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## A Retrospective Study to Evaluate the NSAID's Usage and Prevalence of Polypharmacy among Elderly Patients Admitted to Medicine & Orthopaedic Wards at a Rural Teaching Hospital: Emphasis on Comorbid Conditions Among Geriatrics.

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### ABSTRACT

**Introduction:** Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) are indicated in the treatment of various acute and chronic inflammatory conditions and also concomitant with antimicrobial agents. Recent studies have shown that NSAIDs are most commonly prescribed in orthopaedics and medicine wards in hospitals and the proportion of geriatrics, the most common group to be admitted in hospitals. They have at least one chronic disease and have more comorbidity. Hence, while prescribing NSAIDs in elderly, it is given along with multiple other drugs. Polypharmacy exposes elderly patients to increased risk of drug-drug interactions, monetary issues and adverse drug events, thus jeopardizing the therapy. This present study highlights the various comorbid conditions amongst the geriatric population (above 65 years of age). However, an inter-professional strategy can be one of the most effective interventions for addressing polypharmacy.

**Aim:** The main aim of the present study was to evaluate the NSAIDs usage and prevalence of polypharmacy among elderly patients.

**Methodology:** The present short term research study was designed as a retrospective observational study type, conducted amongst the elderly patients ( $n=50$ ) for duration of two months. The necessary data from patient case files was retrieved retrospectively over a period of one year; elderly patients admitted to Medicine & Orthopaedic ward. Polypharmacy was assessed in the same patients.

**Results and Conclusion:** From our analysis of data collected it was observed that 26 were males and 24 were female patients out of total 50 participants. Moreover, out of total 50 patients, 27 (54%) patients were from orthopaedic ward, whereas 23 (46%) patients were from medicine ward. Also, we studied the comorbidities in the same group of patients, among cases with and without polypharmacy, and we recorded that 41.86% elderly patients had comorbid condition with polypharmacy, while 14.28% of elderly patients have comorbid condition without polypharmacy. The gender-wise comorbid conditions amongst males and female elderly patients were also analyzed. Further, we noted the addiction habits amongst these patients. Nearly 18% of them had addictions and none of them were addicted to more than one substance. Nearly 86% polypharmacy was reported among elderly patients prescribed with at least one drug as NSAIDs. Analgesics are commonly used inappropriately among elderly persons, suggesting that prescribing pattern may be improved. Further, more research studies are needed, to reflect whether the frequent use of NSAIDs along with frequent polypharmacy in patients is necessary; or is avoidable; according to the conditions and comorbidities of patients.

**Key words:** Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), polypharmacy, elderly patients, adverse drug events, comorbidities, orthopaedic

## INTRODUCTION

Regardless of age, gender, and demographic data, pain is one of the most important health issues worldwide. Currently, numerous non-pharmacological and pharmacological treatment options are available both as prescription drugs and over the counter purchases for the pharmacotherapy of pain & most rheumatological disorders. Among which, the major medicines used includes Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), and in many cases, combination of analgesics is required for effective pain relief. A number of these drugs possess antipyretic activity in addition to having analgesic and anti-inflammatory actions, and thus have utility in the treatment of fever [1]. Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) era started with the discovery of Aspirin in 1946. NSAIDs are taken massively worldwide and to a great extent used for the management of rheumatological disorders, as analgesics and antipyretics & also along with antimicrobial agents. Physicians prescribe medications based on different factors including patient-information, drug-related factors, and disease related aspects, keeping in mind the comorbidities patients suffer with [1]. Polypharmacy, known as the concurrent use of multiple medications by a patient, is unavoidable in the elderly as they often suffer from multiple comorbidities. Polypharmacy in the elderly complicates therapy, increases cost, and is a challenge for healthcare agencies [2]. The proportion of elderly population has been constantly increasing over last few years. Polypharmacy is unavoidable in the elderly as they often suffer from multiple co-morbidities. Earlier research studies have shown that the proportion of geriatrics, the most common group to be admitted in hospitals, has been constantly increasing over the last few years as they have at least one chronic disease and suffer from various conditions such as from illness, chronic diseases, social isolation and have more comorbidities like heart disease, respiratory diseases and diabetes which are more common and costly chronic health conditions [3, 4, 5], which increases polypharmacy. Although there is no standard definition, polypharmacy is often defined as the routine use of five or more medications which includes over-the-counter, prescription and/or traditional and complementary medicines used by a patient [7]. A recent systematic review of the definitions of polypharmacy showed that the term was most commonly applied to situations where patients took five or more medications, and this numerical definition was used by 46.4% of the studies evaluated [7] including all OTC, and traditional and complementary medicines. While excessive polypharmacy i.e., usage of more than 10 drugs, is categorized as prescribing more than 10 drugs [7]

