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Determinants of Polypharmacy Among Older Adults in Baghdad, Iraq: A Cross-Sectional Analysis

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Abstract
Polypharmacy refers to the concurrent use of multiple medications, often extending to inappropriate or excessive drug use. It is influenced by factors such as age, gender, socioeconomic status, and comorbid conditions like type 2 diabetes, heart failure, and renal disease. This phenomenon increases the risk of drug interactions, adverse drug reactions, and non-adherence. Addressing polypharmacy requires patient education, appropriate prescribing, and interprofessional collaboration to ensure safe and effective treatment outcomes. Aim of the study was to determine the Risk Factors of Polypharmacy in Elderly Patients in Baghdad city. A cross-sectional study was conducted using a Google Form to assess polypharmacy among 76 elderly patients in Baghdad with chronic diseases. Participants were classified by gender, education level, and family support. The study aimed to identify demographic factors influencing medication use and adherence.
Show that the average number of medications used was significantly higher among males compared to females [p = 0.016]. However, there were no significant differences based on educational level [p = 0.566] or family support [p = 0.647]. Gender appears to be the most influential factor in the prevalence of polypharmacy among the elderly.

Keywords
Polypharmacy; Elderly; Risk factors; Medication adherence; Chronic diseases; Baghdad; Cross-sectional study; Drug utilization

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INTRODUCTION
Polypharmacy refers to the concurrent use of multiple medications and often extends to describe the excessive or inappropriate use of drugs. This includes situations where individuals consume more medications than clinically required or use combinations that may lead to adverse outcomes. The term encompasses all medications an individual may take, whether prescribed for chronic conditions, short-term use, over-the-counter (OTC) drugs, complementary and alternative medicines (CAM), or dietary supplements[1]. Drug utilization studies typically emphasize prescription medications due to their clinical significance and potential for harm. However, the risks associated with OTC drugs are frequently underestimated; nearly 40% of individuals believe these medications are too mild to cause harm[2]. Consequently, OTC use is often underreported in such studies. Traditionally, polypharmacy has been defined as the use of five or more prescribed medications[3,4,5] . This definition has evolved over time, reflecting the increasing prevalence of multiple concurrent drug therapies. In 1997, Bjerrum and colleagues classified[6] the use of two to four medications as minor polypharmacy and five or more as major polypharmacy.

Occurrence of Polypharmacy
Studies investigating polypharmacy use a range of criteria, varying from more than two to over ten medications. These studies span different patient populations, including outpatients, hospitalized individuals, nursing home residents, and patients with specific conditions such as psychiatric disorders. Although the majority of research focuses on elderly populations, some studies adopt a broader, population-based perspective[7,8,9].

Factors Associated with Polypharmacy
Numerous studies highlight the potential adverse effects of polypharmacy, including drug-drug

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interactions, adverse drug reactions [ADRs], and decreased medication adherence. In response, research has also focused on strategies to minimize unnecessary medication use and improve the appropriateness of pharmacological therapy.

PATIENT-RELATED FACTORS

Age

Although polypharmacy is not confined to older adults, age remains a key predictor. With advancing age[10], the incidence of chronic diseases increases, necessitating the use of multiple medications. Age-related physiological changes, particularly in liver and kidney function, also contribute to altered drug metabolism and increased vulnerability to drug-related problems[11,12,13].

Gender

Women are generally more likely to use multiple medications compared to men. This gender disparity may be attributed to differences in health-seeking behavior and disease prevalence. However, the discrepancy tends to diminish among older adults[3,14,15].

Race and Ethnicity

Medication usage patterns vary significantly across racial and ethnic groups. In the United States, for example, the prevalence of drug use ranges from 84% among white Americans to 57% among Asian/Pacific Islanders[16]. These differences suggest that cultural, socioeconomic, and healthcare access factors may influence polypharmacy rates.

Socioeconomic Status

Individuals with lower socioeconomic status are more likely to experience polypharmacy. Educational attainment may also play a role, although findings on this variable have been mixed[5,12,18].

CLINICAL CONDITION RELATED FACTORS

Medical Therapy

Certain drug classes are consistently associated with polypharmacy. Cardiovascular medications[3], in particular, are frequently prescribed in combination with other treatments. Studies of patients on five or more prescriptions commonly identify high usage of antibacterials, analgesics, psycholeptics, antithrombotic agents, and beta- blockers[19].

