

Control Poly-Pharmacy: Elderly Patients' Perception

Hanan Elzeblawy Hassan^{1,*}, Soheir Badr-Elden²,
Sameer Hamdi³, Mohamed Elsayed Aboudonya⁴

¹Maternal and Newborn Health Nursing, Faculty of Nursing, Beni-Suef University, Egypt

²Community Health Nursing, Faculty of Nursing, Cairo University, Egypt

³Community Health Nursing, Faculty of Nursing, Beni-Suef University, Egypt

⁴Nursing Science Teaching Specialist in Technical Health Institute of Imbaba, Egypt

*Corresponding author: nona_nano_1712@yahoo.com

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Abstract *Background:* Poly-pharmacy has previously been recognized as a key predictor of potentially inappropriate prescription in the elderly. The number of medicines used is not always symptomatic of Poly-pharmacy since all of the prescriptions may be clinically required and acceptable for the patient; nevertheless, as the number of prescribed drugs grows, so does the likelihood of Poly-pharmacy. **Aim of the study:** The study aims to assess the level of knowledge regarding Poly-pharmacy among old-age patients. **Design:** Descriptive cross-sectional study design was used. **Subjects & Setting:** sample size was 114 elderly patients from elderly patients visiting outpatient clinics monthly. **Tool:** An interview questionnaire to assess geriatric patient's Poly-pharmacy knowledge. **Results:** Two-thirds of the study sample (66.7%) were taking medications based on their own previous experience, 41.2% was unaware of the Poly-pharmacy definition, 36.8% didn't know about Poly-pharmacy contributing factors, 38.5% was unaware of GIT side effects related to Poly-pharmacy, 35.9% was unaware of the Poly-pharmacy impact on their cognitive function, 29.8% didn't know the measures that are reducing Poly-pharmacy. **Conclusion:** The prevalence of Poly-pharmacy and its consequences among the elderly is significantly consequent to the level of education. **Recommended:** Designing an educational program for the elderly to increase their awareness and knowledge about the phenomenon of drug abuse and its consequences.

Keywords: poly-pharmacy, old age, knowledge

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1. Introduction

The term "elderly" refers to those aged 60 and above, who make up the world's fastest-growing demographic. This rise in life expectancy has resulted in an increase in the number of chronic diseases, resulting in more hospitalizations, numerous medicines, and adverse drug reactions (ADRs). Inappropriate use of medications is one of the public health domain's concerns, since it may lead to severe (ADRs), which account for 3% to 23% of hospital admissions, longer hospital stays, and higher morbidity and death rates. [1]

Poly-pharmacy has previously been recognized as a key predictor of potentially inappropriate prescription (PIP) in the elderly. The number of medicines used is not always symptomatic of Poly-pharmacy since all of the prescriptions may be clinically required and acceptable for the patient; nevertheless, as the number of prescribed drugs grows, so does the likelihood of Poly-pharmacy. [2]

The phenomenon of Poly-pharmacy is rising in the old age population, and the incidence of adverse drug effects and complications is increasing as well. [3]

Poly-pharmacy is considered to be a geriatric syndrome with the rise of modern medicine and the rapid growth of the old age population, Poly-pharmacy has become a subject of interest for primary care providers, geriatricians, hospitalists, pharmacists, healthcare payers, and regulatory institutions. [4]

On International Day for Older People, Central Agency for Public Mobilization and Statistics (CAPMAS) issued a statement. The number of senior Egyptians still working, according to the organization, has reached 1.217 million, with 52.9 percent working in agriculture and fishing, almost 17.5 percent in wholesale and retail commerce, 4.7 percent in transportation and storage, and 24.9 percent in other industries. Egypt's population surpassed 99 million people in July, according to CAPMAS. [5]

Pharmacokinetic changes in the elderly: As a consequence of different clinical circumstances, medication reaction varies with age. The drug's absorption is decreased, and its distribution is affected by the body's well-known changes in composition. In old age, the frequency and efficiency of their removal are substantially decreased. [6]

Orally given medicines are absorbed via the digestive system. The rate of absorption is determined by the blood supply and the physicochemical characteristics of the

medication; however, owing to atrophy of the stomach mucosa, the gastric fluid output is significantly decreased in the elderly. Low absorption of dietary nutrients such as iron or vitamin B12 is caused by a decrease in gastric juice productions. [7]

