Original Article

Burden of diabetes among various ethnic minorities in US and its implications

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ABSTRACT

Introduction: Diabetes is one of the major healthcare issues worldwide. The average prevalence of diabetes was 11.7% in adults between 20-79 years of age in the US in 2011. This is a brief review of diabetes etio-pathogenesis and prevalence amongst various ethnic groups in the US. **Materials and Methods:** A pubmed search was done using key words diabetes, minorities and prevalence on September 15 2013. Relevant studies were selected for further review. In addition, more information was obtained from CDC websites. **Discussion:** As per CDC fact sheet 2011, 11.3% of all US adults ≥20 years of age had diabetes. 7.1% of non-Hispanic Whites, 8.4% of Asian Americans, 11.8% of Hispanics, and 12.6% of African-Americans (non-Hispanic Blacks) had diabetes in adults ≥20 years of age. Overall, 26.9% of adults of ≥65 years of age had diabetes in 2010. Amongst Native Indians, the prevalence ranges from 5.5% in Alaska natives to 33.5% amongst natives in Arizona. For immigrant south Asian population to the US (India, Pakistan, Nepal, Bangladesh and Sri Lanka), the prevalence has been documented to be varying from 17% to 29%. The wide variation in prevalence of diabetes poses a tough challenge to confine the epidemic as the measures have to be tailored to the needs of different race and ethnic groups. **Conclusion:** As these ethnic groups continue to grow, management of diabetes in these minorities confers a major health issue in the US.

Key words: Diabetes, ethnic minorities, prevalence, social factors and implications

INTRODUCTION

Diabetes is one of the major health care issues world-wide, more so in the western world. With diabetes comes a host of other cardiovascular comorbidities. This disease has been rising at an alarming rate over past few decades. According to International Diabetes Federation about 37.7 million people with diabetes lived in North America and Caribbean region in 2011 and this population was expected to increase to 51.2 million by 2030. The average prevalence was 11.7% in adults between 20 and 79 years of age. The biggest contributing factor was aging population in the US and Canada. Diabetes is responsible for 13.8% of all deaths in this region. US has one of the highest number of deaths due to diabetes of any country in the world.[1]

In this brief communication, we summarize etiopathogenesis and prevalence of diabetes amongst various ethnic groups in the US. Extensive knowledge of this distribution is especially important in a country like US, which is composed of a wide variation of races and ethnicities. In addition, it also affects various health care policies and it predicts resource utilization at community and individual level.

MATERIALS AND METHODS

A PubMed search was done using key words diabetes, minorities and prevalence on September 15, 2013. Relevant studies were selected for further review. In addition, more information was obtained from Center for Disease Control and Prevention (CDC) websites. It was noted that definition of diagnosing diabetes was different

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amongst various studies. Studies from 1990s have used a cutoff of fasting plasma glucose (FPG) of ≥126 mg/dL and oral glucose tolerance test (OGTT) (≥200 mg/dL) as the standard definition of diabetes. More recent studies have used the latest definition approved by American Diabetes Association (ADA) in 2010 of using hemoglobin A1c ≥6.5% as the method of diagnosis in addition to standard definitions.[2,3] Some of the variation in the census can be explained by this as the pathogenesis of diabetes is different amongst different ethnic groups. For example, insulin deficiency leading to impaired glucose tolerance is more prominent in non-obese ,4.8% by Asian Americans. The rest 70% is constituted by White Americans.[4-6]

Studies have been carried out by various government agencies including CDC, the Indian Health Services, National Patient Information Reporting System, National Institute of Health, National Health and Nutrition Examination System (NHANES) and Behavioral Risk Factor Survey System. Ways for collection of data collection has also varied amongst these studies. They have ranged from self-reported cases, physician diagnosed, Medicare database, Indian health database, internet based questionnaires to paper questionnaires. Limitations of studies were based on the way which was used to collect data. Sample size has varied from 35 to 185,000 patients.[2,7,8]

Burden of diabetes in minorities

As per ADA, the number of diabetic patients will double by 2050 in the US. Prevalence of diabetes varies greatly in US amongst different regions, race and ethnicities. Studies have shown this disparate distribution of diabetes in US to a large extent. They have shown a consistent pattern of rise in prevalence amongst all racial groups in US. Some of the facts from different population census are mentioned below.

As per latest data released by CDC fact sheet 2011, 36.3% of population is constituted by racial minority groups. Out of this, approximately 16.7% of the U.S. total population is of Hispanic origin making it the nation's largest ethnic or race minority. Nearly 12.8% of population was constituted by African-Americans (non-Hispanic Blacks), 4.8% by Asian Americans. The rest 70% is constituted by White Americans. 11.3% of all US adults ≥20 years of age had diabetes. On further breakdown, 7.1% of non-Hispanic Whites, 8.4% of Asian Americans, 11.8% of Hispanics and 12.6% of non-Hispanic Blacks had diabetes in adults ≥20 years of age. Overall, 26.9% of adults of ≥65 years of age had diabetes in 2010.[9]