Polypharmacy has been described as a significant public health challenge, as it exposes elderly patients to increased risk of drug-drug interactions, monetary issues and adverse drug events, thus jeopardizing the therapy [8-10]. The worldwide estimated number of elderly population of 605 million in year 2002 is expected to rise beyond 1.2 billion by 2025, with about 840 million representing developing countries [1]. In India, size of elderly population is growing rapidly; from 5.6% of total population in 1961, it is projected to rise to 12.4% by year 2026 [2].

During various researchers' study and literature review we found that polypharmacy continues to increase and is a known risk factor for important morbidity and mortality. A few rigorously designed intervention studies were conducted by researchers to reduce unnecessary polypharmacy in older adults [9-10].

Hence, all of the considerations mentioned above lead to the need for this retrospective study in order to pose the requirement for stricter control of NSAIDs usage and polypharmacy in the elderly. More research study is needed to determine the best effective strategy to decrease polypharmacy, particularly among the elderly, and to quantify the true benefits of reducing their medicinal regimes in terms of enhanced quality of life.

## **MATERIALS AND METHOD**

The present Short-Term Study (STS) (ICMR STS-2020) was approved by The Indian Council of Medical Research (ICMR), New Delhi, [Reference ID: 2020-00017], was designed as a retrospective observational study type. The study was initiated after approval from the Sumandeep Vidyapeeth Institutional Ethics Committee (SVIEC), and the total study duration of present STS was of two months i.e. July 2021 to August 2021.

The research work was carried out retrospectively in 50 elderly patients (n=50) age more than 65 years, who were prescribed atleast one of the Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), admitted in the Medicine & Orthopaedic Department of Dhiraj Hospital during past one year. The necessary data from patient case files was retrieved from the medical records department of Medicine & Orthopaedic wards of Dhiraj Hospital, a rural teaching tertiary care hospital, attached to Smt. B. K. Shah Medical Institute & Research Centre, Sumandeep Vidyapeeth an Institution deemed to be University, Piparia, Vadodara, Gujarat. Collected data and details of the patients which were collected from patient case files were used for scientific purpose only and identification of patient was not disclosed. The demographic data, diagnosis, relevant medical history, data from prescriptions and lab investigations were recorded in excel sheet and presented in form of percentages in results.

## STATISTICAL ANALYSIS

All the observed data was collected and entered in the Microsoft excel sheet for statistical analysis. All calculations were performed using statistical software SPSS version 21.0 computer-based. Data were analysed by using appropriate analytical tests like chi-square test, t test, or percentile. P values considered to be significant if less than or equal to 0.05 ( $p \leq 0.05$ ).

