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POLYPHARMACY AND ITS EFFECT ON DRUG ADHERENCE IN ELDERLY PATIENTS ATTENDING PRIMARY HEALTH CARE CENTER

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ABSTRACT

Background: Polypharmacy and poor medication adherence are major challenges in elderly populations, especially those attending primary healthcare centers. Understanding the nature of non-adherence (whether intentional or unintentional) is crucial for targeted interventions. **Aim:** To know the prevalence of non-adherence in polypharmacy in elderly patient and the prevalence of intentional and unintentional non-adherence also to know the relation between non adherence level (poor or medium) and sociodemographic factor, number of medication and non-adherence type (intentional and un-intentional medication adherence). **Method:** A cross-sectional study was conducted among 300 patients aged 60 years and above attending primary healthcare centers. Data were collected using the Girerd's adherence questionnaire to assess medication adherence and classify types of non-adherence. **Result:** Nearly half of the participants exhibited poor adherence and one third of the participant exhibit medium adherence and only 16% of them exhibited good adherence. Intentional non-adherence was more common (78.5%) compared to unintentional non-adherence (21.5%). Factors such as lower education level male factor and unemployment were significantly associated with poorer adherence ($p < 0.05$), also increase number of medication was significantly associated with poorer adherence. **Conclusion:** The high rate of intentional non-adherence recommends the need for interventions targeting patients' beliefs and attitudes toward medications. Tailored educational strategies may help improve adherence in this vulnerable group.

KEYWORDS: Understanding the nature of non-adherence (whether intentional or unintentional) is crucial for targeted interventions.

INTRODUCTION

In health, drug use is one of the essential factors contributing to improve the quality of life. Polypharmacy, defined as regular use of at least five medications, is common in older adults and younger at-risk populations and increases the risk of adverse medical outcomes.[1]

It is particularly common among older adults and individuals in long-term care facilities, where patients may take five or more medications daily. This practice can sometimes lead to unnecessary prescriptions or medications taken to counteract the side effects of other drugs or with over-the-counter drugs or dietary supplements.[2]

In fact, the Centers for Disease Control and Prevention report that one in five people between the ages of 40 and 79 take five or more prescription drugs every day. The negative consequence of polypharmacy includes delay refilling and the patient may remove medications that may be in the patient's best interest along with Drug-drug interactions and financial burden on patient.[1]

Complex dosing instructions for multiple medications, side effects, drug-drug interactions, and high drug costs can lead to decreased patient compliance, especially among elderly patients.[2]

Participants of the World Health Organization Adherence meeting in June2001 defined adherence as the

extent to which the patient follows medical instructions yet, there are no firm factors that can genuinely predict adherence (World Health Organization, 2003).[3]

Intentional non-adherence occurs when patients consciously decide not to follow their prescribed treatment plan. This behavior is often influenced by personal beliefs, fear of side effects, perceived inefficacy of the treatment, or the complexity and burden of polypharmacy. Patients may deliberately skip doses, alter the dosage, or stop the medication altogether due to mistrust in healthcare providers or a lack of perceived necessity for the treatment.[6] In contrast, non-intentional non-adherence typically arises from forgetfulness, cognitive decline, physical difficulties (such as impaired vision or manual dexterity), or misunderstanding of medication instructions—factors particularly prevalent among the elderly.[4,5]

The two types often coexist, especially in older adults managing multiple medications, making it essential to distinguish between them to design appropriate interventions. Identifying whether non-adherence is intentional or unintentional helps healthcare providers tailor solutions—educational strategies may address intentional behaviors, whereas reminder systems and simplified regimens may help mitigate unintentional lapses.[6]

This study aims to score the adherence level of elderly patient in polypharmacy. To know the prevalence of non-adherence type (intentional and unintentional). To know the relation between non adherence level (poor or medium) and sociodemographic factor, number of medication and non-adherence type (intentional and non-intentional medication adherence).

PATIENTS AND METHODS

Study plan

This was an analytic cross-sectional study and the convenient sample method was used. The current study was conducted during the period from 1st of February till 1st of August 2025 during week days. The study included a convenient sample from outpatient of two primary health care centers (Al- Mansour and hay Al- Adel primary health care centers).

The study included a convenient sample of 300 patients who were attending the primary health care.

Exclusion criteria

- Any patient less than 60 years.
- Any patient does not need the medication for chronic use.
- Any patient use less than 5 drugs.

Inclusion criteria

Old age patients 60 years old and more who use 5 medication or more per day for more than 3 months.

