

## Nursing Based Intervention to Optimize Knowledge and Practices of Old Age Patients about Polypharmacy

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### Abstract

**Background:** Polypharmacy is a clinical challenge in older adults and one of the major issues in the world that can lead to numerous medical and economic problems. Nurses have a unique opportunity to help identify patients at risk for inappropriate polypharmacy and to educate patients and families about risk reduction. **The aim** of the present study was to examine the effect of nursing based intervention to optimize knowledge and practices of old age patients about polypharmacy.

**Design:** A quasi experimental design with pre-post assessment was used to achieve the aim of the current study.

**Sample and Setting:** A convenience sample was selected under the inclusion criteria (92 old age patients) was included in the study. The study was conducted in the outpatient clinic of the medical department at Beni-Suef University Hospital in Beni-Suef city, Egypt.

**Sampling technique:** patients were consecutively recruited in the study sample according to the eligibility criteria. **Tools:** The researchers prepared an interview form including four sections: I- Questionnaire to assess socio-demographic characteristics of studied old age patients. II- Questionnaire to assess medical characteristics of studied old age patients. III- Questionnaire to assess knowledge of studied old age patients regarding polypharmacy. IV- Questionnaire to assess safe practices of medication administration & non-pharmacological intervention.

**The main results** of the present study: the most frequent health complain was for GIT problems and joint pain, followed by cough, dryness of eye, and fever and the most frequent medications used by self-prescription were ante acids and laxatives, followed by analgesics and cough depressants. The total level of knowledge and reported practice of studied sample significantly associated with residence and educational level. **Conclusion:** The knowledge about polypharmacy and safe practice of medication administration & non-pharmacological intervention of the old age patients improved after receiving the nursing based intervention than before, also the rate of self-prescribing medication among the old age patients decreased after receiving nursing based intervention than before.

**Recommendations:** Further studies aimed at improving patient awareness on polypharmacy, and empowering them with the knowledge and tools they need to successfully reduce polypharmacy.

**Key Words:** Nursing based Intervention, optimize knowledge, old age patients, polypharmacy

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Date of Submission: 13-02-2019

Date of acceptance: 28-02-2019

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### I. Introduction

According WHO there are about 600 million people aged 60 and over worldwide; this total will double by 2025 and will reach virtually two billion by 2050. The majority of older people will be living in developing countries that are often the least prepared to confront the challenges of rapidly ageing societies (WHO, 2018). The rates of multi-comorbidities as, obesity, diabetes, and cardiovascular disease are increase among old age. The most common method used by the health care provider to manage these comorbidities through prescribing medications. One drug and sometimes several medications are required to control co-morbidity. This often results in older adults taking multiple medications several times a day. This use of multiple medications simultaneously is known as poly pharmacy (Hannah, 2013).

Polypharmacy is widely recognized as a contributor to adverse outcomes in geriatric populations. As the proportion of elderly people ( $\geq 65$  years of age) in the population continues to grow, the burden of associated comorbidities managed with medications will increase (A profile of older Americans, 2012). Polypharmacy is understood as use of more number of drugs than that is clinically indicated in a patient or the use of five or more drugs in a patient and excessive polypharmacy is defined as the use of ten or more drugs in a patient. Polypharmacy is much more complex than just the number of medications. It constitutes a serious problem in

the health care system, and is one of the contributing factors to the escalating health care costs and financial burden on the patient community (**Jenny et-al, 2012**).

Recent research reported between 44% and 59% of elderly patients taking  $\geq 1$  medications unnecessarily. Significant consequences of undue medications in the elderly include increased risk of adverse drug events (ADE), drug-drug interactions, geriatric syndromes, medication non-adherence, and both direct and indirect cost. Older persons react differently to medications than younger persons. Although absorption rates for most drugs don't change with age, aging alters body fat and water composition: fat stores increase while total body water decreases. These changes can alter therapeutic drug levels, causing greater concentrations of water-soluble drugs and longer half-lives of fat-soluble drugs (**Maher, Hanion and Hajjar, 2014**).