As mentioned above, African Americans are one of the largest minority groups in the US. An interesting pattern is the change in the prevalence of diabetes over last many years in this subgroup. The increase in age adjusted diabetes prevalence from 1995 to 2010 was 82.2%, which varied amongst different regions in the US. The maximum increase was seen in southern states (104%).[8] The population distribution in these states also has higher distribution of blacks varying from 21% to 49%. Similar pattern is seen in distribution of obesity by various states.[10]

According to NHANES III, the prevalence of diabetes between 1988 and 1994 was estimated to be about 5.1% of all US adults ≥20 years of age. This prevalence was calculated based on FPG and OGTT criteria. There was no significant sex difference. Overall for adults ≥20 years of age, non-Hispanic Blacks, Mexican-Americans and non-Hispanic Whites had prevalence rates of 6.9%, 5.6% and 5.0% respectively. Age adjusted rates showed increased prevalence with increasing age with the highest rate in Mexican-American women between 60 and 74 years (25%). For the entire population, it ranged from 1.6% in 20-39 years of age to 21.1% in 60-74 years of age. This pattern was consistent amongst all the races.[11]

The total population of Native Indians is about 5.1 million as per a survey done in 2011. Amongst them, the prevalence ranges from 5.5% in Alaska natives to 33.5% amongst natives in Arizona. This prevalence is considered one of the highest in the world. Overall, 16.1% had diagnosed diabetes amongst Native Indian population in US. For Native Indians youth aged 10-19 years, the rate of new cases was higher for type 2 diabetes than type 1 diabetes as compared to non-Hispanic white youth where the opposite was true.[5] A fascinating study was published in 2009 which showed that 10.2% of Japanese and 16.1% of Native Hawaiians had self-reported rates of diabetes compared to 6.3% of non-Hispanic Whites. In this study, of all the ethnic groups, Japanese had the lowest body mass index (BMI) 23.9 kg/m^2 and native Hawaiians had the highest BMI of 28.49 kg/m^2. According to their analysis, BMI affected diabetes prevalence less amongst the non-Caucasian population.[12]

For immigrant south Asian population to US (India, Pakistan, Nepal, Bangladesh and Sri Lanka), the prevalence has been documented to be varying from 17% to 29% respectively. However, these are from very small single center studies sporadic studies. This is again, in spite of the fact that they have lower BMI compared to Caucasians.[13-18]

Discussion

The wide variation in distribution of diabetes is a result of different medical, social, cultural, ethical and genetic factors. For the purpose of this article, we will focus on the social and cultural aspect of the disease. African-American ($38409) and Hispanic families ($39730) have significantly lower median annual income in USD in 2009 as per census released by CDC compared to Whites ($62545).[19] This drives families to buy unhealthier food which are often cheaper. Cultural practices also guide cooking methods. For many African-American, frying is a preferred method as it is less time consuming. Traditional Mexican diet is also high in fat and low in fiber. However, even after adjustment for socio-economic factors, African-American have higher risk of developing diabetes which has been attributed to in interplay of some genetic factors.

Role of life-styles changes, dietary habits, communication barriers and traditional medicines have been implicated for high prevalence of diabetes in Native Indian tribes.[20]

Interesting pattern has been noticed with immigrant Indians living in US. Traditional diet consisting of high fiber has been noticed to get transformed into low fiber, high fat western diet. The change has been noticed to be directly related to length of stay in US. However, contradictory results have also been shown.[21] As per a study, Asian Indians with stronger traditional beliefs have higher carbohydrate intake in accordance with serving Indian sweets on various occasions, feeding ghee to pregnant females and less focus on physical activities.[13] This in addition to "lean-fat" concept puts them at much higher risk of developing diabetes. Western diet and environmental factors also play an important role in the pathogenesis as evident by 2 fold increase in diabetes prevalence amongst Japanese population living in California compared to Hiroshima.[22]

The immigrant population is steadily increasing in US from 1970 and has reached about 13% of total population. The majority of these immigrants belong to these aforementioned high risk ethnic groups. In addition, many of illegal immigrants do not have access to complete health care. These wide variations in epidemiology transition into a major health care expense for this region. The expense was estimated to be almost half of the world's total expenditure on diabetes. In US, more than 70% of health care expenditure is on management of chronic diseases. As per ADA, the cost of diabetes in US is $245 billion when compared to $174 in 2007. This includes $174 billion in direct medical costs.[23]

Conclusion

The wide variation in prevalence of diabetes poses a tough challenge to confine the epidemic as the measures have to be tailored to the needs of different race and ethnic groups. They have to be socially and culturally acceptable at the same time to increase compliance. US Government has initiated many programs such as National Diabetes Education Program and HOPE catering to Native Indian tribes. Specific programs are formulated which focus on meal planning, physical activity planning, education and culturally appropriate print materials. Nutrition fairs and diabetes awareness walks are organized from time to time. Many drugs for diabetes, blood pressure and cholesterol management have already been put on 4$ prescription to ensure widespread availability. Buying insulin does not even need a prescription. Extensive education material is available online on ADA and American Association of Clinical Endocrinologists (AACE) website for patients and clinicians free of cost. An interesting article on obesity management suggests very useful cost conscious methods, which can be easily extrapolated to diabetes even in a developed country like US.[24] As these ethnic groups continue to grow, management of diabetes in these minorities confers a major health issue. We need more customized and focused methods of health care and research for them.

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