of the participants are having abnormal weight. Obesity is a modifiable risk with high-value prevention and would decrease the rate of modification, and exercise is a subcategory of the physical activity the development of T2DM. diabetes in succeeding years. assessed. old had normoglycemia.diabetes. Results from many studies enlighten the fact that lifestyle modification plays an important role to reverse prediabetes, Physical activity is considered a tangential component of lifestyle spectrum.

The aim of this study is to know the prevalence and risk factors among the Saudi Population within Riyadh, Saudi Arabia Prediabetes is the intermediate state between normal glucose hemostasis and diabetes.[1] According to the National Diabetes Data Group, it occurs either due to 'impaired fasting glucose' or 'impaired glucose tolerance' or both. Therefore, prediabetes can be considered as a stage when the level of the glycemic variables is higher than the normal level of glycemic variables is higher than normal levels but not in the range of diabetes.[1] The global prevalence of diabetes in 2019 is measured to be 9.3% (463 million) people are suffering from diabetes, and it is predicted to continue rising to be 10.2% (578 million) by the year 2030 and 10.9% (700 million) by the end of 2045, worldwide people aged between (20–79) years measured 7.5% (374 million) are living with prediabetes. Out of the (463 million) people, approximately half (50.1%) are living with diabetes, and they are unaware of their illness.[2] Pre-diabetes is a term that is used when the blood sugar level is higher than normal, but not high enough to meet the diagnoses criteria of type II diabetes mellitus.[3] In Saudi Arabia, the diabetes mellitus prevalence among the adult population had reached 23.7%, one of the highest percentages across the globe.[4] Diabetes can affect anyone, but there are some risks and factors that raise the possibility, several studies found that Aging and Obesity are two factors that have the strongest connection with T2DM.[3] People with pre-diabetes by the time they will have T2DM, study shows approximately 70% of people would develop T2DM within 10 years, The prevalence of pre-diabetes is increasing worldwide and the risk of many diseases and complications are increasing too, therefore it is essential to detect and prevent such progression with appropriate management, many studies show that lifestyle modification and metformin are effective management to prevent the development of T2DM.[5] If prediabetes is left untreated it will affect 37% of individuals with diabetes in succeeding years.[6] Prediabetes also imposes the potential burden of mortality upon the affected individuals due to its association with cardiovascular complications.[1] In a population-based MESA study. Prediabetes was associated with lower right Ventricular mass and smaller RV volume but not with RV systolic function, while RV diastolic function was not assessed.[7] It is worth mentioning that the conditions of up to 10% of prediabetics develop into diabetes each year.[7] One of

the most important risk factors for Dm is Ageing, one study was conducted in Jeddah in 2016 to determine the risk of DM among Saudi residents, The study shows that Ageing was the strongest predictor, half of the people aged 50 years and above were diagnosed with DM, while 10–15% with prediabetes, and only a small proportion of participants with this age more than 50years old had normoglycemia.[8] On the other hand, Obesity also has a strong association with prediabetes and diabetes and plays an important role when diagnosis DM. One study was done in Al-Kharj in 2019 to estimate the Predictors of Prediabetes and Diabetic among Saudi Females, the study shows approximately 23% of participants were overweight, and 22.57% were obese, almost half of the participants are having abnormal weight. Obesity is a modifiable risk with high-value prevention and would decrease the rate of diabetes.[9] Results from many studies enlighten the fact that lifestyle modification plays an important role to reverse prediabetes, Physical activity is considered a tangential component of lifestyle modification, and exercise is a subcategory of the physical activity spectrum.[10] The aim of this study is to know the prevalence and risk factors among the Saudi Population within Riyadh, Saudi Arabia.

METHODS
A descriptive cross-sectional study was conducted during the period from January 2022 to May 2022. The study was targeting the general population in Riyadh, Saudi Arabia. The data were collected from the participants using a structured online questionnaire which included participants' socio-demographic data, and participants' behavioral factors associated with pre-diabetes. The questionnaire was distributed to the participants using social media platforms. A total of 438 participants from the general population in Riyadh were included in the study.