Patient Behavior

Medication sharing or borrowing, especially among older adults, is a prevalent yet underrecognized contributor to polypharmacy. Patients often fail to report these practices to healthcare providers, increasing the risk of harmful interactions and suboptimal treatment outcomes[20].

SPECIAL CONSIDERATIONS IN SPECIFIC POPULATIONS

Type 2 Diabetes Mellitus [T2DM]

Polypharmacy is particularly prevalent among patients with type 2 diabetes due to the need to manage both glycemic control and complications such as hypertension, cardiovascular disease, and kidney disorders. The following factors contribute to increased medication use in this population:

- **Multiple Comorbidities:** Elderly diabetic patients often suffer from additional chronic conditions, including heart failure and cancer, which necessitate complex medication regimens.
- **Altered Drug Metabolism:** Age-related physiological changes, especially in hepatic and renal function, affect drug pharmacokinetics and dynamics.
- **Non-Adherence to Treatment:** Intentional or unintentional non-adherence is common, particularly inpatients with cognitive impairments or psychiatric disorders. Additionally, older adults are more likely to use OTC medications and herbal supplements, which may further increase the risk of drug interactions[21,22,23,24,25,26,27].

Heart Failure

Patients with heart failure frequently experience polypharmacy due to the need for long- term treatment of multiple comorbidities. Standard therapies, including ACE inhibitors, beta-blockers, and diuretics, contribute to a substantial pill burden. Since the 1990s, evidence-based guidelines have improved survival rates in heart

failure patients[28,29,30]. However, the resulting increase in medication use often does not account for treatments targeting comorbid conditions, thus complicating overall management and increasing the risk of adverse outcomes[31].

Renal and Hepatic Diseases

Chronic kidney and liver diseases necessitate careful medication management due to altered drug metabolism and excretion. These patients are particularly susceptible to drug-drug interactions [DDIs] and may require frequent dose adjustments and close monitoring to prevent toxicity and therapeutic failure.

Identify the definition of polypharmacy.

- Determine the reasons for recognizing and addressing polypharmacy in the older patients.
- Develop strategies that can help minimize polypharmacy.
- Apply effective interprofessional team strategies to promote a culture of safety and reduce polypharmacy.

SUBJECT AND METHOD

Study design

This study was conducted as a cross-sectional study using Google Form. The study included 76 elderly patients in Baghdad who suffer from chronic diseases and take multiple medications.

Ethics

The study was conducted in accordance with the Declaration of Helsinki and the good clinical practice [GCP] guidelines adopted by the International Council for Harmonization [ICH]

Subjects

A total of 76 were classified according to demographic

1. Divided into two groups male and female
2. Divided into two groups simple and University
3. family support

Assessment of Adherence

Medication adherence was assessed using a 10-item Likert-scale questionnaire. Each item was scored as follows:

- Strongly agree = 5
- Agree = 4
- Unsure = 3
- Disagree = 2
- Strongly disagree = 1

Total scores were categorized as:

- ≤ 25 → Non-adherent
- > 25 → Adherent

Inclusion Criteria

Residents of Baghdad.

- Age 65 or older.
- Taking three or more medications [polypharmacy].
- Diagnosed with at least one chronic condition such as diabetes, hypertension, cardiovascular disease, or other long-term conditions requiring multiple medications.
- Able to complete the questionnaire independently or with the help of a family member.

Exclusion Criteria

- Patients who do not reside within Baghdad Governorate
- Patients aged 65 years and below
- Patients who take less than three medications
- Patients who did not complete the questionnaire or whose data was incomplete.
- People who take medications without a prescription only, without using a medically prescribed medication

Statistical Analysis

Data were analyzed using appropriate statistical methods:

- Continuous variables were expressed as mean ± standard deviation (SD)
- Independent samples t-test was used to compare differences between groups
- Shapiro–Wilk test was used to assess normality of data distribution
- Levene's test was used to evaluate homogeneity of variances
- A p-value < 0.05 was considered statistically significant

RESULTS

Participant Characteristics

A total of 76 individuals participated in the survey, including 31 males and 45 females. In terms of family support, 45 participants reported having family support, while the remaining 31 did not receive any support from family members. Regarding educational level, 40 participants had a university-level education, whereas 36 had only basic (non-university) education.

The results revealed a statistically significant difference between genders in terms of mean scores (p = 0.016). Male participants had a higher average score (M = 38.29, SD = 5.58) compared to female participants (M = 35.47, SD = 4.37).

