

Prevalence and Factors Associated with Polypharmacy among Elderly Persons.

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Received: August, 2018 Accepted: October, 2018

Abstract

Background: Polypharmacy especially in elderly is a challenging public health problem all over the world that leads to increased hospitalization, poor quality of life and represents an economic burden especially in developing countries like Egypt. **Objectives:** To estimate the prevalence of polypharmacy and identify associated factors among elderly persons. **Method:** A descriptive, cross-sectional study conducted from August to December 2017, in Benha city, Qalubiyah Governorate, Egypt. Study population is 60 years elder and over. They were interviewed by the researcher using a standardized valid questionnaire. **Results:** A total of 300 elderly persons were enrolled. Approximately 67% aged between 60 and 70 years, 73.7% of them live with their families, and 51.7% of them had a monthly income more than 2000 LE, 80% of them was non-smokers, and 85.3% of them reported using five or more medications. Logistic regression revealed that the significant predictors of polypharmacy use were sex (adjusted Odds Ratio (aOR), 0.1; 95% CI 0.04-0.28, $p < 0.001$), residence (aOR, 3.29; 95% CI 1.18-9.14, $p = 0.02$), monthly income (aOR, 0.33; 95% CI 0.13-0.18, $p = 0.02$) and co-morbidity (aOR, 2.56; 95% CI 1.75-3.74, $p < 0.001$). On the other hand, polypharmacy was not significantly associated with age (aOR, 0.84; 95% CI 0.34-2.07, $p = 0.71$), smoking (aOR, 0.83; 95% CI 0.23-2.88, $p = 0.77$), educational level (aOR, 1.19; 95% CI 0.62-2.29, $p = 0.59$) or marital status (aOR, 0.71; 95% CI 0.47-1.07, $p = 0.1$). **Conclusion:** The prevalence of polypharmacy was 85.3%. Sex, residence, monthly income and co-morbidity were significant predictors of polypharmacy.

Keywords: Polypharmacy; Elderly; Prevalence; Egypt.

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Introduction

World Health Organization (WHO) report anticipated that between 2015 and 2050, the percentage of the world's population over 60 years will nearly double from about 12% to 22%.¹ Egyptian census 2017, reported that people above 60 years represented 6.9% of total Egyptian population.² Elderly people usually suffer from multiple co-morbidities and, as a result, become exposed to multiple drugs;

this situation is often referred to as "polypharmacy".³

Polypharmacy is defined as the use of several different medications by one patient at the same time.⁴ Sometimes it is estimated it to be 2 to 5 drugs, but the most commonly used definition is the simultaneous utilization of 5 to 7 drugs³ and over seven medications is termed excessive polypharmacy.⁵

Polypharmacy especially in elderly is a challenging public health problem all over the world.¹ Geriatric patients regularly experience the ill effects of changed pharmacokinetics, lessened medication clearance, and cognitive deficits.⁶ Accompanying utilization of various medications may result in higher adverse drug reactions, drug-drug interaction and bring down adherence to treatment and cognitive decline.⁷ In addition to increase need for care, higher healthcare cost and elevated hospital admission rate.⁴

An adverse drug event is defined as “an injury due to a medication,” and occurs in approximately (35 %) of elderly outpatients and (40 %) of elderly hospitalized patients.^{8,9} The most common type of ADE is an adverse drug reaction (ADR), which is characterized as a noxious and unintended response that occurs at normal doses of a medication.¹⁰ ADRs may be Type A or Type B reactions. Type A reactions are related to the mechanism of action, for example, bleeding on warfarin, and this may occur if drug interactions increase medication’s plasma levels. Type B reactions are random, like anaphylaxis. The risk of ADRs is (15%) with two medications and rises to (58%) with five medications and (82%) with over seven medications. The four most common drug groups associated with preventable drug-related admissions are anti-platelets; diuretics; NSAIDs and anti-coagulants.¹¹

The prevalence of polypharmacy in the elderly had been assessed by many studies. It ranged between (39%)¹² and (45%)¹³ in developed countries. Egyptian study estimated it to be (56%) in rural communities¹⁴, but still there is rarity in studies evaluating the prevalence of polypharmacy in developing countries and to our knowledge, it is the first study

estimating the prevalence of polypharmacy in Benha city, Qalubiya Governorate.