Poly-pharmacy contributing factors: Prescribers order maintenance medicines for the elderly who have been diagnosed with persistent medical problems. A study of what defines Poly-pharmacy found that various numbers of medications are needed for different situations. Poly-pharmacy is defined as the ordering of more than five drugs by ambulatory or community-dwelling older individuals; Poly-pharmacy occurs in hospitalized patients and long-term nursing home residents when the total number of medications prescribed reaches nine or more. [8]

Poly-pharmacy in the elderly has been recognized by the Centers for Medicare & Medicaid Services as essential to the safety of the nation's long-term care population. Residents of nursing homes are required to undergo a monthly Medication Regimen Review by a pharmacist who specializes in geriatric patient care. The consultant pharmacist's job is to make sure that a resident's medication regimen is free of unnecessary drugs, such as prescription medications, over-the-counter medications, or supplements, that have no indication, are prescribed at unsafe doses, or are causing or risking drug-drug interactions. When these circumstances are present or have happened, the prescriber must accept the pharmacist's advice and determine what action should be done to alleviate the situation. [9,10]

In the long-term care population, potentially inappropriate medicines, defined as those whose dangers outweigh their benefits, are extensively utilized. Poly-pharmacy among nursing home residents leads to a rise in drug-drug interactions, emergency department visits, hospitalizations, mortality, and healthcare expenditures. Patients are living longer and have more illnesses that require medication therapy. Therefore, geriatric nurses see this as a major problem. This issue is difficult to address since patients may see numerous specialists and may be under-informed about how to manage their prescriptions. Providers may play an important role in teaching patients about the dangers of Poly-pharmacy. [3]

In addition to healthcare professionals' contributions to medication management, informal caregivers assist older individuals with numerous chronic illnesses, particularly those who may also have a cognitive impairment, in ensuring safe, proper drug usage at home. Although informal caregivers play an important role in drug management, there have been reports of time restrictions, worry about making mistakes, and older persons' unwillingness to collaborate. They also have trouble keeping constant supplies of medications, supporting administrative work, making clinical choices, and dealing with conflicts or arguments with the elderly or even with healthcare experts over inefficient pharmaceutical procedures.

The Roles and Accountability of Healthcare Professionals: Because of the complexity of care that home-bound older people with various chronic illnesses need, they are frequent consumers of healthcare services and consult with a variety of healthcare experts. As a result, medication management in this group necessitates

cross-professional cooperation across various healthcare and social service providers and organizations. In addition to prescribers, pharmacists, nurses, and other allied health professionals may be involved in and accountable for medication management. [11]

Elderly people who live alone and have numerous chronic illnesses often do not get the efficient, effective, and coordinated care that they need. MRPs are inextricably linked to the failure to coordinate care for older people living at home who have many chronic illnesses. Those who visit three or more healthcare experts say they get contradictory advice, making it difficult to determine which counsel to trust. Inadequate medication explanations result in omissions and incorrect dosages, as well as anxiety and confusion among the elderly. Healthcare professionals should take responsibility for enhancing medication management among older individuals who live at home, particularly when they move from acute care facilities to their homes. [12]

1.1. Significance of the Study

The distribution of drugs varies in old age because of the body composition changes. As individuals grow older, their total body water drops, their lean mass decreases, and their body fat percentage rise instead. The volume of distribution for lipophilic medicines increases, whereas the volume of distribution for hydrophilic drugs shrinks. As a consequence, water-soluble medicines have a greater serum concentration than lip-soluble pharmaceuticals, resulting in a longer duration of action for water-soluble drugs. Another notable alteration is a drop in plasma albumin (up to 20% in healthy old people), which is most likely attributable to a restriction in their production in the liver. As a result, many medications that bind to albumins (such as anti-inflammatory drugs) have reduced binding capacity, resulting in greater plasma-free drug levels. As a result, either their impact or their toxicity has increased. [13]

Poly-pharmacy in the elderly may, also, be linked to a higher risk of poor adherence, worse results, and a higher financial burden. Because age-related physiologic changes impact medication pharmacokinetics and pharmacodynamics, older people are at a higher risk for these side effects than the general population. Low health literacy, as well as medication abuse owing to cognitive impairment in the elderly, all contributes to a higher risk of Poly-pharmacy-related adverse events. In the elderly, Poly-pharmacy has been linked to a greater death rate and more unnecessary hospitalizations. [2]

Therefore, the study aims to assess the knowledge regarding to control Poly-pharmacy among old age patients.

1.2. Aim of the Study

The current study aims to assess the level of knowledge with regards to poly-pharmacy among old age patients.

