



Review

Dynamics of diabetes and obesity: Epidemiological perspective[☆]Annette Boles^{a,*}, Ramesh Kandimalla^{b,d,**}, P. Hemachandra Reddy^{a,b,c,d,e,f,g}^a Community Outreach and Education, 6630 S. Quaker Ave., Suite E, Lubbock, TX 79413, United States^b Garrison Institute on Aging, Texas Tech University Health Sciences Center, 3601 4th Street, MS 9424, Lubbock, TX 79430-9424, United States^c Department of Cell Biology & Biochemistry, Texas Tech University Health Sciences Center, 3601 4th Street, Lubbock, TX 79430-9424, United States^d Department of Pharmacology & Neuroscience, Texas Tech University Health Sciences Center, 3601 4th Street, Lubbock, TX 79430-9424, United States^e Department of Neurology, Texas Tech University Health Sciences Center, 3601 4th Street, Lubbock, TX 79430-9424, United States^f Speech, Language and Hearing Sciences Departments, Texas Tech University Health Sciences Center, 3601 4th Street, Lubbock, TX 79430-9424, United States^g Department of Public Health, 3601 4th Street, MS 9424, Lubbock, TX 79430-9424, United States

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ABSTRACT

The purpose of this review article is to understand the current literature on obesity, diabetes and therapeutic avenues across the world. Diabetes is a chronic lifestyle condition that affects millions of people worldwide and it is a major health concern in our society. Diabetes and obesity are associated with various conditions, including non-modifiable and modifiable risk factors. Early detectable markers are not well established to detect pre-diabetes and as a result, it becomes diabetes. Several published epidemiological studies were assessed and the findings were summarized. Resources from published studies were used to identify criteria used for pre-diabetes, the role of diet in pre-diabetics and potential risks and characteristics associated with pre-diabetes. Preventive strategies are needed to combat diabetes. Individuals diagnosed with pre-diabetes need detailed education, need to fully understand the risk factors and have the ability to manage diabetes. Interventions exist that include chronic disease self-management programs, lifestyle interventions and pharmacological strategies. Obesity plays a large role in causing pre-diabetes and diabetes. Critical analysis of existing epidemiological research data suggests that additional research is needed to determine the efficacy of interventions. This article is part of a Special Issue entitled: Oxidative Stress and Mitochondrial Quality in Diabetes/Obesity and Critical Illness Spectrum of Diseases - edited by P. Hemachandra Reddy.

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Abbreviations: AD, Alzheimer's disease; A β , beta amyloid; ApoE4, apolipoprotein E4 genotype; T2DM, type 2 diabetes mellitus; GSK3 β , glucose synthase kinase 3 beta; Drp1, dynamin-related protein1; ROS, reactive oxygen species; WHO, World Health Organization; ADA, American Diabetes Association; PCOS, polycystic ovary syndrome; HLA, human leukocyte antigen; GDM, gestational diabetes mellitus; FTO, fat mass and obesity; PUFA, poly unsaturated fatty acids; SFA, saturated fatty acids; GIPR, gastric inhibitory polypeptide receptor; VOO, virgin olive oil; IL-6, interleukin 6; BMI, body mass index; HbA1C, glycosylated hemoglobin A1C; FPG, fasting blood glucose; OGTT, oral glucose tolerance test; PPAR- γ , peroxisome proliferator-activated receptor gamma; IGT, impaired glucose tolerance test; WAT, white adipose tissue.