DISCUSSION
Diabetes is increasingly becoming a global challenge. Despite the fact that type-2 diabetes can also be cured with certain lifestyle changes, prevention is preferable to symptomatic treatment.

Prior to the full-blown onset of diabetes, pre-diabetes develops.

This study indicates that individuals who are pre-diabetic may benefit from health education so that the disease's progression can be stopped or reversed once they have been identified.

This study ascertained a high prevalence of pre-diabetes in Saudi Arabia, which is consistent with the trend in neighboring nations like Oman, the United Arab Emirates, Kuwait, Qatar, and Bahrain.[1–3]

High income, the emergence of so-called "diseases of affluence," and the latter's growing influence on public health are the commonalities among these nations. High rates of obesity and smoking have likely will contribute to an increased pre diabetes. Given that it has been shown that the onset of diabetes is preceded by a reversible pre-diabetic state that is treatable, critical lifestyle interventions and modifications should be widely promoted to combat this rising trend. It would be more instructive to chart additional socio-demographic correlates in this regard.

To assess potential risk factors, a logistic regression model was employed to elucidate the association between pre-diabetes and certain socio-demographic and physiolog- ical parameters. Variables such as male gender, age group ($\geq$ 50), and indicators of psychosocial including marital status, BMI, smoking, family history of diabetes, co-existing and hyperglycemia indices were found to be strongly associated with a pre-diabetic state. Health education could significantly impact the number of pre-diabetics who have the means to adopt the lifestyle changes that are the most effective means of preventing its onset during the pre-diabetic stage.

As diabetes is frequently considered to be a disease of affluence because increased with high income level.[4]

Furthermore, health education can be helpful to address the pre-diabetes risk factors.

Study limitations.
To generalize the present findings comes with a number of restrictions. First, a cross-sectional study design may not always support conclusions that link risk factors to the pre-diabetes condition causally. Therefore, a long-term study would be more pertinent. Second, there were roughly 79% more female participants than male in the study, and the female response rate was higher.

Numerous studies have suggested that diabetes and hypertension are related. Although it was not possible to measure participants' blood pressure in the current study due to logistical constraints, future research should definitely consider including hypertension as a variable. Finally, the strength and generalizability of the findings may be impacted by the present analysis' omission of waist circumference measurements and participant occupation information. Future research should take these important factors into account to better understand their role in causing pre-diabetes.

Despite the warnings mentioned above, this is the the first study in the country at the scope of the pre-diabetes problem and its relationship to risk factors for the pre-diabetes. Given that men, the elderly, and those who are obese have the highest risk of developing pre-diabetes, systematic healthcare interventions aimed at these populations are advised to lessen the disease's burden. So that interventions with immediate effects on pertinent social and behavioral issues can be designed and implemented before the diabetes problem further expands in scope and severity, additional studies utilizing social and behavioral paradigms are required.