Method

Study design: This is a descriptive cross-sectional multicenter study conducted in Benha city, Qalubiya Governorate, Egypt between August and December 2017.

Sample size: The sample size was calculated using EPI-Info (Epidemiological information package) software version 6.1, C.I (Confidence Interval) 95%, Power 80%. The sample was 271 people we increase 10% so the sample size needed was 300 people.

Data collection methods: The researcher used the face-to-face structured interview approach, based on standardized questionnaire. The data for analysis was collected from patients in different health care institutions including Benha University Hospital and Health Insurance clinics.

Sample selection: The study sample was selected according to certain inclusion criteria: Being 60 years old or more, Be a resident of Banha city, The patients had at least one chronic pathological condition in the following clusters: cardio-metabolic (consisting of diabetes, heart disease or hypertension), musculoskeletal (consisting of arthritis or osteoporosis), and respiratory (consisting of COPD or asthma), GIT (hepatic or gastric diseases) and psychological disorders (depression and sleep disorders), Have been taking at least two drugs on regular base in the last six months and His health condition is stable and he is not a hospital resident at the time of study.

For five months, study participants were selected from elderly attending out-patient clinics. The researcher interviewed patients on Saturday and Tuesday at Banha University Hospital and on Sunday and Wednesday at health insurance clinics.

Patients were interviewed in front of the drug dispensary. At the beginning of each day of the data collection period, the first patient was selected randomly then every 10th patients was chosen in order to have time to interview selected ones. The time of interview was ranged between (5-10 minutes). The selected patient was asked to participate in this study and in case of agreement, we explained the purpose of the study and confirmed that all the patient's data is surrounded by confidentiality and the patient is entitled to remain anonymous if he wants. Sometimes care givers were allowed to help participants respond to questions.

The average number of interviewed patients was (3-5) per day. The total interviewed patients were (327) patients, and after exclusion of incomplete sheets (some patients refused to answer questions related to monthly income or could not remember the name of all drugs) we finally had 300 sheets valid for coding and further analysis.

Those with cognitive deficit or a condition that prevented answering the questionnaire were excluded from the start.

Data collection tool: The questionnaire was pre-tested on 10 participants as a pilot study prior to the gross data collection which was not included in our results, and relevant modifications were instituted prior to commencement of actual data collection. The questionnaire contained socio demographic data, including gender, age, and marital status, place of residents, education level, monthly income, health status of the patient and behaviours and complications of drug use. The used questionnaire was validated in previous study.¹⁵ We classified patients to two groups according to the number of taken drugs, polypharmacy group (5 drugs or more) & no-polypharmacy group (less than 5 drugs).

Table (1): Characteristics of the study group:

Characteristic	N & (%) 300
Age, n (%), years	
60-70	200 (66.7)
71-80	91 (33.3)
more than 80	9 (3)
Sex, n (%)	
Male	162 (54)
Female	138 (46)
Residence, n (%)	
Geriatric home	3 (1)
With family	221 (73.7)
Alone	76 (25.3)
Monthly Income, n (%), LE	
Less than 1000	106 (35.3)
1000-2000	39 (13)
More than 2000	155 (51.7)
Educational level, n (%)	
Illiterate	56 (18.7)
Basic education	45 (15)
Secondary education	48 (16)
University education	114 (38)
Postgraduate	37 (12.3)
Marital Status, n (%)	
Married	130 (43.3)
Divorced	6 (2)
Widow	164 (54.7)
Smoking, n (%)	
Yes	60 (20)
No	240 (80)
Number of medications, n (%)	
< 5 medications	44 (14.7)
≥ 5 medications	256 (85.3)
Co-morbidity, Median (IQR)	
	4 (2)

Statistical analysis

The collected sheets were divided into two groups each of (150 sheets). Every researcher was responsible of one group for easier, faster and more accurate data entry ,and this was according to pre-determined code. Data were tabulated, coded and analyzed using the Statistical Package for the Social Sciences (SPSS) software version 20.0 for Windows. Qualitative data were expressed in number

Table (2): Comparison between polypharmacy and no polypharmacy regarding socio-demographic data:

