The association between polypharmacy and its adverse health outcomes in adult patients with type 2 diabetes mellitus: A systematic review and meta-analysis

Nan Peng [1], You Wu [1], Xiang Long [1], Dongning Yao [2], Pengcheng Liu [1]

1 School of International Pharmaceutical Business, China Pharmaceutical University, Nanjing, Jiangsu, China
2 Nanjing Medical University, Nanjing, Jiangsu, China

Background

- Type 2 diabetes mellitus (T2DM) remains a significant chronic disease for adults. **Nowadays more adults have been diagnosed with T2DM and classified as early-onset patients.**
- The age-standardized global T2DM prevalence rate was 5,282 per 100,000 population, with a projected increase to 9.5% by 2050, impacting over 1.27 billion individuals.
- The issue of polypharmacy has garnered increasing attention due to the simultaneous development of new drugs and extended life expectancy.
- 72.2% of adult patients with T2DM were prescribed polypharmacy (≥5 medicines) according to a database study in China. **Yet the possible detriment of polypharmacy has not been fully explored.**

Objective

- To present **a summary of the research literature** on polypharmacy and its association with adverse health outcomes in adult T2DM patients.

Methods

- **A systematic review was conducted across three databases** (PubMed, Web of Science, and ScienceDirect) through October 2023.
- Studies regarding the relationship between polypharmacy and diabetes-related health outcomes, complications as well as multi-morbidity were included.
- For one specific outcome, qualified data from more than two studies were **synthesized in the meta-analysis with a fixed effects model for the odd ratio (OR) and corresponding 95% confidence intervals (CIs)** and I^2 test for the measure of heterogeneity.

Results

- Among 24 studies that met the inclusion criteria, three were included in the meta-analysis.
- **The association between polypharmacy and poor glycemic control was found to be statistically significant** (OR=1.84, 95% CI [1.68-2.01], P<0.00001, I^2=0%).

Results

- Polypharmacy (the daily/concurrent use of ≥5 medications or the use of ≥1 oral antidiabetics/oral antidiabetics combined with insulin) was found to be significantly associated with an 84% higher risk of poor glycemic control in T2DM adult patients.
- Included studies also reported the association between polypharmacy and **hospitalization, death, hypoglycemia, complications (diabetic foot ulcers, non-proliferative diabetic retinopathy), and multi-morbidity (fracture, falls, depression relapse, health-related quality of life).**
- Only insignificant association between stroke and polypharmacy (combined ≥2 types of antidiabetic medications) was reported.

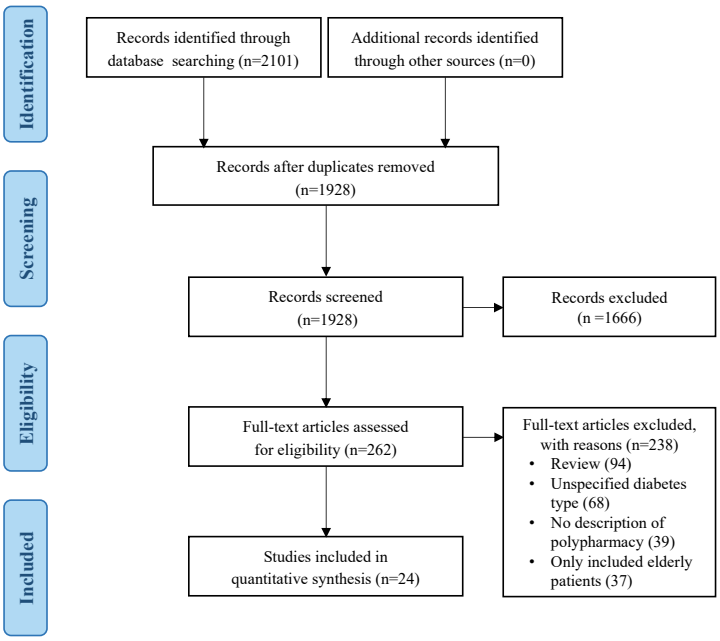

Figure 1: The PRISMA flow diagram for the included studies

Discussion

- The limitations of this meta-analysis revolve around **the definition of polypharmacy and the reporting of diabetic complications and comorbid conditions.**

Conclusion

- The current research has revealed a significant association between polypharmacy and several adverse health outcomes in adults with T2DM.
- The evidence underscores the need **for greater caution and improved management in drug therapies** to mitigate these risks.

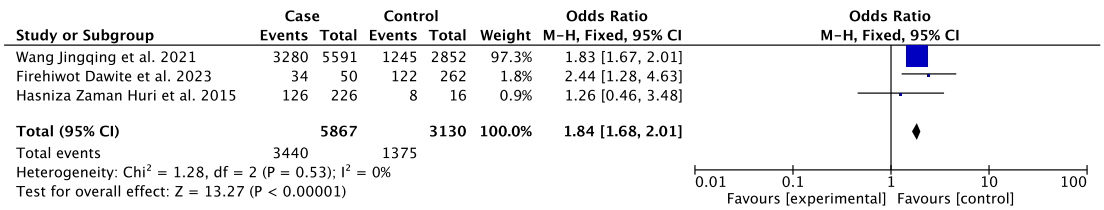

Figure 2: Meta-analysis of studies on association between polypharmacy and poor glycemic control

Contact

Pengcheng Liu: Professor
Email: liupcmail@163.com

Nan Peng: Ph.D. Candidate
Tel: +86 152-9835-9581
Email: cpupn2013@163.com