Also, because the liver metabolizes many drugs, such age-related changes as reduced hepatic blood flow and liver size alter drug clearance. Drug elimination also may be affected by age-related decreases in renal blood flow, kidney size, and glomerular filtration rates, as well as changes stemming from chronic diseases. Additionally, digoxin and certain other drugs are bound to plasma proteins so that only the unbound or free portion of the drug is biologically active. Therefore, decreases in serum albumin levels—common in older adults with chronic illnesses, malnutrition, or severe debilitation—can lead to higher drug blood levels. Subsequently, older patients may be more sensitive to some drugs and less sensitive to others (**Howe, 2015**).

Reducing polypharmacy in elderly populations needs a multi-pronged approach that includes risk identification; explore nonpharmacologic alternatives to drugs, such as dietary changes, determine strategies to minimize medications, and interdisciplinary teamwork. This review draws upon existing literature to suggest evidence-based strategies to minimize poly-pharmacy (**Pugh, et-al., 2013**).

Polypharmacy not considered problem when appropriate medications are prescribed to reduce symptoms, drug resistance or for synergistic effect and which in turn decreases the associated morbidity and mortality. However, irrational use of multiple medications occurs too frequently which could result in several drug related problems such as increase in adverse drug reactions, drug interactions, drug toxicity and medication errors. Drug related problems increase among old age patients because the aging process alters the way in which medications are tolerated by the body, creating an increased risk for complications (**Rodrigues and Olivier, 2016**).

The health of old age is largely influenced by the standard of health services available to them at their homes, acute care setting and outpatient clinics. A large proportion of care for older adults given by registered nurses and have great opportunity to Optimize drug prescription and poly-pharmacy by using non pharmacological interventions to control many health problems as constipation, pain, cough and eye inflammation. Although unable to prescribe medications, Nurses play a functional role in preventing drug related problems because they aware of the dangers of polypharmacy, responsible for assuring the safe preparation and administration of medications, as well as monitoring for indications and effects of medications. Nurses are also responsible for implementing nursing based interventions to improve awareness of old age about poly-pharmacy, drug reaction, safe steps of medication administration to enable old age to adopt healthy practices related to this issue (**Pilotto and Martin, 2018**).

### **Significance of the problem**

Problems related to polypharmacy are one of the leading causes of hospitalization in older adults. In fact, the rate of hospitalization due to problems related to medication use for older adults is seven times higher than for younger adults (**Rodrigues and Olivier, 2016**). The biological changes associated with aging that affect the absorption, metabolism, distribution, and excretion of medications, combined with the often increased need for multiple medications, puts older adults at high risk for adverse drug reactions associated with polypharmacy, drug reactions may lead to confusion, falls, arrhythmias, and even death. Therefore, the proper management of medications for these individuals is imperative to the maintenance of their optimal level of functioning, safety, and overall health. One way to properly manage medications is through appropriate prescribing and meticulous monitoring of the older adult's medication regimen (**Golchin et al., 2015**).

The prevalence of polypharmacy among the elderly population varies from 4% to 34%. Polypharmacy, a preventable and significant contributor to morbidity and mortality in the geriatric population, is best defined as any number of medications that exceed medical necessity. A multi-pronged approach using nursing-based interventions is needed to effectively address polypharmacy and prevent downstream harm to old age patients. Resources and interventions should target patients, situations, and prescribing practices associated with higher risk of experiencing an adverse drug event. Liberalizing clinical targets in the elderly and drawing from nursing care concepts can pave the way for rational discontinuation of multiple medications (**Wang, Camargo & Veluswamy, 2013**).

### **Aim of the study**

The aim of this study was to examine the effect of nursing based intervention to optimize knowledge and practices of old age patients about polypharmacy

### **Research hypotheses**

**RH1:**The knowledge of old age patients about polypharmacy will improve after receiving the nursing based intervention than before.

**RH2:**Safe practice of medication administration & non-pharmacological intervention of the old age patients will improve after receiving the nursing based intervention than before.

**RH3:** The rate of self-prescribing medication among the old age patients will decrease after receiving nursing based intervention than before.

## **II. Methodology**

### **Research Design:**

A quasi-experimental design with pre-post assessment was used to achieve the aim of the current study.

### **Research Setting**

The study was conducted in the outpatient clinic of the medical department at Beni-Suef University Hospital in Beni-Suef city, Egypt.