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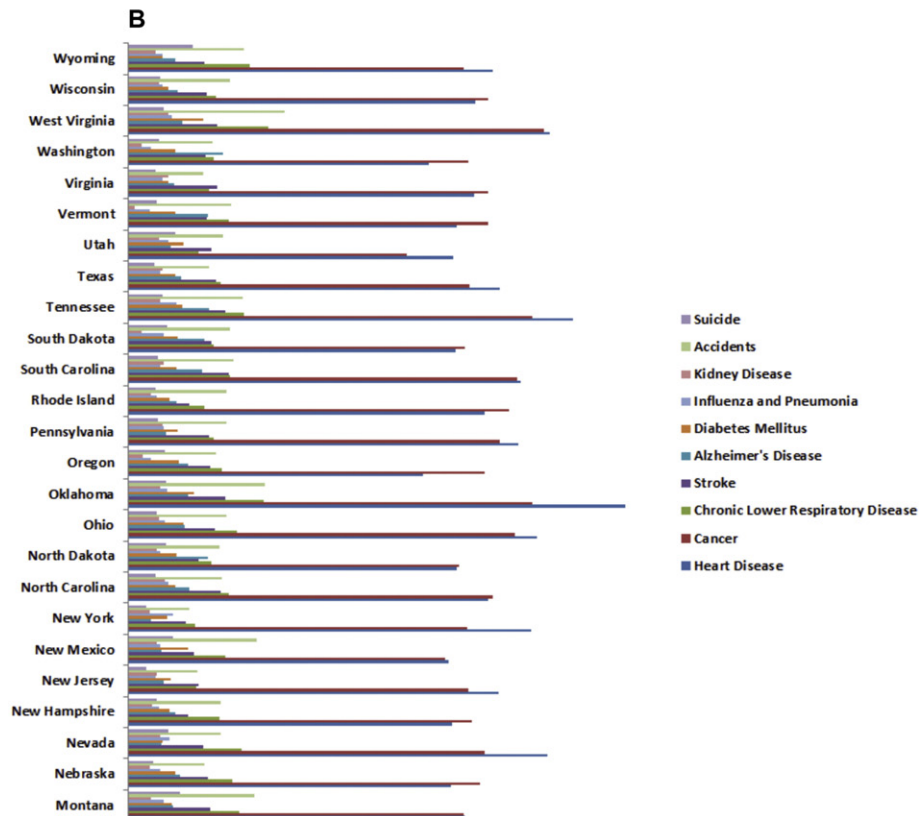
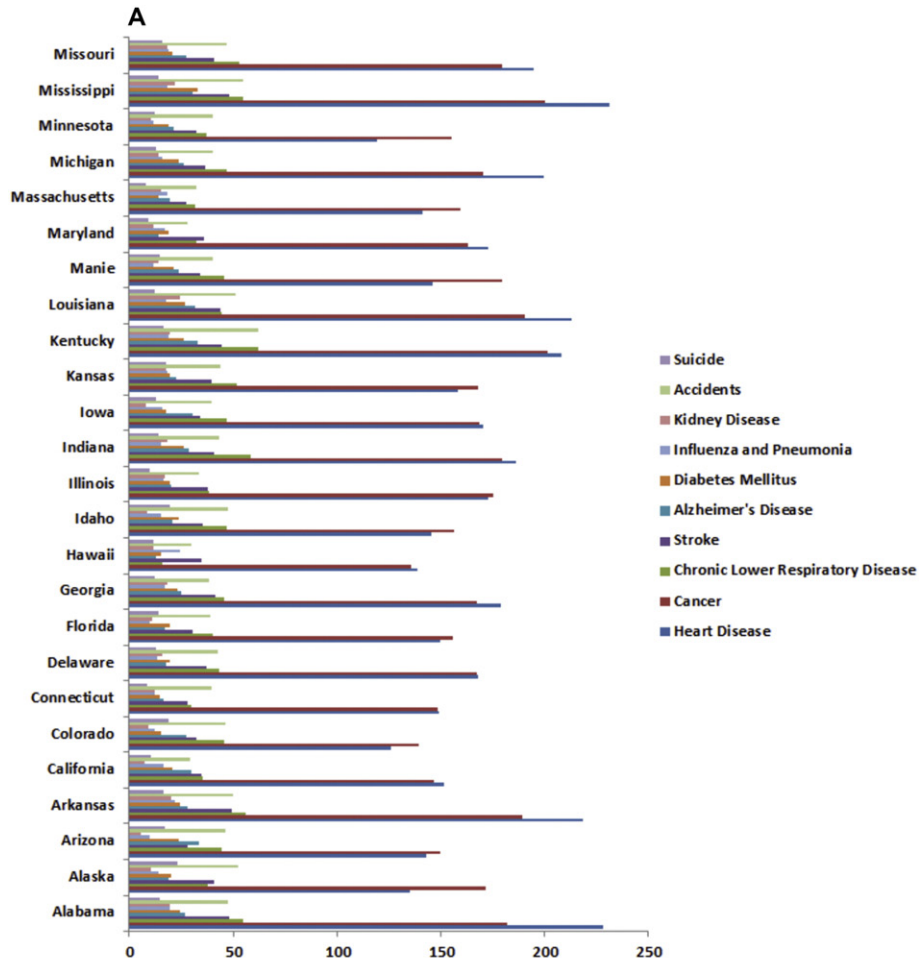
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1. Introduction

When an individual's blood glucose levels are higher than normal levels can be termed as pre-diabetes in that individual; however, blood glucose levels do not meet the standard to be classified as diabetes. In the United States, 37% of the population or 86 million adults have pre-diabetes [1–3]. Of those that have pre-diabetes, only 11% of the population is aware of the condition [4]. Individuals diagnosed with pre-diabetes need to understand the difference between a diagnosis of pre-diabetes and diabetes. Education is essential to help prevent persons that are in the pre-diabetes stage from having diabetes [5]. Understanding the long-term effects of diabetes and the types of diabetes an individual can develop can help individuals better understand why prevention of the disease is important [6].

According to the International Diabetes Foundation (IDF) every 6 s one person dies of diabetes [7,11]. In 2012, diabetes caused 1.5 million deaths (WHO Executive Summary) and ranked 6th overall in related deaths worldwide [8] (CDC; see Fig. 1). In Texas, diabetes ranked 6th overall in related deaths (Fig. 1). Worldwide 415 million people have been diagnosed with diabetes according to the IDF. It is projected to increase to over 600 million people by 2040. In the United States, alone,



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