1.3. Research Questions

What is the level of old age patient's knowledge with regards to polypharmacy?

2. Subjects and Methods

Subjects and methods of this study were portrayed under the four main topics as follows:

- 2.1. Technical design.
- 2.2. Operational design.
- 2.3. Administrative design.
- 2.4. Statistical design.

2.1. Technical Design

The technical design for this study includes research design, research setting, and subjects of the study, and tools of data collection.

2.1.1. Research Design

Descriptive design was used to fulfill the aim of the study.

2.1.2. Research Setting

This study was conducted at the outpatient (OPD) clinics affiliated to Beni-Suef university hospital.

2.1.3. Subjects

Representative cross-sectional convenient sample consisted of 114 elderly patients visiting OPD clinics in the pre-determined setting

2.1.4. Tools of Data Collection

The tool used for data collection for the current study namely, geriatric patient's poly-pharmacy knowledge. It consists of two parts:

Part (A):- Demographic data: This part was developed by the researcher aims at pertaining personal characteristics data about study subjects such as age, gender, level of education, current comorbidities...etc.

Part (B):- It aims to assess geriatric patient's Poly-pharmacy knowledge, it was developed by the researcher, this tool consists of 7 items in the form of multiple-choice questions.

2.1.5. Tools Validity

The content validity of the study tools was assessed by a jury group consisted of five experts of the Community Health Nursing. All of them were Faculty members of the Community Health Nursing Department in the Faculty of Nursing affiliated to Cairo University and Beni-Suef University. Jury group members judge tools for comprehensiveness, accuracy, and clarity of the used language. Based on their recommendation, correction, addition, and/or omission of some items were done.

2.1.6. Tools Reliability

The tool's accuracy was based on Cronbach's Alpha.

2.2. Operational Design

The operational design for this study included three phases namely, preparatory phase, pilot study, and field-work.

2.2.1. Preparatory Phase

This phase started with a review of current and past, national and international related literature concerning the subjects of the study, using textbooks, articles, journals, and websites. This review was helpful to the researcher in reviewing and developing the data collection tools, and then the researcher tested the validity of the tool through a jury of expertise to test the content, knowledge, accuracy, and relevance of questions for tools.

Scoring system:

Questionnaire to assess the old age patient's knowledge related to poly-pharmacy. It consists of 7 major items and each item was scored 3 for the correct and complete answer and 2 for the incomplete answer and 1 for don't know or the wrong answer. The scores were summed up and converted into a percent score. A subject who got less than 50% total score was considered to have an unsatisfactory level of knowledge and who got 50% and over was considered to have a satisfactory level of knowledge.

2.2.2. Pilot Study

A pilot study was carried out on 12 patients to evaluate the applicability, efficiency, clarity of tools, assessment of the feasibility of fieldwork, besides to detect any possible obstacles that might face the researcher and interfere with data collection. Necessary modifications were done based on the pilot study findings to strengthen their contents or for more simplicity and clarity. The pilot sample was excluded from the main study sample

2.2.3. Field-Work

Data collection of the study was started on 15th June 2019 and completed by the end of December 2019. The researcher attended the outpatient clinics three days per week (Sunday, Monday, and Wednesday) from 9 am to 2 pm at Beni-Suef university hospital for all the older adults who are already diagnosed with multi comorbidities disease and receiving medical treatments. The researcher first explained the aim of the study to the participants and reassures them that information collected will be treated confidentially and that it will be used only for the research and they have the right to withdraw from the study at any point without any harm or effect on the service they are receiving.

2.2.4. Ethical Consideration

The study was conducted with careful attention to the ethical standards of research and the rights of participants. Verbal consent was taken from each nurse as well as patient to participate in this study. During the initial interview, the purpose of the study and the procedures were explained to the participants. Subjects were assured that all information will be treated confidentially and will be used for research only to assure the confidentiality of the participants. Participants will be assured that their participation in the study is voluntary and that they can refuse/ withdraw from the study at any time. It was explained that there are no costs to participate in the study and no harm from withdrawal or Refusing to participate.

2.3. Administrative Design

An official letter requesting permission to conduct the study was submitted to the director of Beni-Suef university hospital to obtain his approval to carry out this study. This letter included the aim of the study and photocopy from data collection tools to get permission and help for the collection of data.