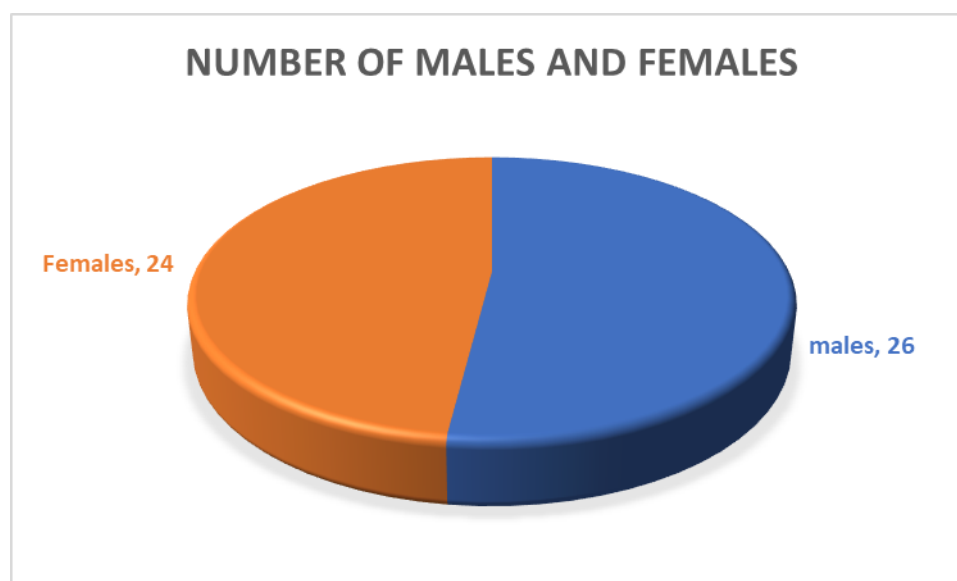
## RESULTS

The present research study was retrospective observational type. Total 50 number of patients ( $n=50$ ) were recruited based on the methodology and selection criteria. As the study was of retrospective type, patients' case files data ( $n=50$ ) from medicine and orthopedic wards were collected during last one year retrospectively.

From our analysis of results it was observed that out of total 50 elderly cases, 26 cases are males and 24 are females [Table1/Figure 1].

**Table 1: Gender wise distribution of patients**

Gender	Total number of patients recruited (n=50)	Number of patients (n=50)	Percentage (%)
Male	50	26	52
Female		24	48

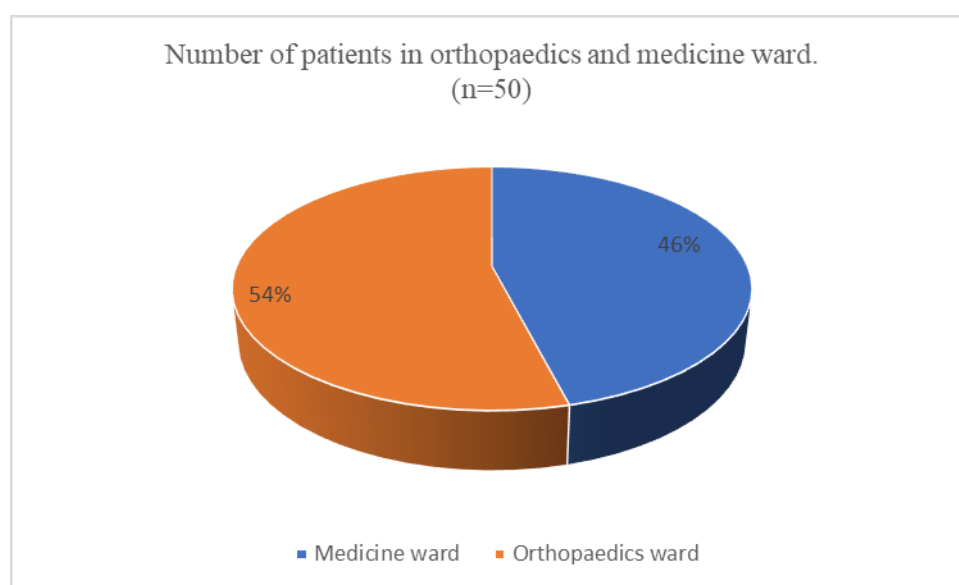


**Figure 1: Gender wise distribution of patients**

Further, we also observed that, out of total 50 patients, 27 (54%) patients were from orthopaedic ward, whereas 23 (46%) patients were from medicine ward as indicated in [Table2/figure 2].