### **Research participants and sample:**

**Sample size:** A convenience sample of 92 old age patients was included in the study, selected according the following inclusion criteria:

- Male and female old age patients experiencing more than two chronic diseases and taking 5 types of drugs or more.
- Age ranged from 65-85 years old.
- Full oriented to place, time, person & others.
- Full insight & judgment
- Not have a history of psychotic disorders.
- Agree to participate in the study.

### **Tools of data collection**

The researchers prepared an interview form including four sections:

- I- Questionnaire to assess socio-demographic characteristics of studied old age patients such as gender, marital status, education, etc.
- II- Questionnaire to assess medical characteristics of studied old age patients such as type of chronic disease & duration.
- III- Questionnaire to assess knowledge of studied old age patients regarding polypharmacy.
- IV- Questionnaire to assess safe practice of medication administration & non-pharmacological intervention.

### **Scoring system:**

**For knowledge and practice:** correct answer was scored 1, and incorrect answer was scored 0. The total scores were calculated as follow: < 60% was considered unsatisfactory, and  $\geq 60\%$  was considered satisfactory.

### **Approval:**

An official permission was obtained from the official personnel in Beni-Suef University hospital to conduct the study and collect the necessary data. Simple explanation was given to them about the nature of the study, its aims, benefits and study data collection tools.

### **Ethical considerations:**

The study was conducted with careful attention to ethical standards of research and rights of participants. Oral consent was taken from each old age patient, they were informed that the data collected will be used for the research only, and confidentiality manner is assured. They were assured about confidentiality; as well they informed that they can withdraw at any time from the study.

### **Data Collection Procedure**

- **Tools developments:** tools were developed by the researcher after reviewing the literature to collect the necessary data. **The tool validity test** was done through five expertises. They were Faculty members of community health nursing department and medical surgical department and necessary modifications were done.

- **The Cronbach alpha** coefficient was calculated to assess the reliability of the scale used through its internal consistency (0.83).
- **A pilot study:** was conducted on 8 old adult patients experiencing two or more chronic disease from the study setting to ensure the clarity, applicability, relevance and feasibility of the tools, to identify the difficulties that might be faced during implementation, and to estimate the time needed for completion of the study tools and, subsequently, final modifications were made to the tools. The patients involved in the pilot study were not included in the main study sample.
- The study was carried out through assessment, planning, implementation, and evaluation phases. **The assessment phase** started with recruitment of patients according to eligibility criteria and with informed consent. The researchers collected baseline data using the finalized tools and these were taken as the pre-intervention baseline data. Every patient interview lasted 30–45 minutes. Researchers interviewed two patients per day. In **the planning phase**, the researchers designed plan for nursing based interventions (educational program) guided by relevant literature. It included sessions provided background about polypharmacy, risks, complications, and factors contributing to polypharmacy as well as applications of safe tips of medication administrations and the use of non-pharmacological interventions and reducing the use of self-prescribed medications. Moreover, a colored booklet was designed by the researchers and distributed to each patient.
- **Implementation phase:**  
Each old age patient interviewed individually, together with a family member to help them follow the instructions at home, different teaching strategies were used, such as, mini-lectures, discussions, and media, such as posters and images.
- **The evaluation phase** included the post test assessment after one month to test the effects of the nursing based intervention (educational program), using the aforementioned tools. The fieldwork was carried out three days weekly throughout a period of six months from Jun 2018 to December 2018.
- **Statistical analysis:**
- The collected data were organized, revised, stored, tabulated and analyzed using the number and percentage distribution, statistical analysis was done by computer .Proper statistical test were used(chi square) to determine whether there was a significant differences or not, using statistical package for social science program (SPSS) version 20. Statistical significance was considered at p-value < 0.05.

### III. Results

**Table (1)** shows the distribution of socio-demographic characteristics of studied old age patients. The data reveals that 60.8% of studied sample are males, 66.3% reside in rural areas, 48.9% of them are married, 44.6% are widowers & 6.5% were divorced. Regarding to the educational level, 39.1% are illiterate while 11.9 % have university education. 64.1% of studied sample reported that their income not enough.

**Table (2)** describes the distribution of studied sample regarding factors influencing inappropriate polypharmacy. The table reveals that 82.6% of studied sample reported previous experience, followed by 70.6% family attitude, 58.6% low socio-economic status and 44.5% reported out-reach of health services.