Data collection

A form of structured questionnaire was developed by the researcher after a review of many similar articles (appendix 1, 2),[7] and supervised by the supervisor to collect data and the content validated by specialist in community (appendix 3), the questionnaire was filled by the researcher after asking the old age patients who was visiting the primary health care. A pilot study was administrated to 20 persons and they were not included in the sample.

Tools of study

The questionnaire consists of 4 sections: sociodemographic, number of medication, Girard questionnaire, and intentional and non-intentional non adherence.

The first section encompasses demographic information such as Age in years, sex, Socio-professional category, marital status and education.

The second section represent the number of the medication that the patient has been used per day for the past 3 months.

The third section represent the level of adherence Adapted from on Girard's questionnaire.[8]

It I compose of 6 questions to answer by yes or no.

When "No" was answered to 6 items (Good Adherence); when 1 or 2 "yes" were given (Medium Adherence); when 3 or more "yes" were given (Poor adherence).

The questions include

1- This morning, did you forget to take your medication?
2- Since the last consultation, have you run out of medication?
3- Have you ever taken your medication late compared to the time usual?
4- Have you ever not taken your medication because some days you were lacking in memory?
5- Have you ever not taken your medication because some days you feel that your treatment is doing you more harm than good?
6- Do you think you have too many pills to take?

The fourth section include causes of non-adherence divided in to intentional causes like side effect, alter regimen as see fit, think medications not effective, do not care to take medications, modify diuretics due to increase urination, omit medications if feeling ill, alter dosing schedule for convenience, stop to see if still needed and Fasting once/ month.

Non-intentional causes like forget, Confusion/ hiding pills, too expensive, Trouble swallowing pills, trouble operating dispensers(inhalers), Trouble reading labels and If run out (e.g. pharmacy delivers late or make error).

Ethical consideration

Administrative approval was obtained from Al-Mansour primary health care center and Al-Adel primary health care center and also from Arab board for health specialization in Iraq. Verbal consent was obtained from the participants, and they were informed about the purpose of the study and they could withdraw at any time and all the data were kept confidential and will be used only for this purpose.

Statistical analysis

Data were introducing into Microsoft excel sheet 2019 and loaded into SPSS (statistical package for social science) version (26). Categorical data presented as numbers and percentages. Chi-square test was used to test homogeneity. P-value < 0.05 was considered as a discrimination of significance.

RESULTS

The study included 300 participants with a mean age of 69.10 years. Age distribution showed that 41% were between 60 and 65 years old, and 19% were over 75 years. The sample exhibited a higher proportion of females (60.3%) compared to males (39.7%). Unemployment was the most prevalent occupational status accounting for 54% of the sample, and 33% of participants reported no education, as shown in **Table 1**.

Table (1): Distribution of participants according to demographic data.

Sex	**Frequency**	**Percent**
Male	119	39.7
Female	181	60.3
Total	300	100
Age	**Frequency**	**Percent**
60-65years	124	41.3
66-70years	50	16.7
71-75years	69	23.0
>75years	57	19.0
Total	300	100.0
Socio-professional category	**Frequency**	**Percent**
Employer	21	7
Worker	18	6
Retired	99	33
Unemployed	162	54
Total	300	100
Marital status	**Frequency**	**Percent**
Married	252	84
Divorced	15	5
Single	33	11
Total	300	100
Education	**Frequency**	**Percent**
Not education	100	33.3
Primary school	87	29
Secondary	55	18.3
Collage	51	17
Postgraduate	7	2.3
Total	300	100

The study found that participants most frequently used six or seven medications daily, with each frequency accounting for 28% of the sample. Additionally, 21% of participants reported using five medications daily. The least common frequency was ten medications daily, reported by only 3% of participants. These findings are detailed in **Figure 1**.

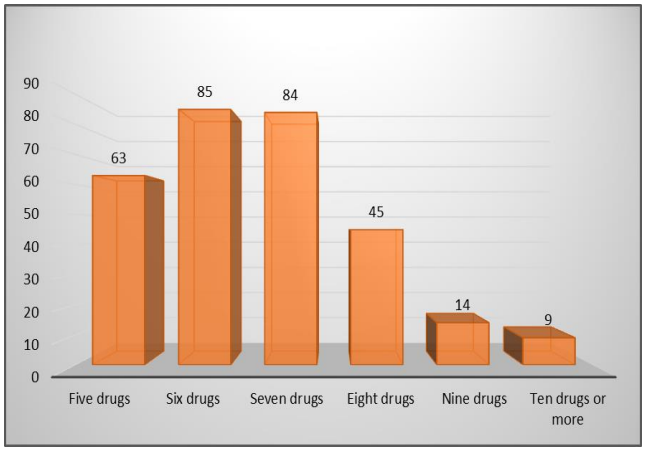

Figure (1): Distribution of participants according to number of medications.

