

Adults with Type 2 Diabetes Mellitus and Hypertension and Obesity: Prevalence and Distinguishing Characteristics

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BACKGROUND

- It is well documented that diabetes is a prevalent and costly disease^{1,2}
- Adults with type 2 diabetes mellitus are likely to have other health conditions that may adversely impact their health status and glycemic control^{3,4}
- Hypertension, obesity, cigarette smoking, and hyperlipidemia act as independent modifiable contributors to CVD in patients with diabetes⁵
- Current ADA standards of medical care aim to reduce the vascular complications through control of glycemia, blood pressure, and blood lipids.⁶ However, little attention has been paid to identifying and characterizing individuals with T2DM and hypertension and obesity

OBJECTIVE

- To estimate the prevalence of self-reported T2DM with HTN and obesity and compare these individuals with adults with T2DM alone

METHODS

STUDY DESIGN

- Cross-sectional analysis among SHIELD respondents with T2DM with or without HTN and obesity
- Study to **H**elp **I**mprove **E**arly evaluation and management of risk factors **L**eading to **D**iabetes (SHIELD), a 5-year population-based survey conducted to better understand the risk for the development of diabetes, as well as disease burden
 - Based upon a screening questionnaire mailed to 200,000 nationally representative households, responses for 211,097 adults from 127,420 households were obtained (64% response rate)
 - A baseline survey was sent to 22,001 selected individuals derived from the screening respondents. Since 2005, annual SHIELD surveys have captured self-reported information on health status, attitudes and behaviors, quality of life, and anthropometry from this representative sample of the US population
 - The 2008 survey collected information from 14,921 individuals (71% response rate) to identify those with the triad conditions (T2DM, HTN, obesity)

METHODS (Continued)

STUDY POPULATION

- Respondents were 18 years of age or older
- Self-reported diagnosis of T2DM was based on being “told by a doctor, nurse or other healthcare professional that you have type 2 diabetes”
- Among the T2DM sample, two cohorts were identified:
 - Those reporting comorbid HTN and obesity
 - Those without a self-report of HTN and obesity

Study Measures

- Respondents reported a diagnosis of HTN based on being told by a healthcare professional that they had high blood pressure or HTN
- Obesity was defined as a BMI ≥ 30 kg/m²
- Respondents had to have a self-reported diagnosis of T2DM and HTN and BMI ≥ 30 kg/m² to be included in the triad condition group. Respondents with a self-reported diagnosis of T2DM and no self-reported diagnosis of HTN and BMI < 30 kg/m² were classified into the T2DM alone group
- Comorbid conditions were self-reported based on survey questions of being told by a healthcare professional that they had the condition

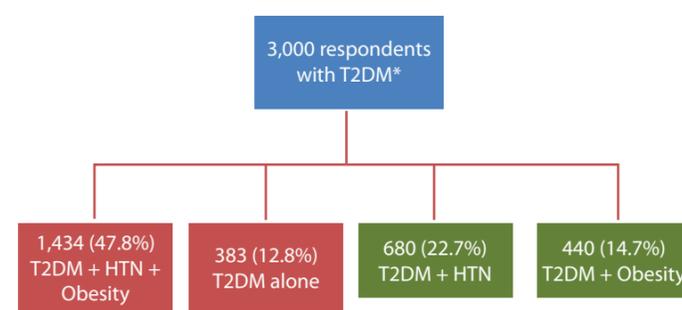
STATISTICAL ANALYSES

- Comparisons between the triad condition group and the T2DM alone group were conducted using chi-square test for categorical variables and *t*-tests for continuous variables
- Statistical significance was set *a priori* as $p < 0.05$

RESULTS

Prevalence of T2DM, hypertension, and obesity

Figure 1. SHIELD respondents with T2DM and other comorbid conditions



RESULTS (Continued)

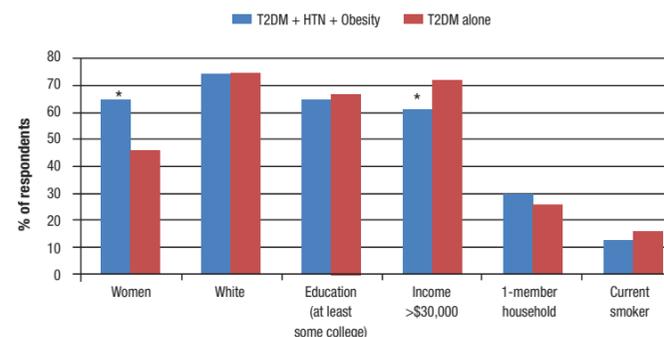
There were 3,000 respondents with T2DM regardless of other health conditions (Figure 1). Subgroups are mutually exclusive

- 47.8% (n = 1,434) of these respondents also had HTN and were obese; thus, the triad conditions were prevalent
- 12.8% (n = 383) of these respondents had T2DM alone
- Respondents with either HTN or obesity, but not in combination, were not included in the analysis
- For 63 respondents*, a BMI could not be calculated because of missing data; these respondents were excluded from the analysis