		< 5 drugs		≥ 5 drugs		X ²	p-value
		No.	%	No.	%		
Age	60-70	35	79.5	165	64.5	8.5	**0.01
	71-80	6	13.6	85	33.2		
	more than 80	3	6.8	6	2.3		
Sex	Male	13	29.5	149	58.2	12.4	**<0.001
	Female	31	70.5	107	41.8		
Residence	Geriatric home	0	0.0	3	1.2	4.4	0.1
	With family	38	86.4	183	71.5		
	Alone	6	13.6	70	27.3		
Monthly Income	Less than 1000	12	27.3	94	36.7	12.1	**0.002
	1000-2000	0	0.0	39	15.2		
	More than 2000	32	72.7	123	48.0		
Educational level	Illiterate	9	20.5	47	18.4	21.2	**<0.001
	Basic education	3	6.8	42	16.4		
	Secondary education	3	6.8	45	17.6		
	University education	15	34.1	99	38.7		
	Postgraduate	14	31.8	23	9.0		
Marital Status	Married	21	47.7	109	42.6	7.02	*0.03
	Divorced	3	6.8	3	1.2		
	Widow	20	45.5	144	56.2		
Smoking	Yes	6	13.6	54	21.1	1.3	0.3
	No	38	86.4	202	78.9		
Co-morbidity	One	0	0.0	6	2.3	10.7	*0.03
	Two	14	31.8	59	23.0		
	Three	16	36.4	51	19.9		
	Four	7	15.9	78	30.5		
	More than 4	7	15.9	62	24.2		

*significant; ** Highly significant

and percentage. The statistical significant differences in polypharmacy and factors affecting it were done with Chi square test (X^2). Logistic regression analysis was done to detect predictors of polypharmacy. P value <0.05 was considered significant.

Ethical Considerations

Ethical approval was granted by ethical committee at Benha Faculty of Medicine and verbal consent was also obtained from each participant before conducting interview. Participants were told that the obtained information is confidential.

Results

As table (1) shows, among the 300 elderly persons surveyed, 66.7% were between 60 and 70 years old, 54% were males, 73.7% live with their families, 51.7% had income more than 2000 LE, and 80% were non-smokers. In addition, 38% had university education, while 18.7% were illiterate. The median (IQR) for co-morbidities was 4 (2%). In terms of polypharmacy, 256 (85.3%) individuals reported using five or more medications (Table 1).

(Table 2) revealed the statistically significant difference between poly-pharmacy and non-poly-pharmacy groups regarding age (most of non-poly-pharmacy group belonged to the age group 60-70

Table (3): Predictors of polypharmacy among elderly patients:

Predictors	Bivariate logistic regression		Multivariate logistic regression	
	OR (95% CI)	P-value	Adjusted OR	P-value
Age	1.49 (0.77-2.87)	0.23	0.84 (0.34-2.07)	0.71
Sex	0.3 (0.15-0.6)	*0.001	0.1 (0.04-0.28)	*<0.001
Smoking	0.59 (0.23-1.47)	0.26	0.83 (0.23-2.88)	0.77
Residence	1.99 (0.89-4.42)	0.09	3.29 (1.18-9.14)	*0.02
Monthly Income	0.66 (0.44-0.94)	*0.03	0.33 (0.13-0.81)	*0.02
Educational level	0.75 (0.58-0.97)	*0.03	1.19 (0.62-2.29)	0.59
Marital Status	1.18 (0.85-1.62)	0.32	0.71 (0.47-1.07)	0.1
Co-morbidity	1.34 (1.04-1.7)	*0.02	2.56 (1.75-3.74)	*0.000

years., while those belonged to the age group 70 to 80 were mainly from a poly-pharmacy group) (p=0.01), Sex (58.2% of poly-pharmacy group were males, while (70.5%) of non poly-pharmacy group were females)(p<0.001), Monthly income (48% of poly pharmacy group and 72.7% of non poly-pharmacy group were more than 2000 L.E. per month .poly- pharmacy group showed lower income than the other group ,and this difference was statistically significant(p=0.002). As regards educational level, only 47.7% of poly-pharmacy group were university or postgraduate educated vs. 65.9% of the other group which reflected lower level of education of poly-pharmacy group (p<0.001).As regards marital status (47.7%) of non poly pharmacy were married, while the majority of polypharmacy group (56.2%) were widows (p=0.03) and finally , having ≥ 4 Co-morbidities were higher among polypharmacy group (54.6%) vs. (31.8%) for non polypharmacy group (p=0.03). There was no statistically significant difference regarding Residence (p=0.1) and Smoking (p=0.3).