REFERENCES

1. Badran M, Laher I. Type II diabetes mellitus in Arabic-speaking countries. International journal of endocrinology, 2012 Oct; 2012.
2. Alqurashi KA, Aljabri KS, Bokhari SA. Prevalence of diabetes mellitus in a Saudi community. Annals of Saudi medicine, 2011 Jan; 31(1): 19-23.
3. Al Mansour MA. The prevalence and risk factors of type 2 diabetes mellitus (DMT2) in a semi-urban Saudi population. International journal of environmental research and public health, 2020 Jan; 17(1): 7.
4. Abou-Gamel M, Abdul-Nassir M, Rajeh A, Makhdoom A, Surrati A, Kateb A, Albouq F. The prevalence of diabetes mellitus among working personnel in the faculty of science, Taibah University, Almadinah Almunawwarah, KSA. Journal of Taibah University Medical Sciences, 2014 Mar 1; 9(1): 85-8.
5. Jadhav RA, Hazari A, Monterio A, Kumar S, Maiya AG. Effect of physical activity intervention in prediabetes: a systematic review with meta-analysis. Journal of Physical Activity and Health, 2017 Sep 1; 14(9): 745-55.
6. Khan RM, Chua ZJ, Tan JC, Yang Y, Liao Z, Zhao Y. From pre-diabetes to diabetes: diagnosis, treatments and translational research. Medicina, 2019 Aug 29; 55(9): 546.
7. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, Colagiuri S, Guariguata L, Motala AA, Ogurtsova K, Shaw JE. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas. Diabetes research and clinical practice, 2019 Nov 1; 157: 107843.
8. Aldossari KK, Aldiab A, Al-Zahrani JM, Al-Ghamdi SH, Abdelrazik M, Batais MA, Javad S, Nooruddin S, Razzak HA, El-Metwally A. Prevalence of prediabetes, diabetes, and its associated risk factors among males in Saudi Arabia: a population-based survey. Journal of diabetes research, 2018 Apr 24; 2018.
9. Beulens JW, Rutters F, Ryden L, Schnell O, Mellbin L, Hart HE, Vos RC. Risk and management of pre-diabetes. European journal of preventive cardiology, 2019 Dec 1; 26(2_suppl): 47-54.
10. Siddiqui S, Zainal H, Harun SN, Ghadzi SM, Ghafoor S. Gender differences in the modifiable risk factors associated with the presence of prediabetes: A systematic review. Diabetes & Metabolic Syndrome: Clinical Research & Reviewsm, 2020 Sep 1; 14(5): 1243-52.
11. Linssen PB, Veugen MG, Henry R, van Der Kallen CJ, Kroon AA, Schram MT, Rocca BL, Stehouwer

CD. Associations of (pre) diabetes with right ventricular and atrial structure and function: the Maastricht Study. Cardiovascular Diabetology, 2020 Dec; 19(1): 1-2.

12. Bahijri SM, Jambi HA, Al Raddadi RM, Ferns G, Tuomilehto J. The prevalence of diabetes and prediabetes in the adult population of Jeddah, Saudi Arabia-a community-based survey. PloS one, 2016 Apr 1; 11(4): e0152559.

13. Al-Zahrani JM, Aldiab A, Aldossari KK, Al-Ghamdi S, Batais MA, Javad S, Nooruddin S, Zahid N, Razzak HA, El-Metwally A. Prevalence of prediabetes, diabetes and its predictors among females in Alkharj, Saudi Arabia: a cross-sectional study. Annals of Global Health, 2019; 85(1).

14. Aldossari KK, Shubair MM, Al-Zahrani J, Alduraywish AA, AlAhmary K, Bahkali S, Aloudah SM, Almustanyir S, Al-Rizqi L, El-Zahaby SA, Toivola P. Association between chronic pain and diabetes/prediabetes: a population-based cross-sectional survey in Saudi Arabia. Pain Research and Management, 2020 Oct; 2020.

15. Mabry RM, Reeves MM, Eakin EG, Owen N. Gender differ-ences in prevalence of the metabolic syndrome in Gulf Cooperation Council Countries: a systematic review. Diabet Med, 2010; 27: 593–7.

16. Al-Daghri NM, Al-Attas OS, Al-Rubeaan K, Mohieldin M, Al- Katari M, Jones AF, et al. Serum leptin and its relation to anthropometric measures of obesity in pre-diabetic Saudis. Cardiovasc Diabetol, 2007; 6: 18.

17. Bener A, Zirie M, Janahi IM, Al-Hamaq AO, Musallam M, Wareham NJ. Prevalence of diagnosed and undiagnosed diabetes mellitus and its risk factors in a population-based study of Qatar. Diabetes Res Clin Pract, 2009; 84: 99–106.

18. Ganguly SS, Al-Lawati A, Al-Shafaee MA, Duttagupta KK. Epidemiological transition of some diseases in Oman: a situational analysis. World Hosp Health Serv, 2009; 45: 26–31.