ACKNOWLEDGMENTS

Conflict of Interest: The editor in chief has reviewed the conflict of interest checklist provided by the authors and has determined that the authors have no financial or any other kind of personal conflicts with this paper. This work was supported by a Mitsui Sumitomo Insurance Welfare Foundation Research Grant 2011.

Author Contributions: Kong: study concept and design, data collection and analysis, interpretation of results, preparation of letter. Chua: subject recruitment, laboratory data collection and analysis, review and revision of letter. Sim: field data collection and analysis, review and revision of letter. Ooi: field data collection and analysis, laboratory data collection and analysis, review and revision of letter. Sim: field data collection and analysis, review and revision of letter.

Sponsor’s Role: The sponsor did not play any role in the design, execution, analysis, interpretation of data, or writing of the study.

REFERENCES

5. Asher L, Aresu M, Falaschetti E et al. Most older pedestrians are unable to cross the road in time: A cross-sectional study. Age Ageing 2012;41:690–694.

A STANDARD INTERNATIONAL VERSION OF THE DRUG BURDEN INDEX FOR CROSS-NATIONAL COMPARISON OF THE FUNCTIONAL BURDEN OF MEDICATIONS IN OLDER PEOPLE

To the Editor: Exposure to drugs with anticholinergic and sedative effects is associated with adverse drug events and with impaired physical and cognitive performance in older people.2,3 In 2007, the Drug Burden Index (DBI) was developed for measuring total exposure to anticholinergic and sedative drugs, modeled as:3

\[ DBI = \sum \frac{D}{\delta + D} \]

where D is the daily dose, and \( \delta \) is the recommended minimum daily dose as approved by the U.S. Food and Drug Administration (FDA).

Several studies have shown that a higher DBI score is associated with poorer functional and physical performance in community-dwelling older people and with higher risk of falls in residents of long-term care facilities.4–7 DBI has also been used to assess the effect of pharmacists’ recommendations on improvement of prescribing practices.8 Therefore DBI could be used as a clinical tool to reduce anticholinergic and sedative exposure in older adults.

International comparison of DBI scores is difficult because dosages and indications may vary from one country to another, so \( \delta \) is redefined according to local context. To allow a comparison of DBI across countries, a calculation is proposed using a common \( \delta \) to represent the defined daily dose (DDD), the assumed average maintenance dose per day for a drug used for its main indication in adults, as defined by the World Health Organization (WHO). DDI is a compromise based on a review of the available information, including doses used in various countries.9

A study aimed at assessing exposure to anticholinergic and sedative medications of older adults during hospitalization was conducted. The study cohort included 337 individuals aged 85 ± 7 admitted to three geriatric hospitals in Lyon, France. DBI and DBI-WHO were calculated for each participant at admission and discharge.

The Bland–Altman method was used to assess agreement between DBI-WHO and DBI on admission and discharge data.10 Estimation accuracy was defined empirically as the percentage of participants whose DBI-WHO was within ±20% of DBI.

The mean difference between DBI-WHO and DBI was –0.28 ± 0.26 (95% limit of agreement = –0.79–0.23) at admission and –0.32 ± 0.26 (95% limit of agreement = –0.83–0.19) at discharge. 95.5% of the difference between the scores at admission lay within the limit of agreement (95.2% for data on discharge). DBI-WHO showed a lower exposure level than DBI, with 74% of individuals with DBI-WHO less than –20% of DBI, whereas 1% of individuals had a DBI-WHO higher than +20% of DBI (78% and 0%, respectively, at discharge). The level exposure of anticholinergic and sedative calculated using DBI-WHO is lower because DBI-WHO is calculated using an average maintenance daily dose instead of a recommended minimum daily dose.

These results suggest that DBI-WHO and DBI could be interchangeable because more than 95% of difference measurements fell within the limits of agreement. In addition, DBI and DBI-WHO were correlated on admission (correlation coefficient \( r = 0.96, P < .001 \)) and on discharge \( (r = 0.97, P < .001) \). Defined daily dose could be used for the calculation of an international DBI, which could become a quality indicator in drug management. Further analyses should be performed to confirm these results in other population studies.