2.4. Statistical Design

The collected data were organized, tabulated, and statistically analyzed using SPSS version 19 created by IBM. For numerical values, the mean and standard deviations were calculated, while the Chi-square test was used to detect the statistical differences between variables. When the chi-square test was not suitable due to the presence of observations with a small number, Monte Carlo exact test was used. The correlation between study variables was calculated using Pearson's correlation coefficient the level of significance was adopted at $p < 0.05$.

3. Results

Figure 1 showed that the distribution of socio-demographic characteristics of the study sample as data reveals that more than half of the study sample (56.2%) was male, and more than two-thirds of the study sample (69.3%) were living in rural areas, while more than half of the study sample (51.7%) were married. More than a third of the study sample (38.6%) completed secondary education. While the findings reveal that near two-thirds of the study sample (60.5%) didn't have enough income. More than half (60.5%) of the study sample didn't have enough income, while less than half (39.5%) of the study sample had enough income. More than two-thirds (70.1%) of the

study sample had easy access to medical health services, while near to third (29.8%) had difficult access to medical health services.

Figure 2 showed that the distribution of the study old age patients according to sources of non-prescribed medications. The data clarified that two-thirds of the study sample (66.7%) were taking medications based on their own previous experience. More than half of the study sample (57%) depended on the pharmacist prescription, and almost half of the sample (49%) referred to the advice of friends. While near half of the study sample (44.7%) were taking medications based on experience from other family members.

Figure 3 describes that the Distribution of the study sample according to their knowledge about Poly-pharmacy. The data showed that near half of the study sample (41.2%) was unaware of the Poly-pharmacy definition, more than a third of the study sample (36.8%) didn't know about Poly-pharmacy contributing factors. More than one-third of the study sample (38.5%) didn't know the people at risk. Less than a third of the sample (28.9%) couldn't identify the impact of Poly-pharmacy on their physical functions. More than a third of the study sample (38.5%) was unaware of GIT side effects related to Poly-pharmacy. More than a third of the study sample (35.9%) was unaware of the Poly-pharmacy impact on their cognitive function and less than one-third of the study sample (29.8%) didn't know the measures that are reducing Poly-pharmacy.

Figure 4 showed that the highest satisfactory level of knowledge was for the university education 60% followed by the secondary level of education 50% and finally in the third level were the male patients 46.8%. On the other hand, the highest unsatisfactory level of knowledge was from the illiterate patients 88% followed by 80% for both the primary level of education and female patients.