Comparison of respondents with triad conditions vs. T2DM alone

- Mean age was 61.4 years for respondents with the triad conditions and 66.2 years for respondents with T2DM alone ($p < 0.01$)

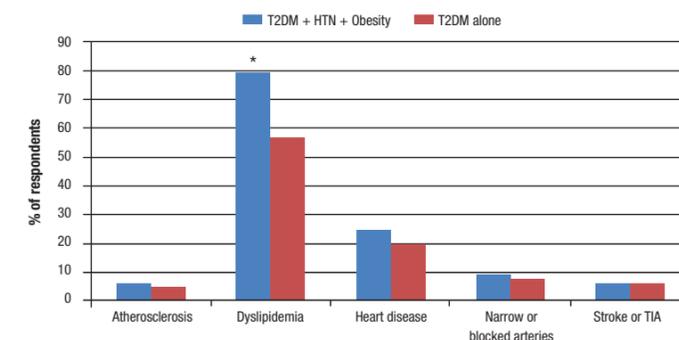
Figure 2. Demographic characteristics of respondents with triad conditions or T2DM alone



* $p < 0.01$

- Respondents with the triad conditions were younger, more often women, and had lower household income than respondents with T2DM alone ($p < 0.01$) (Figure 2)
- Respondents with the triad conditions were similar to respondents with T2DM alone in race, education, household size, and smoking status
- Mean number of comorbid conditions, excluding T2DM, HTN, and obesity, was 6.6 conditions for respondents with the triad conditions and 4.0 conditions for respondents with T2DM alone ($p < 0.01$)

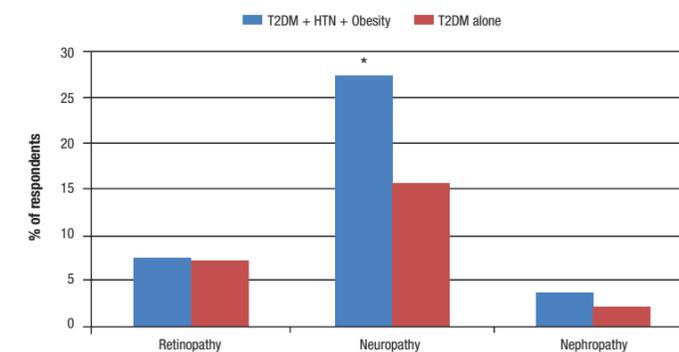
Figure 3. Comorbid conditions among respondents with the triad conditions or T2DM alone



* $p < 0.01$

- More respondents with the triad conditions had dyslipidemia than respondents with T2DM alone ($p < 0.01$) (Figure 3)
- Respondents with the triad conditions were similar ($p > 0.05$) to respondents with T2DM alone in self-reported diagnosis of atherosclerosis, heart disease, narrow or blocked arteries, and stroke or TIA

Figure 4. Diabetes complications among respondents with the triad conditions or T2DM alone



* $p < 0.01$

Retinopathy defined as self-report of eye disease, retinopathy, or blindness. Neuropathy defined as self-report of nerve problems of hands or feet involving pain, tingling, numbness, foot ulcers, or amputation. Nephropathy defined as self-report of chronic kidney disease, dialysis, end-stage kidney disease, kidney transplant, or protein in urine. Respondents could have more than one complication and were counted for each complication.

- More respondents with the triad conditions had neuropathy than respondents with T2DM alone ($p < 0.001$) (Figure 4)
- Respondents with the triad conditions were similar ($p > 0.05$) to respondents with T2DM alone in self-reported retinopathy and nephropathy

LIMITATIONS

- Diagnosis of diabetes, HTN, other comorbid conditions or complications, and weight were self-reported and could not be validated with medical record review or administrative claims data. However, this bias is similar between the groups compared in this study
- Household panels, like the SHIELD study, tend to under-represent the very wealthy and very poor segments of the population and do not include military or institutionalized individuals

SUMMARY

- Prevalence of T2DM with both HTN and obesity was very high, almost 50%
- Respondents with the triad of conditions were distinguishable from respondents with T2DM alone in age, gender, annual income, dyslipidemia, and neuropathy
- Respondents with the triad of conditions may be candidates for comprehensive disease management of the multiple comorbidities

References

- King H, et al. *Diabetes Care* 1998;21:1414–1431
- Senemari B. *Caring* 2005;24:6–12
- Saydah SH, et al. *JAMA* 2004;291:335–342
- Grant RW, et al. *Diab Med* 2004;21:150–155
- Grundy SM, et al. *Circulation* 1999;100:1134–1146
- ADA. Standards of Care. *Diabetes Care* 2010;33(Suppl 1):S11–S61

LIST OF ABBREVIATIONS

ADA	American Diabetes Association
BMI	Body mass index
CVD	Cardiovascular disease
HTN	Hypertension
SHIELD	Study to Help Improve Early evaluation and management of risk factors Leading to Diabetes
T2DM	Type 2 diabetes mellitus
TIA	Transient ischemic attack

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