On the other hand, educational level did not show a statistically significant difference (p = 0.566). Participants with a basic education had a mean score of 36.97 (SD = 5.29), while those with a university education had a slightly lower mean of 36.30 (SD = 4.88).

Table 1. *Sociodemographic Characteristics of the Participants*

Gender		
Male	38.290 ± 5.575	**0.016**
Female	35.469 ± 4.367	
Education		
Simple	36.972 ± 5.289	**0.566**
Univ.	36.300 ± 4.884	
Family Support		
Yes	36.475 ± 4.662	**0.647**
No	37.118 ± 6.382	

**Independent T -Test was performed, level of significance at p < 0.05 , S.D. = standard deviation.*

Analysis and Interpretation:

These findings suggest that gender may be a contributing factor in the assessment related to polypharmacy among the elderly, with male participants tending to score higher possibly reflecting differences in health awareness, medication management, or social roles. In contrast, educational level did not appear to significantly influence the outcomes, indicating that other social, psychological, or behavioral factors may play a more substantial role in the context of polypharmacy among older adults.

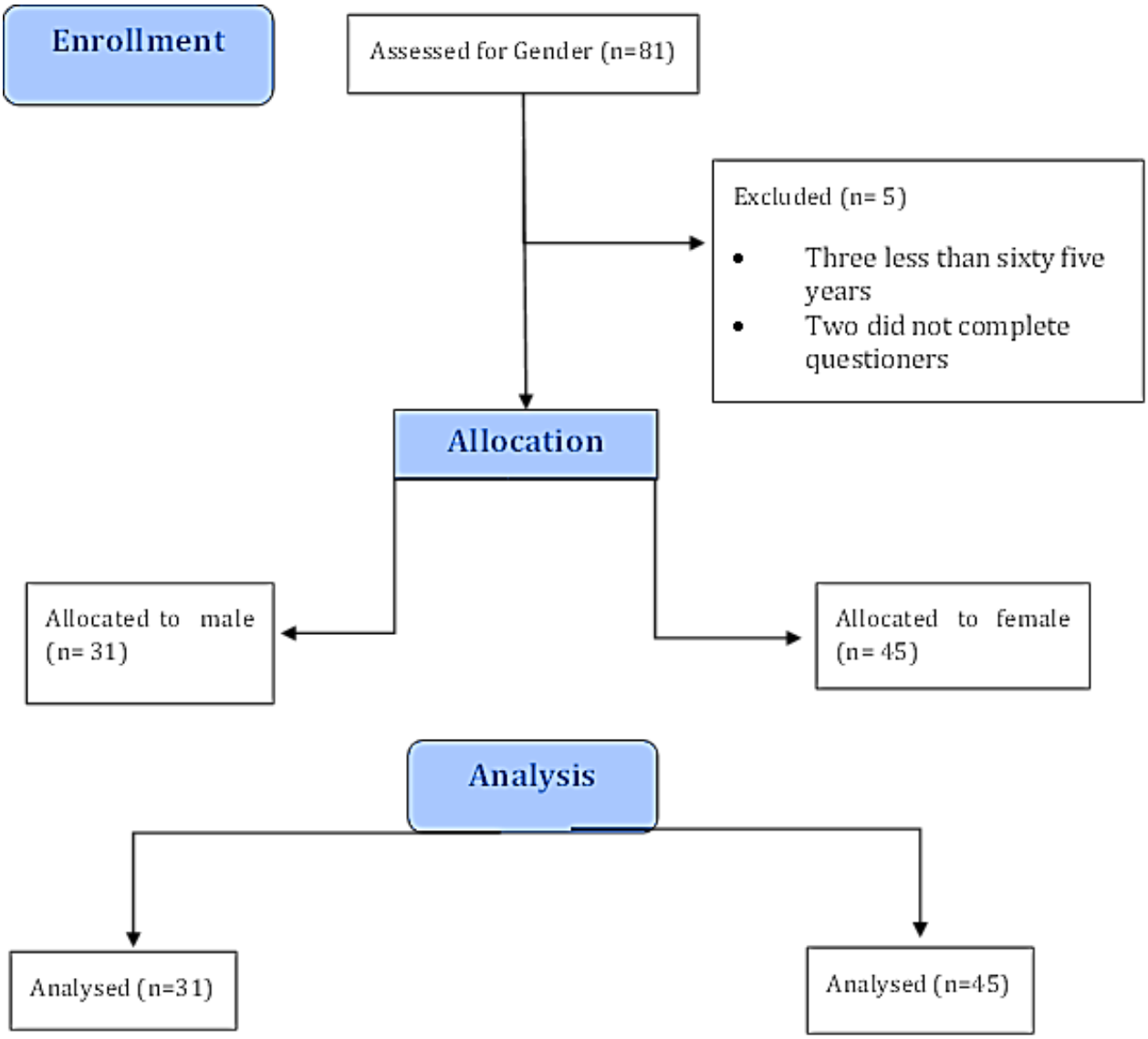

Figure 1: *The flow chart of gender*

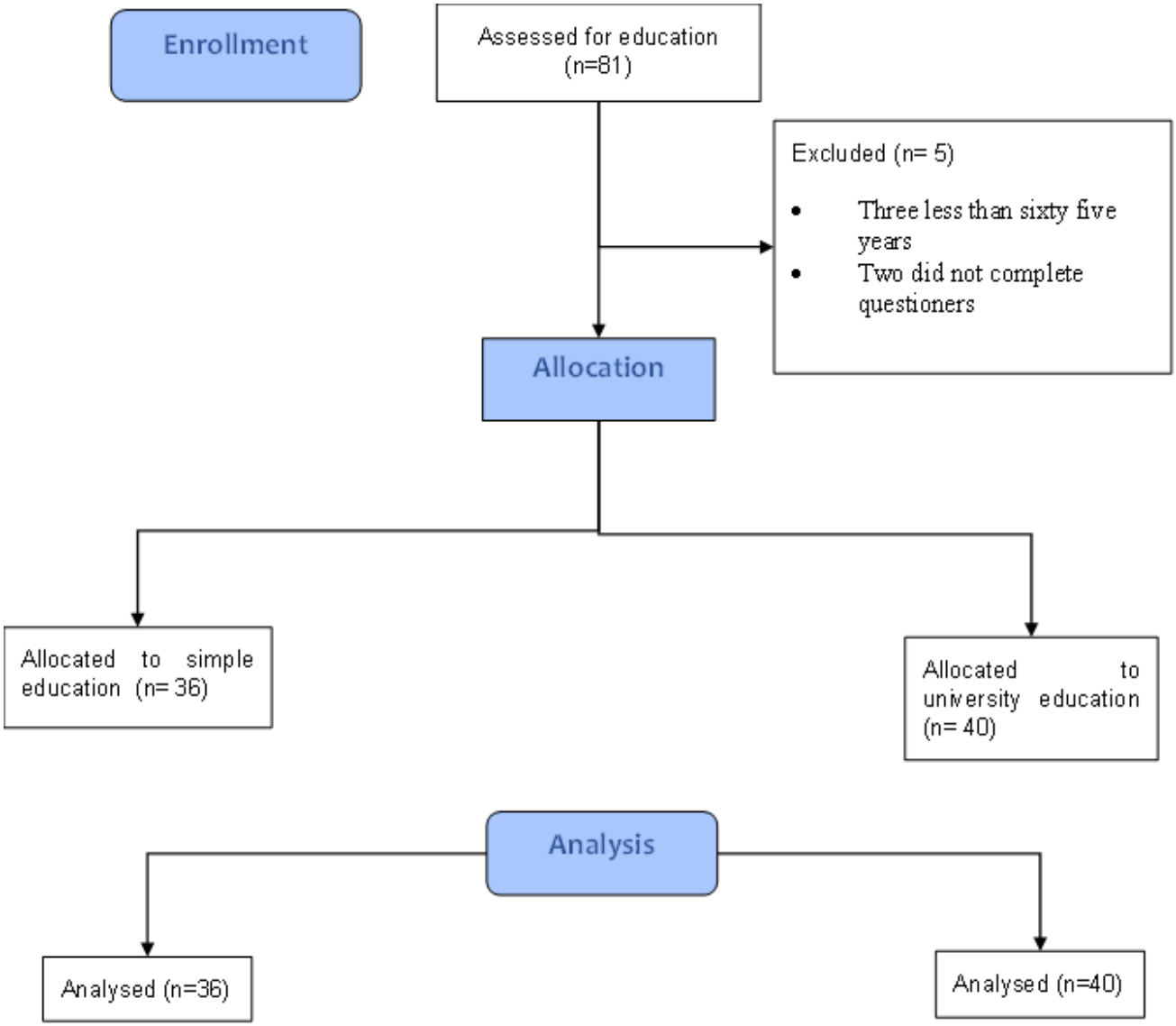

Figure 2: *The flow chart of education*

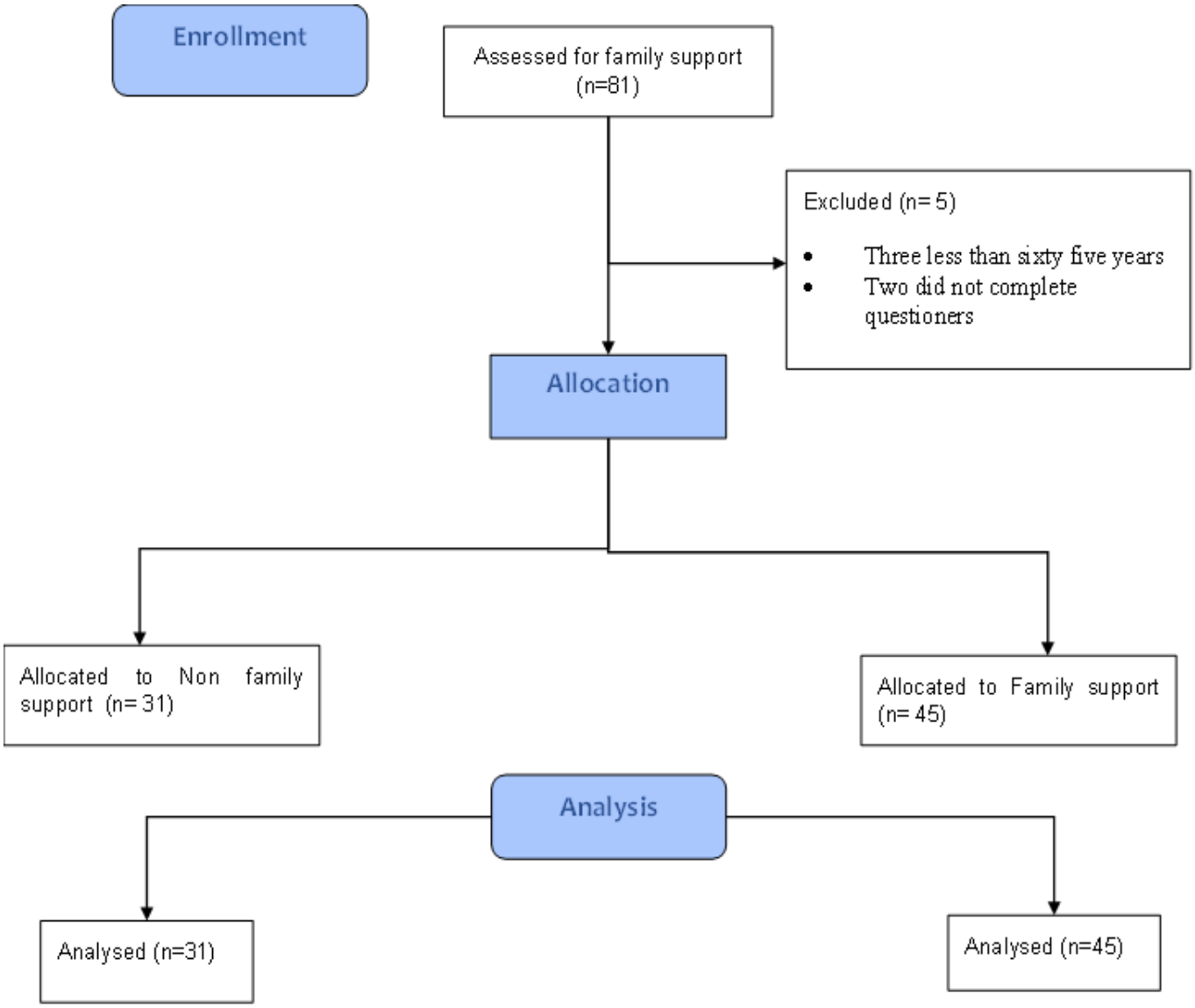

Figure 3: *The flow chart of family support*

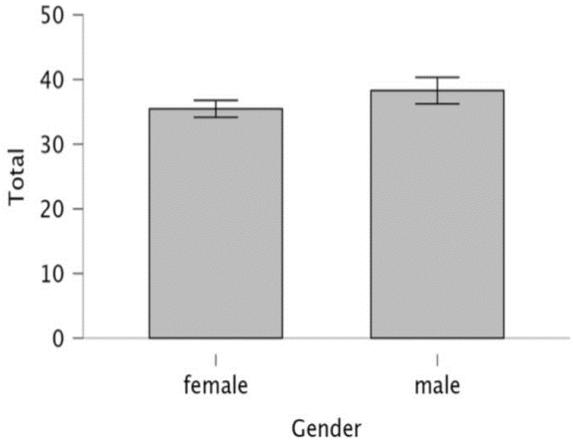

Figure 4: *Bar Plots of Gender*

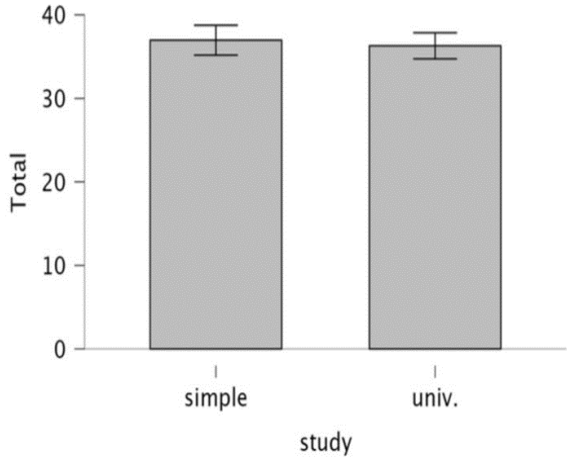

Figure 5: *Bar plots of Education*

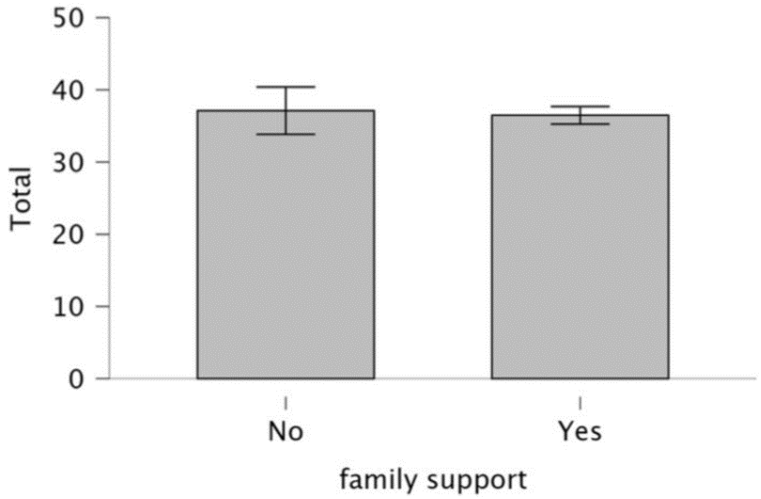

Figure 6: *Bar plots of Family Support*

DISCUSSION

Our study explored the risk factors contributing to polypharmacy in elderly patients in Baghdad. The results include descriptive statistics, independent samples t-tests, assumption checks, and bar plots, which provide insights into the relationships between key variables such as gender, educational level, and family support.