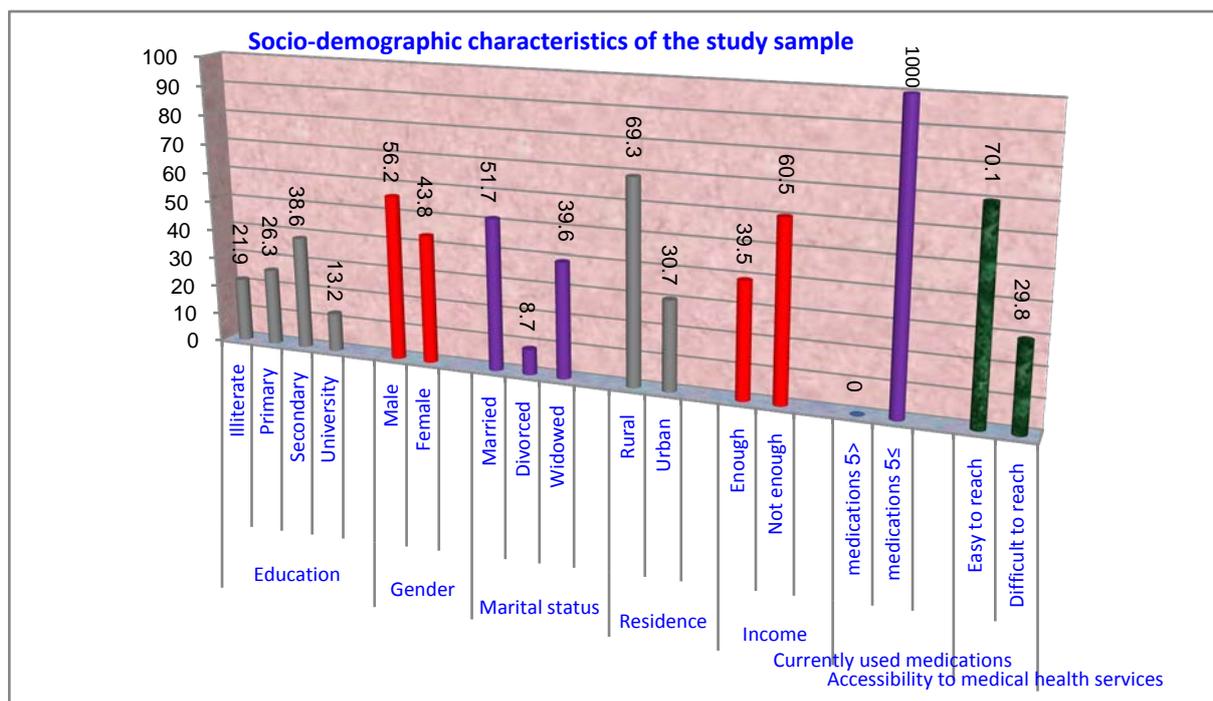


Figure 1. Distribution of the studied older adults according to their socio-demographic characteristics (N=114)

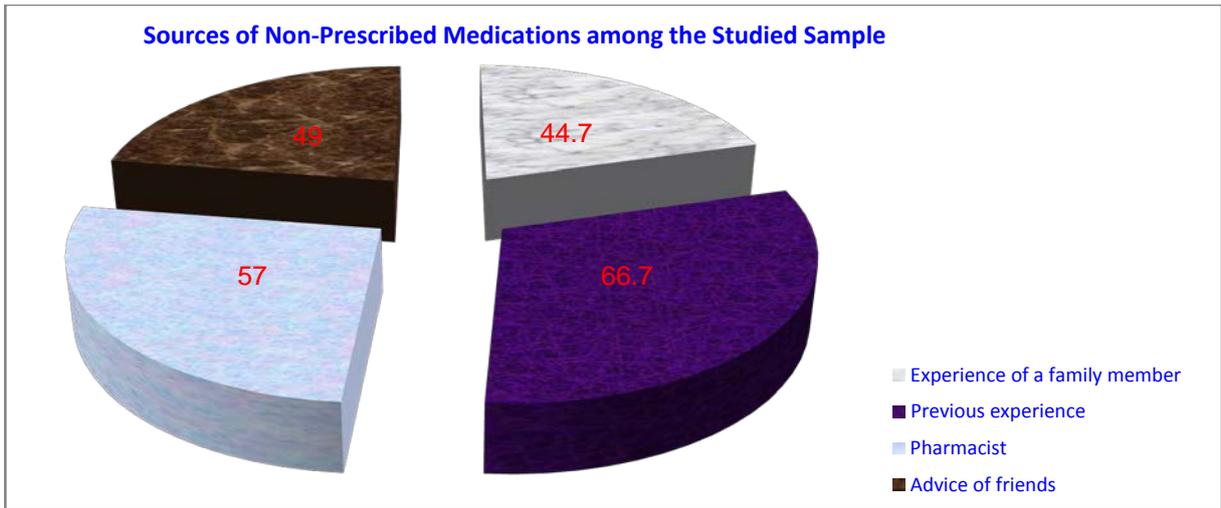


Figure 2. Distribution of the different sources of non-prescribed medications among the studied sample

