Prevalence of Hypertension and/or Obesity in Patients With Type 2 Diabetes Mellitus Throughout the World: A Systematic Literature Review

Ann D Colosia,1 Roberto Palencia,2 Shahnaz Khan1

1RTI Health Solutions, Research Triangle Park, NC, United States; 2Boehringer Ingelheim GmbH, Ingelheim, Germany

BACKGROUND

- Type 2 diabetes mellitus (T2DM) is a disorder of the metabolism characterized by irreversible changes in the liver's insulin production and progressive insulin resistance.
- An estimated 90% of diabetes cases are T2DM.
- Hypertension (HTN) and obesity14,15 increase the risk of long-term vascular complications of T2DM, including stroke, chronic kidney disease, heart disease, peripheral vascular disease, and death.
- Hypertension and obesity are often seen together, especially in people with T2DM.
- Hypertension and obesity may coexist but have been documented throughout the world.14
- The prevalence of diabetes in adults was approximately 364 million in 2011 to 552 million in 2030, due to increasing prevalence of T2DM in every country.20

METHODS

Study Selection (Figure 3)

- A systematic literature review of PubMed, Embase, and Cochrane Library (including the National Health Service Economic Evaluation Database (NHS EED), 1996-2012) for articles related to T2DM plus hypertension and/or obesity (English, 2001-2011).21
- Two searches were conducted:
  - Search 1 was conducted July 25, 2011 (PubMed, Embase, and NHS EED), and August 2, 2011 (Cochrane Library without NHS EED).
  - Search 2 was conducted February 3, 2012 (all databases).
- Search strategies used a combination of medical subject heading (MeSH) terms and keywords for the disease and its complications as well as antihypertensive medications.
- Additionally, bibliographies of included studies were examined.

Inclusion and Exclusion Criteria

Inclusion criteria:

- Observational studies that presented prevalence rates for hypertension and/or obesity in patients with T2DM.

Exclusion criteria:

- The study did not present prevalence rates specifically for patients with T2DM.
- The T2DM population was defined by having another chronic illness, such as cancer or other chronic disease conditions.
- The study was not reported in English.
- The study was published prior to 2001.

RESULTS

- A total of 2,688 abstracts were screened (Figure 1).
- Three studies of specific subanatomizations of hypertension (e.g., isolated hypertension) were omitted, leaving 85 studies for inclusion in this review (Table 1).

Prevalence of Hypertension Among Patients With T2DM

- Among the reviewed studies, hypertension was defined by blood pressure at or above 140/90, 130/85, and 130/80 mmHg or the use of antihypertensive medications.

- Figure 2 shows the prevalence rates of hypertension by the regions alphabetically, with countries within a region ranked by the highest estimate.

Prevalence of Obesity Among Patients With T2DM

- In all regions, the percentage for defining obesity by body mass index (BMI) was 30 kg/m2, except in a few studies, in which the cutpoint was 25 kg/m2.12,14,16

- For waist circumference (WC), obesity was most commonly defined by measurements of at least 88 cm for women and at least 102 cm for men in Africa,6,36 Asia,2,44 Africa,10,45 and Europe.23

- For waist-to-hip ratio (WHR), the cutoffs for obesity were: WHR > 0.85 for women and > 0.90 for men.15

- Figure 3 shows the prevalence rates by the obesity groups alphabetically, with countries within a region ranked by the highest estimate. Obesity was determined by BMI, WC, WHR (all databases) or BMI, WC, or WHR.

Prevalence of Hypertension and Obesity Among Patients With T2DM

- Figure 4 shows the prevalence rates of hypertension and obesity by the regions alphabetically, with countries within a region ranked by the highest estimate.

- Obesity was determined by BMI or WC. Hypertension was defined by blood pressures at or above 144/83, 140/90, 130/85, and 130/80 mmHg or the use of antihypertensive medications.

LIMITATIONS

- Interpretation of the findings in this review is limited by the lack of representativeness for some subpopulations.
- For example, there were no studies in Canada or Russia in many countries in this analysis.
- Few studies were identified for China, although it is the country with the lowest absolute number of patients with diabetes mellitus.
- Possible explanations for these gaps are:
  - This was a systematic review, and the studies retrieved were selected based on eligibility criteria.
  - The search was limited to studies in English, and regionally relevant epidemiology studies may be published in the native language for that region.

- Studies of metabolic syndrome in patients with T2DM were not included, unless the abstract indicated that the components of the syndrome were analyzed separately. Excluded studies of metabolic syndrome may have contained prevalence data not referred to the abstract.

CONCLUSIONS

- The ranges of prevalence rates for hypertension or obesity were broad for many of the regions. The variations in rates within a region may be due to data collection methods.
- Most of the studies reported hypertension rates well above 50%, with rates exceeding 75% in many of the studies.
- Only Asia had countries (Iran, India, Japan) with maximum hypertension rates, with rates exceeding 80% in many of the studies.
- Obesity rates were well above 30% in most of the studies.
- Only a few studies reported the combination of hypertension and obesity among patients with T2DM, but most found rates of 50% or higher.
- Among obese adults, hypertension rates were above 70% in Asia and above 60% in Europe.

CONTACT INFORMATION

Ann D Colosia, PhD
Senior Associate, Market Access and Outcomes Strategy
RTI Health Solutions
Phone: +1 919 454 2638
Fax: +1 919 454 3742
E-mail: anncolosia.org

Table 1. Number and Size of Studies Reporting Prevalence Data by Region:

<table>
<thead>
<tr>
<th>Region</th>
<th>Inclusion of Studies (n)</th>
<th>Prevalence of T2DM (%)</th>
<th>Prevalence of HTN (%)</th>
<th>Prevalence of Obesity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>21 (n = 11)</td>
<td>36.9% (95.0%)</td>
<td>63.4% (69.0%)</td>
<td>22.1% (18.9%)</td>
</tr>
<tr>
<td>Europe</td>
<td>40 (n = 21)</td>
<td>34.3% (83.9%)</td>
<td>57.9% (78.07%)</td>
<td>51.2% (49.9)</td>
</tr>
<tr>
<td>North</td>
<td>19 (n = 5)</td>
<td>38.6% (49.9)</td>
<td>50.0% (50.7)</td>
<td>42.0% (47.7)</td>
</tr>
<tr>
<td>South</td>
<td>28 (n = 2)</td>
<td>40.6% (65.0)</td>
<td>50.0% (49.9)</td>
<td>50.0% (47.7)</td>
</tr>
<tr>
<td>Asia</td>
<td>47 (n = 27)</td>
<td>36.9% (49.9)</td>
<td>57.9% (65.0)</td>
<td>51.2% (50.7)</td>
</tr>
</tbody>
</table>

Figure 1. PRISMA Flow Diagram of Review and Inclusion/Exclusion

Figure 2. Hypertension Prevalence Rates Among Patients With Type 2 Diabetes Mellitus by Region and Country

Figure 3. Prevalence of Obesity Among Patients With T2DM by Region and Country

Figure 4. Prevalence of Hypertension and Obesity in Adults With T2DM by Region and Country

Abstract PDB15: ISPOR 15th European Conference; Berlin, Germany; 3–7 November, 2012