Gender and Polypharmacy

The independent samples t-test comparing male and female participants indicates a statistically significant difference [t = -2.472, p = 0.016], suggesting that gender may influence medication use. Prior research has found that women tend to experience higher rates of polypharmacy due to a greater prevalence of chronic conditions and increased healthcare utilization [32]. However, our descriptive statistics reveal relatively close mean medication use between genders, suggesting that while significant, the practical difference may not be large.

Educational Level and Polypharmacy

The comparison of polypharmacy rates between individuals with simple and university-level education yielded no statistically significant difference [t = 0.576, p = 0.566]. This suggests that educational level alone may not be a strong predictor of polypharmacy in our sample. Studies have shown mixed results in this regard, with some indicating that higher education leads to better medication management, while others suggest it may increase access to multiple prescriptions [33]. The absence of a significant difference in our study may be due to cultural factors, healthcare accessibility, or sample characteristics.

Family Support and Polypharmacy

The t-test comparing individuals with and without family support showed a non-significant result [t = 0.460, p = 0.647], indicating that family support did not significantly impact medication use. However, prior research has emphasized the role of social support in improving medication adherence and reducing the risk of inappropriate medication use, particularly among elderly populations [34]. The lack of statistical significance in our study may be due to other mediating factors such as healthcare provider involvement, financial stability, or self-efficacy in medication management.