The study's findings on medication adherence reveal several key challenges among participants. Nearly a quarter (23%) reported forgetting to take their morning medications, and 27.7% experienced running out of medication. A significant majority, 57%, took their medications later than scheduled. Furthermore, 40.7% sometimes missed doses due to forgetfulness, while 48% felt their treatment was harmful. A substantial 53% of participants believed they had too many pills to take, as shown in **Table 2**.

Table (2): Distribution of participants according to Adherence score.

Q1: This morning, did you forget to take your medication?	**Frequency**	**Percent**
Yes	69	23
No	231	77
Total	300	100
Q2: Since the last consultation, have you run out of medication?	**Frequency**	**Percent**
Yes	83	27.7
No	217	72.3
Total	300	100
Q3: Have you ever taken your medication late compared to the time usual?	**Frequency**	**Percent**
Yes	171	57
No	129	43
Total	300	100
Q4: Have you ever not taken your medication because some days you are lacking in memory?	**Frequency**	**Percent**
Yes	122	40.7
No	178	59.3
Total	300	100
Q5: Have you ever not taken your medication because some days you feel that your treatment is doing you more harm than good?	**Frequency**	**Percent**
Yes	145	48.3
No	155	51.7
Total	300	100
Q6: Do you think you have too many pills to take?	**Frequency**	**Percent**
Yes	160	53.3
No	140	46.7
Total	300	100

The study revealed a clear distribution in medication adherence levels. Poor adherence was the most frequently observed category, accounting for 46.7% of participants. A substantial 37% showed medium adherence, while good adherence was the least common, at 16.3%. For a detailed breakdown, refer to **Figure 2**.

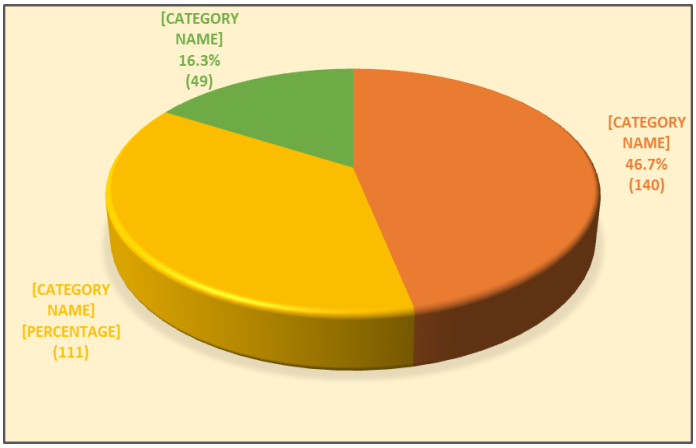

Figure (2): Distribution of participants according to adherence level.

The study identified two types of non-adherence: intentional (78.5%) and unintentional (21.5%). Among those with intentional non-adherence, the most common reasons cited were side effects (33%) and the perception that medications were ineffective (12%). For unintentional non-adherence, forgetfulness was the primary cause (14.3%), followed by medication expense (3.7%). Refer to **Table 3**.

Table (3): Distribution of participants according to non-adherence types and its causes.

Non-adherence types	Causes	Frequency	Percent
Intentional non-adherence	side effect	99	33
	alter regimen as see fit	8	2.7
	Think medications not effective	38	12.7
	Do not care to take medications	26	8.7
	Modify diuretics due to increase urination	2	0.7
	Omit medications if feeling ill	4	1.3
	alter dosing schedule for convenience	7	2.3
	Fasting once/ month	13	4.3
	Total	197	78.5%
Unintentional non-adherence	Forget	43	14.3
	Too expensive	11	3.7
	Total	54	21.5%

A statistically significant association ($p<0.05$) was found between adherence level and the socio-demographic characteristics of sex, education, and occupation status. Conversely, no significant association ($p>0.05$) was observed with age or marital status, as shown in **Table 4**.

Table (4): Relationship between the adherence level and socio-demographic characteristics.