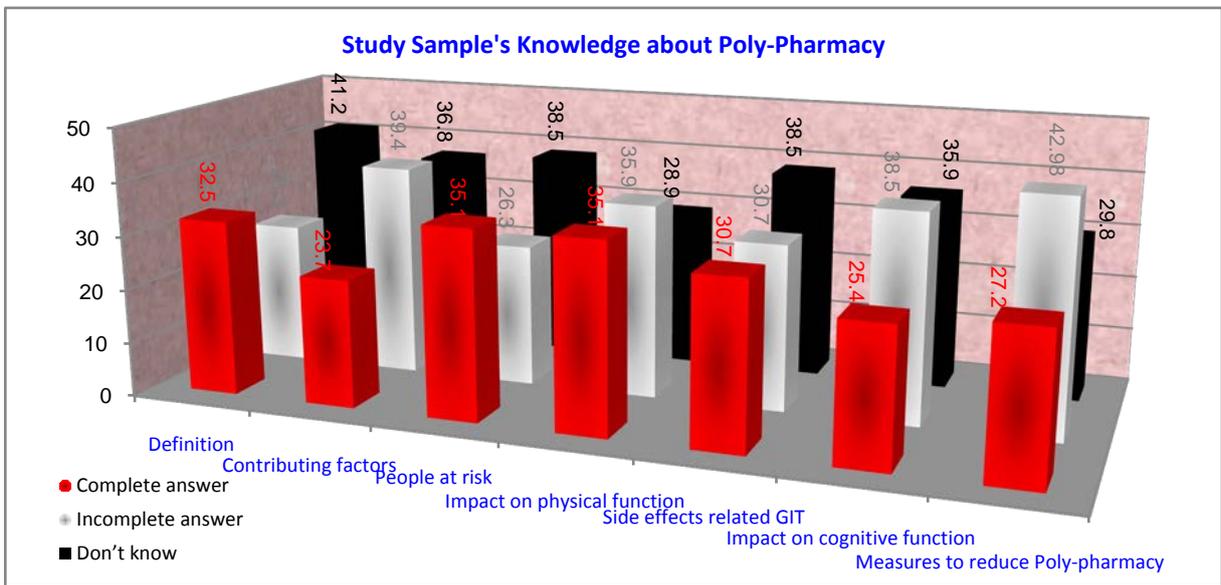


Figure 3. Distribution of the study sample in relation to their knowledge about Poly-pharmacy

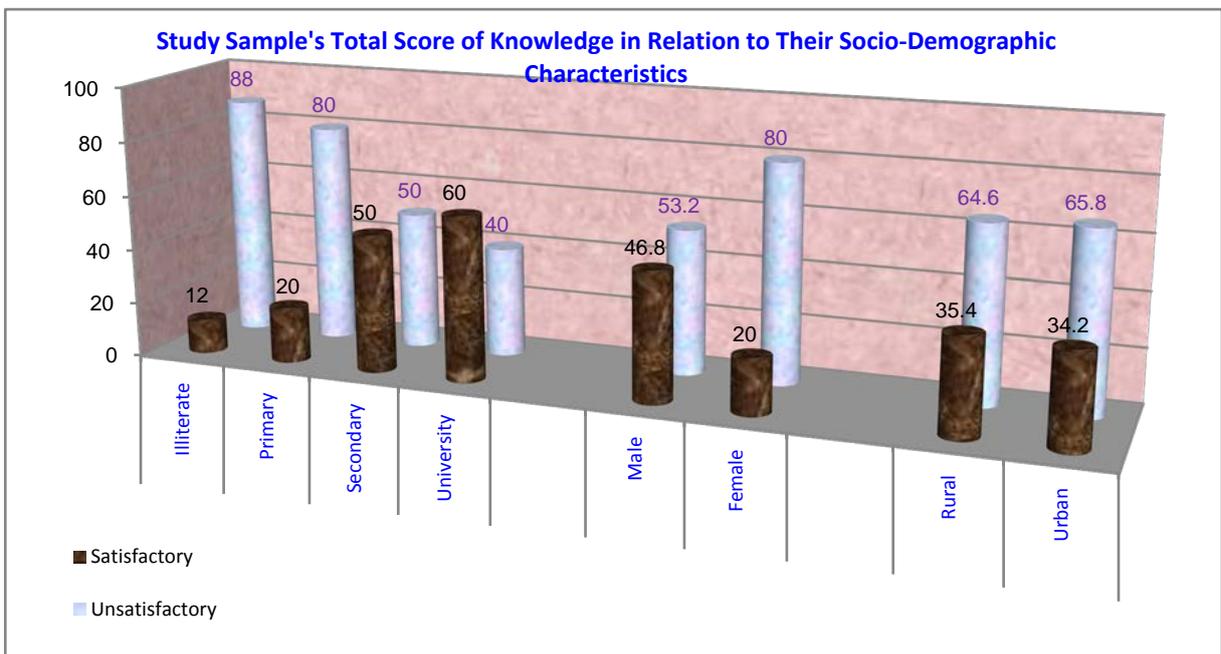


Figure 4. Relationship between Study Sample's Total Score of Knowledge and Their Socio-Demographic Characteristics

4. Discussion

Population aging is an increasingly worldwide phenomenon; The World Health Organization (WHO) predicts that by 2050, the global population of elderly people, defined as those aged 65 and above, would reach 1.5 billion. Older people now account for more than 60% of the global population, resulting in a rise in hospital visits and the usage of numerous medicines. [14,15]