**Figure (1)** illustrates the distribution of studied sample regarding most frequent health complain. The data reveals that the higher percentage of health complain is for GIT problems 70.7% and 66.3% for joint pain, followed by 44.6% for cough, 36.9% for dryness of eye, and 32.6% for fever.

**Figure (2)** illuminates the distribution of inappropriate self-prescribed medications among studied sample. The table reveals that the most frequent medications used by self-prescription were ante acids (87.2%), laxatives (72.8%), analgesics/ antipyretics(77.1%) and cough depressants (59.1%).

**Table (3)** clarifies the distribution of studied sample according their knowledge about poly-pharmacy before and after intervention. The data reveals that the knowledge of studied sample about poly-pharmacy improved after implementation of nursing-based intervention. There were highly significant differences at all elements (overview, risks, complications, measures to reduce polypharmacy)  $P=0.00001$ .

**Table (4)** shows the distribution of studied sample according to self-reported practice about safe tips of medication administration before and after intervention. The data reveals that the percentages of studied sample of applying safe tips of medication administration improved after implementation of nursing-based intervention at all items.

**Table (5)** clarifies the distribution of studied sample regarding their self-reported practice about non pharmacological measures to control their health complain before and after intervention. The data reveals that the reported practice of studied sample significantly improved after implementation of nursing-based intervention. There were highly significant differences at all elements ( $P=0.00001$ ).

**Table (6)** clarifies the distribution of studied sample by their total level of self-reported practices before and after intervention. The data shows that self-reported practice of studied sample regarding non

pharmacological measures to control health complain and applying safe tips of medication administration improved significantly after intervention.

**Table (7)** reveals the socio-demographic characteristics of studied sample in relation to their total level of knowledge before and after intervention. The data indicates that there are statistically significant differences between socio-demographic characteristics among studied old age and total level of knowledge before and after intervention in relation to residence and level of education ( $P < 0.05$ ), but there is no significant relation between gender and total level of knowledge before and after intervention ( $P = .08$ ).

**Table (8)** reveals the socio-demographic characteristics of studied sample in relation to their total level of practice before and after intervention. The data indicates that there are statistically significant differences between socio-demographic characteristics among studied old age and total level of practice before and after intervention in relation to residence and level of education ( $P < 0.05$ ), but there is no significant relation between gender and total level of practice before and after intervention ( $P = 0.5$ ).

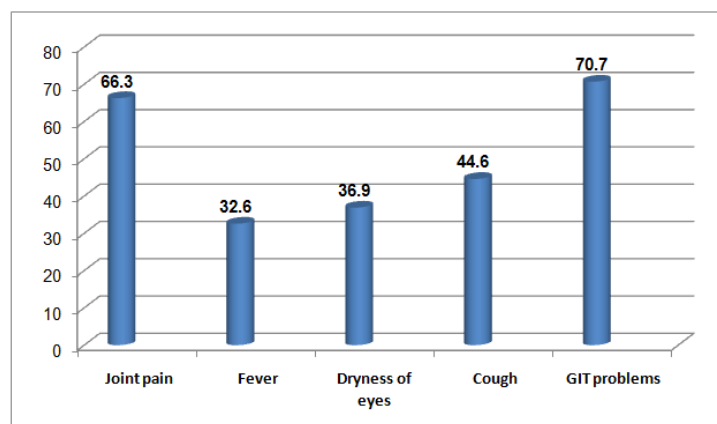
**Figure (3)** illustrates the distribution of studied sample according to rate of inappropriate polypharmacy (self-prescribed medications) after one month before and after intervention. The data reveals significant reduction in the rate of self-prescribed medications after one month of the implementation of nursing-based intervention among studied old age ( $p = .00001$ ).

**Table (1) Distribution of studied sample according to their socio-demographic characteristics**

Items	N	%
<b>Gender</b>		
Male	56	60.8
Female	36	39.2
<b>Residence</b>		
Rural	61	66.3
Urban	31	33.7
<b>Social</b>		
Married	45	48.9
Divorced	6	6.5
Widowed	41	44.6
<b>Educational</b>		
Illiterate	36	39.1
Primary	25	27.1
Secondary	20	21.7
University	11	11.9
<b>Income</b>		
Enough	33	35.8
Not enough	59	64.1

**Table (2) Distribution of studied sample according to factors influencing inappropriate polypharmacy**

Items	N	%
Family attitude	65	70.6
Previous experience	76	82.6
Low socio-economic	54	58.6
Out-reach of health services	41	44.5