Visual Representation and Clinical Implications

The bar plots illustrate differences in total medication use across gender, family support, and educational level. While statistical tests indicate minimal significant differences in some cases, the graphical representation suggests a trend where males, individuals with lower education, and those without family support tend to have slightly higher medication use. Although these trends

were not always statistically significant, they may have clinical relevance, as suggested by studies emphasizing the impact of social determinants on medication use patterns [33].

CONCLUSION AND RECOMMENDATIONS

Our findings suggest that gender may play a role in polypharmacy risk, while educational level and family support do not show strong associations. Given these results, healthcare providers should consider gender-specific interventions in prescribing and adherence strategies. Further studies with larger and more diverse samples are recommended to examine additional factors such as socioeconomic status, healthcare access, and physician prescribing behaviors.

LIMITATIONS

This study has several limitations that should be considered. The relatively small sample size may limit the generalizability of the findings, and the cross-sectional design does not allow for establishing causal relationships. Data were collected using a self-administered online questionnaire, which may introduce recall and reporting bias, particularly among elderly participants. In addition, the use of an online survey may have led to selection bias by excluding individuals with limited access to or familiarity with digital tools. The definition of polypharmacy as the use of three or more medications differs from the commonly accepted definition, which may affect comparisons with other studies. Furthermore, the analysis did not include multivariate methods to control for potential confounding variables, and the adherence assessment tool used was not a widely validated instrument.

REFERENCES

1. World Health Organization Centre for Health Development. (2004). *A glossary of terms for community health care and services for older persons* (Ageing and health technical report, Vol. 5). World Health Organization.
2. Roumie, C. L., & Griffin, M. R. (2004). Over-the-counter analgesics in older adults: A call for improved labelling and consumer education. *Drugs & Aging, 21*(8), 485–498.
3. Bjerrum, L., Søgaard, J., Hallas, J., et al. (1998). Polypharmacy: Correlations with sex, age and drug regimen. A prescription database study. *European Journal of Clinical Pharmacology, 54*(3), 197–202.
4. Viktil, K. K., Blix, H. S., Moger, T. A., & Reikvam, A. (2007). Polypharmacy as commonly defined is an indicator of limited value in the assessment of drug-related problems. *British Journal of Clinical Pharmacology, 63*(2), 187–195. *(corrected based on standard record)*
5. Haider, S. I., Johnell, K., & Thorslund, M., et al. (2008). Analysis of the association between polypharmacy and socioeconomic position among elderly aged ≥77 years in Sweden. *Clinical Therapeutics, 30*(2), 419–427.
6. Bjerrum, L., Rosholm, J. U., Hallas, J., et al. (1997). Methods for estimating the occurrence of polypharmacy by means of a prescription database. *European Journal of Clinical Pharmacology, 53*(1), 7–11.
7. Denneboom, W., Dautzenberg, M. G., Grol, R., et al. (2006). Analysis of polypharmacy in older patients in primary care using a multidisciplinary expert panel. *British Journal of General Practice, 56*(528), 504–510.
8. Junius-Walker, U., Theile, G., & Hummers-Pradier, E. (2007). Prevalence and predictors of polypharmacy among older primary care patients in Germany. *Family Practice, 24*(1), 14–19.
9. Johnell, K., Fastbom, J., Rosen, M., et al. (2007). Inappropriate drug use in the elderly: A nationwide register-based study. *Annals of Pharmacotherapy, 41*(7), 1243–1248.
10. Hovstadius, B., Åstrand, B., & Petersson, G. (2009). Dispensed drugs and multiple medications in the Swedish population: An individual-based register study. *BMC Clinical Pharmacology, 9*(1), 11.
11. Veehof, L., Stewart, R., Haaijer-Ruskamp, F., et al. (2000). The development of polypharmacy: A longitudinal study. *Family Practice, 17*(3), 261–267.
12. Hajjar, E. R., Cafiero, A. C., & Hanlon, J. T. (2007). Polypharmacy in elderly patients. *American Journal of Geriatric Pharmacotherapy, 5*(4), 345–351.