**Table 2: NSAIDs usage based on medicine & orthopedic ward**

Wards	Total number of patients recruited (n=50)	Distribution of patients (n=50)	Percentage (%)
Medicine ward	50	23	46
Orthopaedic ward		27	54



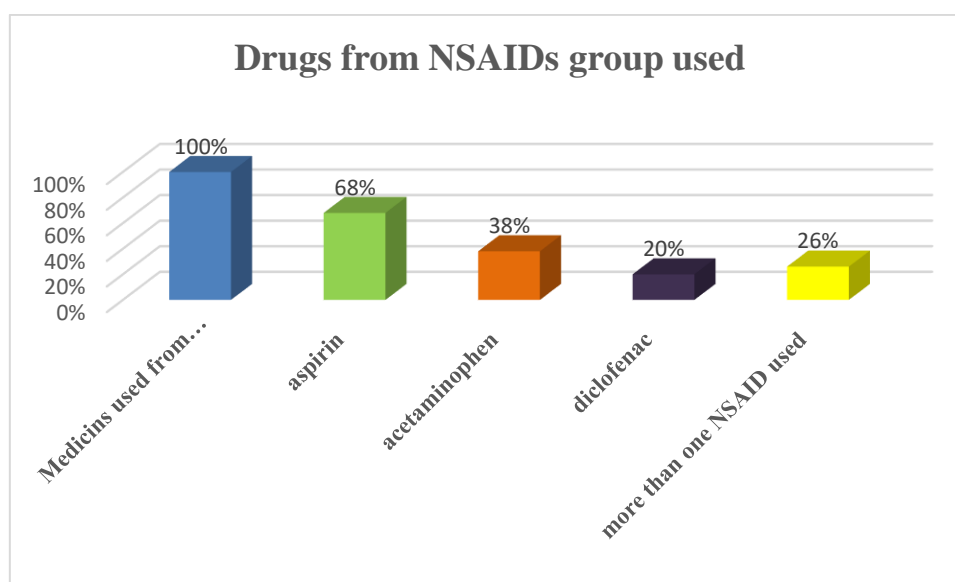
**Figure 2: NSAIDs usage based on medicine & orthopedic ward**

In our study we found that the most significant outcome was; Aspirin, Acetaminophen (Paracetamol), Diclofenac and combination of Acetaminophen (Paracetamol) + Diclofenac Sodium was found to be the main NSAIDs drugs prescribed to the geriatric patients in medicine and orthopedic wards. The details are mentioned in [Table 3/Figure 3].

Moreover while evaluating the pattern of prescription writing; it was observed that in every prescription, one of the essential drugs is prescribed by the clinician in each of the prescriptions.

**Table 3: Drug-wise distribution amongst prescribed NSAIDs**

Medicines used from NSAIDS group	Number of patients (n=50)	Percentage (%)
Acetaminophen (Paracetamol)	34	68
Aspirin	19	38
Diclofenac sodium	10	20
More than one NSAID used	13	26

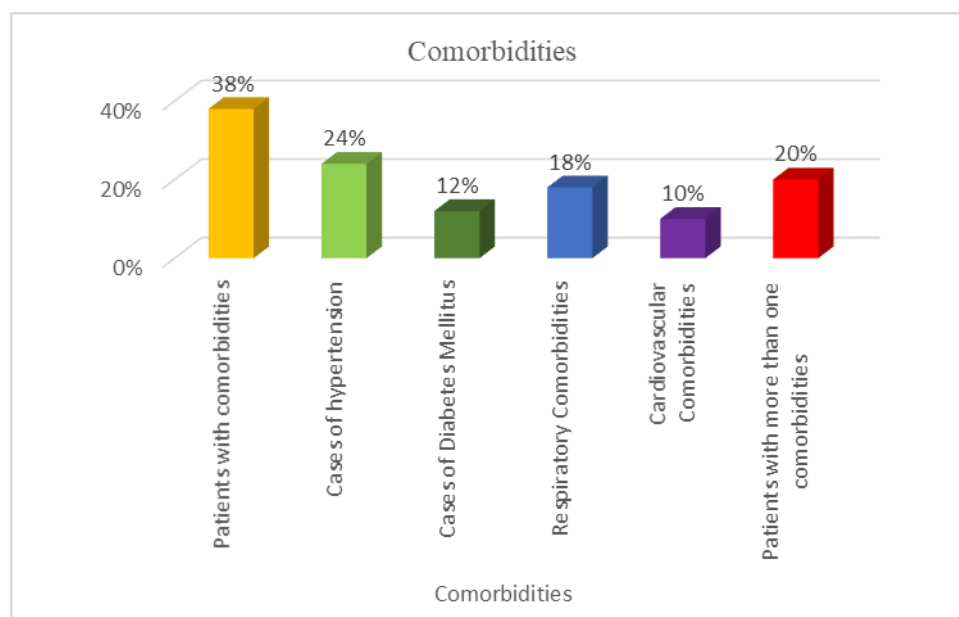
**Figure 3: Drug-wise distribution amongst prescribed NSAIDs**