Age	Poor adherence	Medium adherence	Good adherence	P value
60-65years	63	43	18	**0.248**
	50.80%	34.70%	14.50%	
66-70years	24	15	11	
	48.00%	30.00%	22.00%	
71-75years	27	27	15	
	39.10%	39.10%	21.70%	
>75years	26	26	5	
	45.60%	45.60%	8.80%	
Sex	**Poor adherence**	**Medium adherence**	**Good adherence**	**P value**
Male	64	45	10	**0.008***
	53.80%	37.80%	8.40%	
Female	76	66	39	
	42.00%	36.50%	21.50%	
Socio-professional	**Poor adherence**	**Medium adherence**	**Good adherence**	**P value**
Employer	12	0	9	**0.001***
	57.10%	0.00%	42.90%	

Worker	8	10	0	
	44.40%	55.60%	0.00%	
Retired	58	26	15	
	58.60%	26.30%	15.20%	
Unemployed	62	75	25	
	38.30%	46.30%	15.40%	
Marital status	**Poor adherence**	**Medium adherence**	**Good adherence**	**P value**
Married	115	98	39	
	45.60%	38.90%	15.50%	
Divorced	9	3	3	**0.527**
	60.00%	20.00%	20.00%	
Single	16	10	7	
	48.50%	30.30%	21.20%	
Education	**Poor adherence**	**Medium adherence**	**Good adherence**	**P value**
not education	40	47	13	
	40.00%	47.00%	13.00%	
primary school	40	39	8	
	46.00%	44.80%	9.20%	
Secondary	29	9	17	**0.001***
	52.70%	16.40%	30.90%	
Collage	26	16	9	
	51.00%	31.40%	17.60%	
Postgraduate	5	0	2	
	71.40%	0.00%	28.60%	
Pearson Chi-Square statistically significant*				

Table 5 indicates a statistically significant association between adherence level and the number of medications a person takes (p = 0.001). Specifically, adherence decreased as the number of medications increased.

Table (5): Relationship between the adherence level and number of medicines.

Number of medications	Poor adherence	Medium adherence	Good adherence	P value
5 drugs	25	15	23	
	39.70%	23.80%	36.50%	
6 drugs	43	29	13	
	50.60%	34.10%	15.30%	
7 drugs	43	35	6	
	51.20%	41.70%	7.10%	
8 drugs	11	27	7	0.001*
	24.40%	60.00%	15.60%	
9 drugs	11	3	0	
	78.60%	21.40%	0.00%	
≥10 drugs	7	2	0	
	77.80%	22.20%	0.00%	
Total	140	111	49	
	46.70%	37.00%	16.30%	
Pearson Chi-Square statistically significant *				

Regarding the relationship between commitment level and non-adherence types, the study's results indicate two key associations. First, intentional non-adherence causes were more influential in leading to poorer commitment, a relationship that was statistically significant (p = 0.001). Second, participants demonstrating poor commitment were also more prone to unintentional non-adherence causes, likewise showing a statistically significant association (p = 0.001). Refer to **Table 4.6** for details.

Table (6): Relationship between the adherence level and non -adherence types.

Intentional non-adherence	Poor adherence	Medium adherence	P value
side effect	46	54	
	46%	54%	0.001*
alter regimen as see fit	7	1	

	87.50%	12.50%	
think medications not effective	23	15	
	60.50%	39.50%	
Do not care to take medications	14	12	
	53.80%	46.20%	
Modify diuretics due to increase urination	2	0	
	100.00%	0.00%	
Omit medications if feeling ill	0	4	
	0.00%	100.00%	
alter dosing schedule for convenience	5	2	
	71.40%	28.60%	
Fasting once/ month	9	4	
	69.20%	30.80%	
Unintentional non-adherence	**Poor adherence**	**Medium adherence**	**P value**
Forget	31	12	0.001*
	72.10%	27.90%	
Too expensive	4	7	
	36.40%	63.60%	
Pearson Chi-Square statistically significant *			

DISCUSSION

Distribution of participants according to Adherence level

The Girerd adherence scale in our study show that 16.3% of participants good adherence, 37% had medium adherence, and 46.7% were classified as poor adherents. These results closely align with those reported by **Turki L, et al. in Tunis (2024),**[9] The similarity in good and moderate adherence rates indicates a consistent trend across studies of comparable populations, likely influenced by shared challenges such as polypharmacy, chronic disease burden, and age-related cognitive decline. Conversely, when compared to the study by **G. Reach et al. in France (2023)**[7] our results appear more favorable, as that study reported lower rate good adherence and higher rate poor adherence, indicating a heavier burden of non-adherence in their sample. These comparisons suggest that while adherence patterns in our population are generally consistent with international data.