Concerning the socio-demographic characteristics of the study sample, the data reveals that more than half of the study sample were married, more than third of the study sample completed secondary education and near to two-thirds of them didn't have enough income, these results were overall supported by Abdelwahed et al., (2018) who conducted a study in Damanhur city at Al Buhayrah governorate which is nearly similar to the current study setting in terms the agricultural nature which consequently explains the existing similarities between the two studies socio-demographic characteristics, While more than two-thirds of the study sample were rural while Metwally, T., & Aly, H. (2020) who conducted their study in Suez governorate which doesn't have agricultural nature as it was found that more than three-quarters of their study sample were living in urban areas. [16,17]

Regarding the sources of the non-prescribed medications, the current study revealed that almost two thirds and near to half of the older adults were taking their medications based on their previous experience and pharmacist advice, this might be because of the low income of the older adults who can't tolerate the expenses of regular check and medical follow up, these results were in the same line with the results of Ghazawy, E .R., (2017) which demonstrated that the same two sources were the most reported ways for the non-prescribed medication among elderly. [18]

The current study revealed that more than two-thirds of the study sample either had an incomplete knowledge or even didn't know at all of the meaning of Poly-pharmacy and near to three-quarters of the subjects were either partially aware or unaware of the contributing factors for Poly-pharmacy, this might be due to relatively low level of education of the study sample, in the same regard these findings were supported by Galazzi A., et al., (2016) as his study showed that less than quarter of the studied sample who had Poly-pharmacy reported that they don't feel they were taking a large number of medications while less than half of the subjects were understanding the reason for having many medications, in agreement with these results Priya N., (2019) revealed that half of the study sample does not know the use of medication, while the majority of the study sample did not know the clinical purpose of the medicine they were using, more over Hermann, M., et al (2021) found that more than two thirds of his study sample was unaware about the side effects of the over counter medications. [19,20,21]

In addition to the awareness about consequences of Poly-pharmacy on the elderly, the current study showed that almost two-thirds of the study subjects were either partially or unaware about Poly-pharmacy impacts on their physical functions and more than two-thirds were either partially or unaware about the gastro-intestinal tract consequences and this might be due lack of health education on the given medications, supporting

these findings Crofford L., (2020) found that less than one-quarter of the studied sample of the elderly patients were aware of the side effects of the medications they were taking. [22]

In relation to demographic characteristics of the study sample in relation to the total level of knowledge related to poly-pharmacy, the current study demonstrated that male patients had a significantly more satisfactory level of knowledge related to poly-pharmacy than female subjects, this might be explained by the variable involvements and exposures of male patients which expand their knowledge during working outside the native community to get the needed life expenses, on the other hand, a study conducted by Kasemy Z., et al., (2020) showed that females had more significantly higher level of knowledge which might be explained by the higher perception of risk and more compliance among females. [23]

5. Conclusion

The current study concluded that: The prevalence of polypharmacy and its consequences among the elderly is affected by the level of education. University education was the highest percentage of a satisfactory level of knowledge about poly-pharmacy.

6. Recommendations

In the light of the results of this study, the following recommendations are suggested:

- Designing an educational program tailored for the elderly people aiming at raising their awareness and knowledge about poly-pharmacy and its consequences.
- Activating the role of patient-family-educators while inpatients discharge and within ambulatory care services to enhance the use of non-pharmacological interventions and safe medication administration for the elderly and caregivers.

References

- [1] Ahmed, B., Nanji, K., Mujeeb, R., & Patel, M. J. (2014). Effects of Poly-pharmacy on Adverse Drug Reactions among Geriatric Outpatients at a Tertiary Care Hospital in Karachi: A Prospective Cohort Study. *PLoS ONE*, 9(11), e112133.
- [2] Ong, S. M., Lim, Y. M. F., Sivasampu, S., & Khoo, E. M. (2018). Variation of Poly-pharmacy in older primary care attenders occurs at prescriber level. *BMC Geriatrics*, 18(1), 1-12.
- [3] Ikemefuna, V. (2017). Impact of Staff Education on Knowledge of Geriatric Poly-pharmacy- Pro Quest. Retrieved from <https://search.proquest.com/docview/2008219065/abstract/E03EEFE9DDB64225PQ/1?accountid=33993>.
- [4] Schlesinger, A., Weiss, A., Nenaydenko, O., Adunsky, A., & Beloosesky, Y. (2016). Does Poly-pharmacy in Nursing Homes Affect Long-Term Mortality? *Journal of the American Geriatrics Society*, 64(7), 1432-1438.
- [5] CAMPAS, 2019. Retrieved from: <https://www.capmas.gov.eg>.
- [6] Kourkouta, L. (2017). Journal of Pharmaceutical and Pharmacological Poly Pharmacy in Elderly. *Journal of Pharmaceutical and Pharmacological Poly Pharmacy in Elderly*, 2016 (June).