Table (3) revealed that the following were significant predictors of polypharmacy use, sex (OR:0.3 ,95% CI 0.15-0.6, p<0.001), monthly income (OR: 0.66 ,95% CI 0.44-0.94,p =0.03) ,educational level (OR:0.75 ,95% CI 0.58-0.97,p=0.03)and finally presence of Co-morbidity (OR: 1.34 ,95%

CI 1.04-1.7, p=0.02) .Multivariate logistic regression revealed that the following were the significant predictors of polypharmacy, sex (adjusted odds ratio (aOR), 0.1; 95% CI 0.04-0.28, p <0.001), residence (aOR, 3.29; 95% CI 1.18-9.14, p = 0. 02), monthly income (aOR, 0.33; 95% CI 0.13-0.18, p = 0. 02) and Co-morbidity (aOR, 2.56; 95% CI 1.75-3.74, p <0.001). However, polypharmacy was not significantly associated with Age (aOR, 0.84; 95% CI 0.34-2.07, p =0.71), Smoking (aOR, 0.83; 95% CI 0.23-2.88, p =0.77), Educational level (aOR, 1.19; 95% CI 0.62-2.29, p =0.59) and Marital status (aOR, 0.71; 95% CI 0.47-1.07, p=0.1).

Discussion

In this study, the prevalence of polypharmacy was 85.3%, which is nearly similar to the results of previous studies conducted in Mexico¹⁶, Abu Dhabi¹⁷ & Saudi Arabia¹⁸ (84.5%, 89% and 89% respectively). On the contrary, our rate was higher than that of a previous Egyptian study estimated it to be 56% in rural communities¹⁴ and another study performed in elderly patients on discharge from a tertiary care hospital in Oman which found it (76.3%).⁴ The high rate of polypharmacy among our study group can be attributed to many factors like multiple co-morbidities they have, the culture of taking medications without medical prescription, easy access to over-the-

counter medicines and higher socioeconomic condition in urban areas in comparison to rural ones which enable elderly people to have medications at their own expense. Though the high socioeconomic standard in developed and Arab countries in Gulf area, but there is very strict supervision on private pharmacy which limits easy access to over the counter medications.

This study found a significant difference between polypharmacy & no polypharmacy group regarding age, sex, educational level, monthly income, marital status & co-morbidities. Polypharmacy group was older, male more than female, of lower educational level, lower monthly income, the majority were widows with multiple co morbidities > 4. Some of our findings come in agreement with results of previous studies reported a significant association between polypharmacy and sex¹⁹ level of education, and/or a history of diabetes or hypertension.²⁰ Patient conduct and understanding can affect polypharmacy. Deprived knowledge about medication may lead to extra or needless drugs by physicians who don't know patients' current or previous medication list, this may be due to movement of patients between primary and secondary care. That result in a 'prescribing cascade', in which new symptom appears and the physicians don't know its source and write another drug for it and so on. Visiting more than one physician in different sites also rise the risk of repeated medications or drug interactions.²¹

This study results differed from another study found no association between polypharmacy and age, sex, educational level, or number of co-morbidities. These differences could be the result of differences in the characteristics of the populations studied and/or sample size.

Limitations of this study

Inability to generalize the results of this study for elderly in different countries due

to socio-demographic & economic variations and multiple accepted definitions of polypharmacy.

Conclusion

Polypharmacy is a common phenomenon among old males, with low educational level. The majority of polypharmacy group were widows with multiple co-morbidities (≥ 4 diseases). Sex, residence, monthly income and number of co-morbidities are significant predictors of this phenomenon.

Recommendations

Ministry of health should strictly supervise private pharmacies to limit over-the-counter medicines and recent medical prescription should be mandatory for having drugs. Also, periodic medical evaluation must be done especially for old people with multiple chronic diseases to minimize the amount of taken medications as possible as we can to decrease drug interaction.

Acknowledgment

The authors are thankful for all participants for their collaboration.