**Figure (1) Distribution of studied sample regarding most frequent health complain contributing to inappropriate polypharmacy**

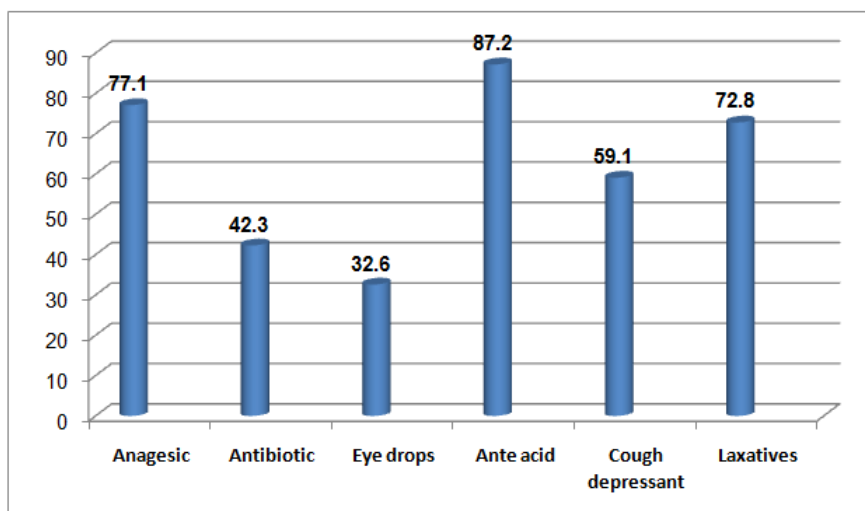


Figure (2) The distribution of studied sample regarding most frequent self-prescribed medication

Table (3) Distribution of studied sample according to their knowledge about poly-pharmacy before and after intervention

Items	Level of knowledge	Pre		Post		X <sup>2</sup>	P
		N	%	N	%		
Over view about poly pharmacy	Satisfactory	19	20.6	67	72.8	50.3	.00001
	Unsatisfactory	73	79.4	25	27.2		
Risks	Satisfactory	16	17.4	63	68.4	49.1	.00001
	Unsatisfactory	76	82.6	29	31.6		
Complications	Satisfactory	14	15.2	56	60.8	40.6	.00001
	Unsatisfactory	78	84.7	36	39.1		
Contributing factors	Satisfactory	9	9.7	51	55.4	43.6	.00001
	Unsatisfactory	83	90.3	41	44.6		
Measures to reduce poly-pharmacy	Satisfactory	26	28.2	72	78.2	46.1	.00001
	Unsatisfactory	66	71.8	20	21.8		
Total level of knowledge	Satisfactory	32	34.7	58	63.1	14.7	.0001
	Unsatisfactory	60	65.3	34	36.9		

Table (4) Distribution of studied sample according to self-reported practice of safe tips for medication administration before and after intervention

Items	Pre		Post	
	N	%	N	%
Keep up to date list of your medication	15	16.3	65	70.6
Review your medication with your physician	17	18.4	70	67.1
Read labels	19	20.6	56	60.8
Ask about right dose and route	41	34.7	81	88.1
Don't share or borrow medication	10	10.8	72	61.3
Store medication in secure location	21	22.8	76	82.6
Ask about safe guide line to stop	11	11.9	64	69.5
Ask about drug interaction	15	16.3	71	77.1

Table (5) Distribution of studied sample according to their reported practice regarding non pharmacological measures to control most frequent health complain before and after intervention

Items	Level of knowledge	Pre		Post		X <sup>2</sup>	P
		N	%	N	%		
Headache	Satisfactory	24	26.1	61	66.4	29.9	.0001
	Unsatisfactory	68	73.9	31	33.6		
Constipation	Satisfactory	20	21.7	56	60.9	29.1	.0001
	Unsatisfactory	72	78.3	36	39.1		
Prevention of eye inflammation	Satisfactory	28	30.4	61	66.4	23.6	.0001
	Unsatisfactory	64	69.6	31	33.6		
Heart burn	Satisfactory	34	36.9	59	64.2	13.5	.0002
	Unsatisfactory	58	63.1	33	35.8		
Cough	Satisfactory	30	32.6	71	77.1	36.8	.00001
	Unsatisfactory	62	67.4	21	22.8		