- [7] Sinclair, A. J., Dunning, T., Mañas, L. R., & Munshi, M. (Eds.). (2017). *Diabetes in old age*. John Wiley & Sons.
- [8] Strehl, V. (2013). Wavelet Transformationen in der Bildverarbeitung Script. 13(1), 1-11.
- [9] National Patient Safety Goals. The Joint Commission. (2020). <https://www.jointcommission.org/en/standards/national-patient-safety-goals/>.
- [10] Mortazavi, S. S., Shati, M., Keshtkar, A., Malakouti, S. K., Bazargan, M., & Assari, S. (2016). Defining Poly-pharmacy in the elderly: A systematic review protocol. *BMJ Open*, 6(3), 1-4.
- [11] Salisbury C., Johnson L., Purdy S., Valderas J., Montgomery A. Epidemiology and impact of multimorbidity in primary care: a retrospective cohort study. *Br J Gen Pract.*, 2011; 61(582):e12-21.
- [12] Pereira, F., von Gunten, A., Amoussou, J. R., Salamun, I. D. G., Martins, M. M., & Verloo, H. (2019). Poly-pharmacy among home-dwelling older adults: The urgent need for an evidence-based medication management model. *Patient Preference and Adherence*, 13, 2137-2143.
- [13] Liao, C. D., Tsauo, J. Y., Lin, L. F., Huang, S. W., Ku, J. W., Chou, L. C., & Liou, T. H. (2017). Effects of elastic resistance exercise on body composition and physical capacity in older women with sarcopenic obesity: A CONSORT-compliant prospective randomized controlled trial. *Medicine*, 96(23).
- [14] Rankin, A., Cadogan, C. A., Patterson, S. M., Kerse, N., Cardwell, C. R., Bradley, M. C., Hughes, C. (2018). Interventions to improve the appropriate use of Poly-pharmacy for older people. *Cochrane Database of Systematic Reviews*, 2018(9).
- [15] Aboudonya M., Badr Elden S., Hassan H., Hafez S. Knowledge And Practices Used By Old Age Patients To Control Polypharmacy. *Nile journal for geriatric and gerontology*, 2022; 5(1): 80-91.
- [16] Abdelwahed, A. Y., Algameel, M. M. M., & Tayel, D. I. (2018). Effect of a nutritional education program on nutritional status of elderly in rural areas of Damanhur city, Egypt. *International Journal of Nursing Science*, 8(5), 83-92.
- [17] Metwally, T., & Aly, H. (2020). Prevalence of Poly-pharmacy among Egyptian Patients with Type 2 Diabetes Mellitus. *Suez Canal University Medical Journal*, 23(1), 41-50.
- [18] Ghazawy, E. R. (2017). Self-Medication among Adults in Minia, Egypt: A Cross-Sectional Community-Based Study. *Health*, 09(06), 883-895.
- [19] Galazzi, A., Lusignani, M., Chiarelli, M. T., Mannucci, P. M., Franchi, C., Tettamanti, M., Reeve, E., & Nobili, A. (2016). Attitudes towards Poly-pharmacy and medication withdrawal among older inpatients in Italy. *International Journal of Clinical Pharmacy*, 38(2), 454-461.
- [20] Priya Sharma, N. L. G. (2019). Assessment of patterns and associated aspects of Poly-pharmacy among the geriatric population of Kangra (Himachal Pradesh). *International Journal of Health & Allied Sciences*, 7(3), 145-150.
- [21] Hermann, M., Carstens, N., Kvinge, L., Fjell, A., Wenersberg, M., Folleso, K., & Bostrom, A. M. (2021). Poly-pharmacy and Potential Drug-Drug Interactions in Home-Dwelling Older People—A Cross-Sectional Study. *Journal of Multidisciplinary Healthcare*, 14, 589.
- [22] Crofford, L. J. (2020). Use of NSAIDs in treating patients with arthritis. *Arthritis Research and Therapy*, 15(SUPPL 3), 60-62.
- [23] Kasemy, Z. A., Babah, W. A., Zewain, S. K., Haggag, M. G., Alkalash, S. H., Zahran, E., & Desouky, D. E. (2020). Knowledge, Attitude and Practice toward COVID-19 among Egyptians. *Journal of Epidemiology and Global Health*, 10(February), 378-385.