Rémi Faure, PharmD
Department of Pharmacy, Hôpital des Charpennes Hospices Civils de Lyon, Villeurbanne, France

Virginie Dauphinot, PhD
Memory Center of Lyon, Hôpital des Charpennes Hospices Civils de Lyon, Villeurbanne, France
HOMA is a mathematically defined model of normal expected to reach 2 billion by 2050. The population was 371 million in 1995 to 629 million in 2002 and is expected to reach 2 billion by 2050. The elderly adult population increased from 105 to 305 million in 2002, and 3% had values close to the limit for diagnosis of DM. One patient had a blood glucose level of greater than 126 mg/dL. Of 88 participants aged 60 to 101 (62 female, 26 male), 28 (31.8%) had glucose levels ranging from 78 to 100 mg/dL, 56 (63.6%) had levels from 101 to 120 mg/dL, 3 (3.4%) had levels from 121 to 125 mg/dL, and one (1.1%) had levels higher than 126 mg/dL. Mean fasting insulin was 3.7 ± 3.5 μU/mL, mean HOMA%B was 36.8 ± 24.0, and mean HOMA-IR was 0.49 ± 0.05. There were no significant differences in HOMA%B or HOMA-IR according to age, sex, or physical activity. The 74 subjects with HOMA-IR less than 1 had a mean insulin level of 2.3 ± 1.7 μU/mL, and the 14 with HOMA-IR greater than 1 had a mean insulin level of 10.1 ± 3.5 μU/mL (P < .001). HOMA%B was 28.9 ± 16.9 in subjects with HOMA-IR less than 1 and 78.2 ± 17.6 in those with HOMA-IR greater than 1 (P < .001).

DISCUSSION

Participants who were previously determined not to have DM based on medical history and laboratory tests showed evidence of abnormal glucose metabolism. Only 31% had glucose levels within the normal range. Glucose intolerance (fasting blood glucose 101–120 mg/dL) was seen in 63%, and 3% had values close to the limit for diagnosis of DM. One patient had a blood glucose level of greater than 126 mg/dL.

It appears that impaired glucose metabolism is common in elderly adults; the prevalence was 63% in these participants. This finding is troubling given the risk of pharmacological intervention in this population. Dietary control should be maximized first. Mean fasting insulin measured in people aged 60 and older were recruited for the study. A clinical history was obtained, and routine tests including fasting glucose levels were conducted. Participants were seen once a week in groups of seven for serum sampling. The samples were centrifuged and stored at −20°C. Blood glucose levels were measured using the oxidase method. Beta cell function (HOMA%B) and insulin resistance (HOMA-IR) were determined using the HOMA 2 calculator, obtained free at the Oxford Center for Diabetes Endocrinology and Metabolism Web site. Written informed consent was obtained from each participant, and the bioethics committee of ISSSTE Hospital of Torreon approved this study.

RESULTS

Of 88 participants aged 60 to 101 (62 female, 26 male), 28 (31.8%) had glucose levels ranging from 78 to 100 mg/dL, 56 (63.6%) had levels from 101 to 120 mg/dL, 3 (3.4%) had levels from 121 to 125 mg/dL, and one (1.1%) had levels higher than 126 mg/dL. Mean fasting insulin was 3.7 ± 3.5 μU/mL, mean HOMA%B was 36.8 ± 24.0, and mean HOMA-IR was 0.49 ± 0.05. There were no significant differences in HOMA%B or HOMA-IR according to age, sex, or physical activity. The 74 subjects with HOMA-IR less than 1 had a mean insulin level of 2.3 ± 1.7 μU/mL, and the 14 with HOMA-IR greater than 1 had a mean insulin level of 10.1 ± 3.5 μU/mL (P < .001). HOMA%B was 28.9 ± 16.9 in subjects with HOMA-IR less than 1 and 78.2 ± 17.6 in those with HOMA-IR greater than 1 (P < .001).