**Table (6) Distribution of studied sample by their total level of self-reported practices before and after intervention**

Self-reported practices		Pre		Post		X <sup>2</sup>	P
		No.	%	No.	%		
Using safe tips of medication administration	Satisfactory	17	18.5	66	71.7	14.7	.0001
	Unsatisfactory	75	81.5	26	28.3		
Non-pharmacological interventions	Satisfactory	25	27.2	61	66.3		
	Unsatisfactory	67	72.8	31	33.7		
Total level of self-reported practice	Satisfactory	21	22.8	63	68.5	38.6	.00001
	Unsatisfactory	71	77.2	29	31.5		

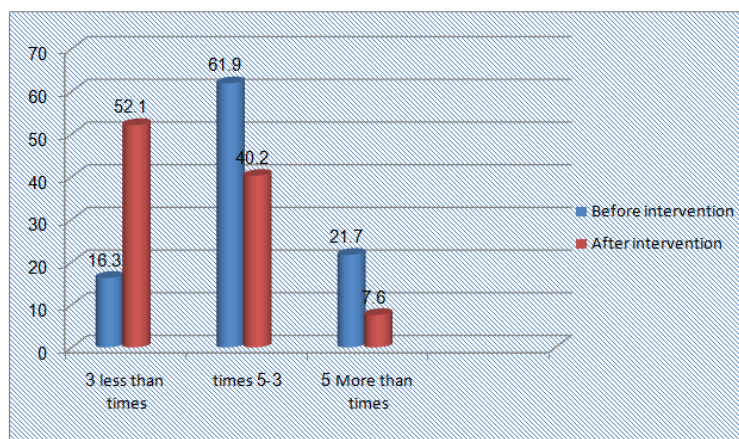
**Table (7) Demographic characteristics of studied sample in relation to their total level of knowledge before and after intervention**

Items	Satisfactory (32)		Unsatisfactory (60)		X <sup>2</sup>	P
	N	%	N	%		
<b>Gender (n)</b>						
Male (56)	25	44.6	31	55.4	3.05	.08
Female (36)	7	19.4	29	80.6		
<b>Residence</b>						
Rural (61)	13	21.3	48	78.7	14.4	.00001
Urban (31)	19	61.3	12	38.7		
<b>Education</b>						
Illiterate (36)	4	11.1	32	88.9	21.5	.00008
Primary (25)	8	32.0	17	68.0		
Secondary (20)	12	60.0	8	40.0		
University (11)	8	72.7	3	27.3		

**Table(8) Demographic characteristics of studied sample in relation to their total level of practice before intervention**

Items	Satisfactory 21		Unsatisfactory 71		X <sup>2</sup>	P
	N	%	N	%		
<b>Gender</b>						
Male (56)	14	25.0	42	75.0	0.3	0.5
Female (36)	7	19.4	29	80.6		
<b>Residence</b>						
Rural (61)	10	16.4	51	83.6	4.2	.03
Urban (31)	11	35.5	20	64.5		
<b>Educational level</b>						
Illiterate	2	5.6	34	94.4	15.8	.001
Primary	5	20.0	20	80.0		
Secondary	8	40.0	12	60.0		
University	6	54.5	5	54.4		

X<sup>2</sup> 27.8 p=.00001



**Figure (3) distribution of studied sample according to rate of inappropriate polypharmacy (self-prescribed medications) per month before and after intervention**

#### IV. Discussion

The specter of polypharmacy is an ever-increasing problem faced by the health care professionals. Nurses play a functional role in assisting elderly population to increase awareness about the dangers of polypharmacy and help them adopting healthy practices regarding medication administration as well as reducing rates of self-prescribing medication. Therefore this study was aimed to examine the effect of nursing based intervention to optimize knowledge and practices of old age patients about polypharmacy. The study sample included 92 old age patients; about two thirds of them were males and more than one third were illiterate while only 11.9 % of them had university education and about two thirds of them were reside rural areas and had not enough income.