Distribution of participants according to non-adherence types

In our study, intentional non-adherence accounted for 78.5%, while unintentional non-adherence represented 21.5%. These findings are consistent with the results reported **by G. Reach et al. in France (2023),**[7] who also found a majority of their sample exhibited intentional non-adherence indicating strong agreement with our finding.

While these studies highlight the importance of addressing both types of non-adherence, the slightly higher rate of intentional behavior in our sample may reflect population-specific factors such as polypharmacy, lower health literacy, or limited provider-patient communication. These disparities may also stem from cultural, educational, and systemic healthcare differences. For instance, religious practices like fasting, which influenced some intentional behaviors in our sample, were not observed in the Spanish study. Moreover, the higher prevalence of unintentional non-adherence in Spain may reflect an older or more cognitively burdened population.

Relationship between the adherence level and socio-demographic characteristics

Our study found that age and marital status were not significantly associated with medication adherence similar to the study by **Rodrigues et al. (2023) in Brazil,**[10] **Turki L, et al. in Tunis (2024),**[9] **Fahrni et al. in Malaysia (2022),**[65] **and G. Reach et al. in France (2023),**[7] suggesting a consistent lack of influence for these variables across diverse elderly populations.

Likewise, both our study and the studies by **Rodrigues et al. (2023) in Brazil**[10] **Turki L, et al. in Tunis (2024),**[9] **G. Reach et al. in France (2023)**[7] **and Albadrani et al. in Saudi Arabian (2024)**[11] reported a significant association between lower educational level and poor adherence, reinforcing the critical role of health literacy in adherence behavior.

Regarding sex, our study identified males as having significantly poorer adherence, a finding that was not supported by the **Albadrani et al. in Saudi Arabian (2024),**[11] **Turki L et al. in Tunis (2024),**[9] **G. Reach et al. in France (2023)**[7] which found no significant gender difference—highlighting a potential cultural or contextual influence specific to our setting.

Regarding occupation in our study, occupational status was significantly associated with medication adherence (p= 0.001), with retirees, workers and unemployed showing the highest rates of poor adherence, and the employers achieving good adherence. These findings is similar to the result of **G. Reach et al. in France**

(2023)[7] and **Fahrni et al. in Malaysia (2022)[65]** and differ from those of a **Albadrani et al. in Saudi Arabian (2024)**[11] and **Turki L, et al. in Tunis (2024)**[9] study involving older adults, which reported no statistically significant association between employment and adherence.

Relationship between the adherence level and number of medicines

As presented in Table 7, our study shows significant association between adherence level and the number of medications a person takes (p=0.001). Specifically, adherence decreased as the number of medications increased which is similar the study by **Liu Y. et al. in China (2023)[69]** and this supports findings from **and Almutairi et al. in Saudi Arabia (2022).[68]** In contrasts to the study by **G. Reach et al. in France (2023)**[7] (which found a positive relationship) and **Turki L, et al. in Tunis (2024)**[9] (which found no significant association). It adds strong evidence to the well-documented concern that polypharmacy negatively impacts adherence, especially in older populations.

Minor discrepancies across studies likely reflect cultural, educational, or healthcare system differences, but the overall alignment underscores a universal pattern. These consistent findings across diverse settings reinforce the relevance of our results and point to common global barriers—particularly pill burden, memory lapses, and belief-driven concerns—as key targets for adherence-improvement interventions in elderly patients with chronic disease and polypharmacy.

Relationship between the adherence level and non - adherence types

The findings of our study revealed that intentional non-adherence was more prevalent than unintentional non-adherence, with most participants reporting that they skipped or altered medications due to side effects or the belief that treatment was ineffective. This result is similar to the findings of **G. Reach et al. in France (2023),**[7] where intentional non-adherence was also prominent, although they found a stronger association between unintentional non-adherence and poor adherence.[7]

CONCLUSION

Elderly patients with polypharmacy face significant challenges in medication adherence, with nearly half demonstrating poor adherence, one-third showing medium adherence, and only 16% achieving good adherence. Among those with suboptimal adherence, intentional non-adherence was more common, affecting about two-thirds, while unintentional non-adherence accounted for the remaining one-third. Poor adherence was significantly associated with male sex, low educational level, unemployment, and a higher number of medications. Furthermore, a strong and statistically significant link was observed between the type of non-adherence and medication commitment, as intentional non-adherence correlated with poorer commitment, and low commitment was also significantly related to unintentional non-adherence.

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