13. Jyrkkä, J., Vartiainen, L., Hartikainen, S., et al. (2006). Increasing use of medicines in elderly persons: A five-year follow-up of the Kuopio 75+ study. *European Journal of Clinical Pharmacology, 62*(2), 151–158.
14. Perry, B. A., & Turner, L. W. (2001). A prediction model for polypharmacy: Are older, educated women more susceptible to an adverse drug event? *Journal of Women & Aging, 13*(4), 39–51.
15. Linjakumpu, T. (2003). *Drug use among the home-dwelling elderly: Trends, polypharmacy, and sedation*. University of Oulu.
16. Kaufman, D. W., Kelly, J. P., Rosenberg, L., et al. (2002). Recent patterns of medication use in the ambulatory adult population of the United States: The Slone survey. *JAMA, 287*(3), 337–344.
17. McGavock, H. (2004). Prescription-related illness: A scandalous pandemic. *Journal of Evaluation in Clinical Practice, 10*(4), 491–497.
18. Haider, S. I., Johnell, K., Weitoft, G. R., et al. (2009). The influence of educational level on polypharmacy and inappropriate drug use: A register-based study of more than 600,000 older people. *Journal of the American Geriatrics Society, 57*(1), 62–69.
19. Hovstadius, B., Tägerud, S., Petersson, G., et al. (2010). Prevalence and therapeutic intensity of dispensed drug groups for individuals with multiple medications: A register-based study. *Journal of Pharmaceutical Health Services Research, 1*, 145–155.
20. Anthierens, S., Tansens, A., Petrovic, M., et al. (2010). Qualitative insights into general practitioners' views on polypharmacy. *BMC Family Practice, 11*, 65.
21. Mortazavi, S. S., Shati, M., Keshtkar, A., Malakouti, S. K., Bazargan, M., & Assari, S. (2016). Defining polypharmacy in the elderly: A systematic review protocol. *BMJ Open, 6*, e010989.
22. Gaman, M. A., Dobrica, E. C., Pascu, E. G., et al. (2019). Cardiometabolic risk factors for atrial fibrillation in type 2 diabetes mellitus. *Journal of Mind and Medical Sciences, 6*, 157–161.
23. Golchin, N., Frank, S. H., Vince, A., Isham, L., & Meropol, S. B. (2015). Polypharmacy in the elderly. *Journal of Research in Pharmacy Practice, 4*, 85–88.
24. Noale, M., Veronese, N., Cavallo Perin, P., et al. (2016). Polypharmacy in elderly patients with type 2 diabetes receiving oral antidiabetic treatment. *Acta Diabetologica, 53*, 323–330.
25. Lipska, K. J., Krumholz, H., Soones, T., & Lee, S. J. (2015). Polypharmacy in the aging patient: A review of glycemic control in older adults with type 2 diabetes. *JAMA, 315*, 1034–1045.
26. Annani-Akollor, M. E., Addai-Mensah, O., Fondjo, L. A., et al. (2019). Predominant complications of type 2 diabetes in Kumasi: A retrospective cross-sectional study. *Medicina, 55*, 125.
27. Haltbakk, J., Graue, M., Harris, J., et al. (2019). Patient safety among older people with diabetes in home care services: An integrative review. *Journal of Advanced Nursing*.
28. Ponikowski, P., Voors, A. A., Anker, S. D., et al. (2016). ESC guidelines for the diagnosis and treatment of acute and chronic heart failure. *European Heart Journal, 37*(27), 2129–2200.
29. Roger, V. L., Weston, S. A., Redfield, M. M., et al. (2004). Trends in heart failure incidence and survival. *JAMA, 292*(3), 344–350.
30. Cowie, M. R. (2017). The heart failure epidemic: A UK perspective. *Echo Research and Practice, 4*(1), R15–R20.
31. Masnoon, N., Shakib, S., Kalisch-Ellett, L., & Caughey, G. E. (2017). What is polypharmacy? A systematic review of definitions. *BMC Geriatrics, 17*, 230.
32. Vozoris, N. T., & Batt, J. (2016). Role of sex in polypharmacy among older adults. *Drugs & Aging, 33*(1), 1–6.
33. Jyrkkä, J., Vartiainen, L., Hartikainen, S., Sulkava, R., & Enlund, H. (2006). Increasing use of medicines in elderly persons. *European Journal of Clinical Pharmacology, 62*(2), 151–158.
34. Kuo, Y. F., Raji, M. A., Chen, N. W., Hasan, H., & Goodwin, J. S. (2013). Association of social support with medication adherence in elderly patients. *Journal of the American Geriatrics Society, 61*(2), 225–230.

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