References

1. World Health Organization Report (2015). Facts About Ageing.
2. Central Agency for Public Mobilization and Statistics (CAMPAS), Census Egypt 2017.
3. Al-Hashar A, Al Sinawi H, Al Mahrizi A, Al-Hatrushi M (2016): Prevalence and Covariates of Polypharmacy in Elderly Patients on Discharge from a Tertiary Care Hospital in Oman; Oman Medical Journal (2016), 31, 6: 421–425.
4. Duerden M , Avery T, & Payne R. (2013). Polypharmacy and medicines optimization.
5. Making it safe and sound. Retrieved from www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/polypharmacy-and-medicines-optimisation-kingsfund-nov13.pdf.
6. Royal Pharmaceutical Society (2013). Promoting Pharmacy. Retrieved from www.rpharms.com/promoting-pharmacy-pdfs/mo—evidence-inpractice.

7. Dagle RJ, Sharma A. Polypharmacy(2014): a global risk factor for elderly people. *J Int Oral Health* 2014 Nov-dec;6(6):i-ii.
8. Almeida N, Reiners A, Azevedo R, Silva A, Cardoso J, Souza L (2017). Prevalence of and factors associated with polypharmacy among elderly persons resident in the community. *Rev. bras. geriatr. gerontol*; 20(1): 138-148.
9. Institute of Medicine (2006). Preventing medication errors. Washington, DC: National Academies Press.
10. Hohl CM, Dankoff J, Colacone A, Afilalo M (2001). Polypharmacy, adverse drug-related events, and potential adverse drug reactions in elderly patients presenting to an emergency department. *Ann Emerg Med.*; 38:666–71.
11. Edwards IR, Aronson JK (2000). Adverse drug reactions: definitions, diagnosis, and management. *Lancet*; 356:1255–9.
12. Howard R, Avery A, Slavenburg S, Royal S, Pipe G, Lucassen P, Pirmohamed M. (2006). Which drugs cause preventable admissions to hospital? A systematic review. *British Journal of Clinical Pharmacology*, 63(2), 136–147.
13. Charlesworth CJ, Smit E, Lee DS, Alramadhan F, Odden MC (2015). Polypharmacy adults aged 65 years and older in the United States: 1988-2010. *J gerontol Ser ABiol Sci Med Sci*. 2015;70(8):989-95.
14. Banerjee A, Mbamalu D, Ebrahimi S, Khan AA, Chan TF (2011). The prevalence of polypharmacy in elderly attenders to an emergency department - a problem with a need for an effective solution International. *J Emerg Med [Internet]*. 2011 [acessoem 30 dez. 2014];4(1):1-8.
15. Sarah A. Hamza, Mohamed Z. Abdel wadoud , Ismail A. A. Kandil and Ahmed K. Mortagy(2010). Polypharmacy and inappropriate medication use among elderly persons in an Egyptian rural area. *ast Journal of Age and Ageing* 2009; Volume 6, Issue 5 Middle East Journal of Age and Ageing Volume 7, Issue 4, August 2010.
16. Akkawi F (2008). Prevalence and Risk Factors affecting polypharmacy among elderly patients in the North of West Bank. Nablus, Palestine. An-Najah National University.
17. Martínez-Arroyo JI, Gómez-García A, Saucedo-Martínez d(2014). Polypharmacy prevalence and potentially inappropriate drug prescription in the elderly hospitalized for cardiovascular disease. *Gac Med Mex* 2014 dec;150(Suppl 1):29-38.
18. Mubarak N. Makramalla E, Umniya A, Rao P (2014). Prevalence of Poly-pharmacy in the Elderly: Implications of Age, Gender, Comorbidities and drug Interactions. *SOJ Pharm Pharm Sci* 2014;1(3):1-7.
19. Salih S, Yousuf M, durihim H, Almodaimegh H, Tamim H(2013). Prevalence and associated factors of polypharmacy among adult Saudi medical outpatients at a tertiary care center. *J Family Community Med* 2013 Sep;20(3):162-167.
20. Linjakumpu T, Hartikainen S, Klaukka T, Veijola J, Kivelä SL, Isoaho R(2002). Use of medication and polypharmacy are increasing among the elderly. *J ClinEpidemiol*. 2002; 55:809–81.
21. Moen J, Antonov K, Larsson CA, Lindblad U, Nilsson JL, Råstam L, et al(2009). Factors associated with multiple medication use in different age groups. *Ann Pharmacother*. 2009; 43:1978–85.
22. Negar Golchin, Scott H. Frank, April Vince, Lisa Isham, and Sharon B. Meropol. Polypharmacy in the elderly. *J Res Pharm Pract*. 2015 Apr-Jun; 4(2): 85–88.