Regarding factors influencing inappropriate polypharmacy among studied old age patients, the results of current study revealed that the majority of studied sample reported previous experience and family attitude, followed by low socio-economic status and out-reach of health services. The results of current study added that the source of self prescribed medication among studied sample were previous experience & pharmacist advice followed by advice of friends, Advertisement, and using books or internet. The results of current study were supported by **Mortazavi, et-al., (2017)** studied self-medication among the elderly in Iran; they reported that the practice of self- medication among the elderly in Iran influenced byfamily and patient's attitudes towards disease and treatment, health system and influential others. In the same line **Jafari, et-al., (2015)** studied prevalence of self-medication among the elderly in Kermanshah-Iran, reported that the most common factors affecting self-medication were certainty of its safety, prior consumption of the drug, busy offices of physicians, non-seriousness of the illness and prior experience of the disease.

Regarding most frequent health complain contributing to inappropriate polypharmacy and type of medication frequently used by studied old age patients, the results of current study revealed thatthe higher percentage of health complain was for GIT problems and joint pain, followed by cough, dryness of eye, and fever. The most frequent medications used by self-prescription were ante acids and laxatives, followed by analgesics and cough depressants. The results of current study supported by **Parmar, Malhotra, and Patel, (2015)** studied prevalence and pattern of self-medication in elderly individuals. They revealed that abdominal pain, headache and joint pain were most frequent symptoms for self-medicationand mentioned that analgesic, laxatives, and cough depressant were the most common drugs used by self-prescription. In the same line **Biswas, et-al., (2015)**studied self-medication trend among the urban elderly reported that the most frequent symptoms were abdominal, joint pain and cough.

The results of current study revealed that the nursing based interventions (educational program) had significant effect on the studied old age patients' knowledge about polypharmacy and self-reported practice regarding non pharmacological measures to control most frequent health complain and applying safe tips of medication administration. The results of current study were supported by **U.S. Department of Veterans Affairs Office of Rural Health, (2017)** implemented integrated management to improve poly-pharmacy among vulnerable elders. They reported that information and healthy practices regarding medication administration improved after intervention among old age patients, their families and care givers. In the same line **Patterson et-al., (2012)** conducted study titled; interventions to improve the appropriate use of polypharmacy for older people, reported that the total level of knowledge and effective use of medication improved after implementing the intervention. Similarly **Lenders, et-al., (2016)** indicated that among studied older patients using five or more prescribed drugs, only minority of them were knowledgeable for all prescribed drugs and reported that the most effective way to improve their knowledge and practices about safe medication administration is implementing health awareness programs. **Ahmad, et-al., (2014)** added that patient health awareness programs are effective for controlling self-medication& polypharmacy. **Ilić, Bukumirić and Janković (2015)** reported thatwell targeted educational interventions improve polypharmacy and decrease inappropriate prescribing rate, and contributing to a better care of elderly patients in nursing homes.

The results of current study showed that the total level of knowledge and reported practice of studied sample significantly associated with residence and educational level. The current study results supported by **lai et-al, (2018)** and **Wang, et-al., (2015)** studied "Poly-pharmacy in the oldest old patients" andmultimorbidity among older Chinese adults living in a rural area. They revealed that there were significant relation between educational level and surrounding living condition of studied sample with their total level of knowledge and compliance to medications. Similarly **Nobili, et-al., (2011)** studied drug utilization and polypharmacy among Italian elderly population, they mentioned that residence of the elderly is the main determinant of polypharmacy. On the other hand **Lenders, et-al., (2016)** reported that there were no statistically significant association was found between elderly' educational level and their medication knowledge. This difference might be due to that most of studied sample were illiterate or low education and only 28.7 % of them their education level were intermediate or high.

The results of current study reported that rate of inappropriate polypharmacy (self-prescribed medications) per month significantly decreased after implementing nursing based intervention (educational program). The results of current study were supported by **Wilchesky et-al., (2018)** studied "The Optima Med intervention to reduce inappropriate medications in nursing home residents with severe dementia. They reported that the overall use of medication decreased after intervention.

#### V. Recommendations

- Explore nonpharmacologic alternatives to drugs, such as dietary supplements and herbal preparations to treat various health problems.
- Determine strategies to minimize inappropriate medications.



- Further studies aimed at improving patient and caregiver awareness on polypharmacy, and empowering them with the knowledge and tools they need to successfully reduce polypharmacy.
- Activate the educator role of nurses in outpatient clinics, and community based centers to implement nursing based interventions about safe medication administration and non-pharmacological intervention for old age patients, families and care givers.

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