Also, we studied the comorbidities in the same group of patients. In [Table4a/figure 4a], it is shown that 38% elderly patients have comorbid condition, while 20% suffer from more than one comorbid condition.

It was found that majority of the elderly patients had hypertension followed by respiratory, metabolic (diabetes mellitus) and cardiac comorbid conditions.

**Table 4a: Comorbid Conditions reported in elderly patients**

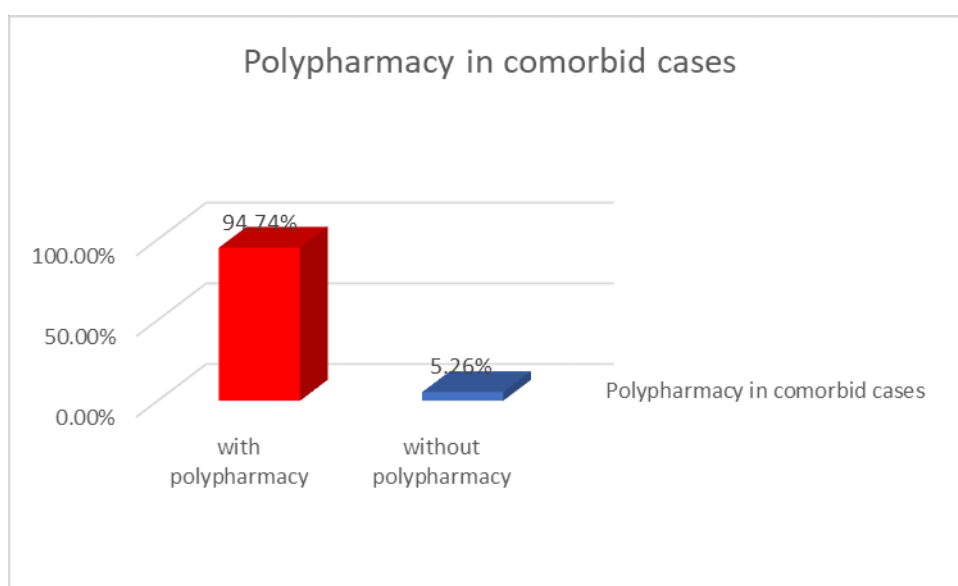
Comorbid conditions	Number of patients (n=50)	Percentage (%)
Patients with comorbidities	19	38%
Cases of hypertension	12	24%
Cases of Diabetes Mellitus	6	12%
Respiratory Comorbidities	9	18%
Cardiovascular Comorbidities	5	10%
Patients with more than one comorbidities	10	20%

**Figure 4a: Presence of Comorbid Conditions In Elderly patients**

Also, we studied the comorbidities in the same group of patients, among cases with and without polypharmacy, as depicted in [Table 4b], it is shown that 41.86% elderly patients have comorbid condition with polypharmacy, while 14.28% suffer from elderly patients have comorbid condition without polypharmacy.

**Table 4b: Comorbid conditions among cases with and without polypharmacy**

Comorbidities	Number of patients WITH Polypharmacy (At least 5 drugs) (n=43)	Percentage of patients WITH polypharmacy (%)	Number of patients WITHOUT Polypharmacy (less than 5 drugs) (n=7)	Percentage of patients WITHOUT polypharmacy (%)
<b>Patients with comorbidities</b>	18	41.86%	1	14.28%
<b>Cases of hypertension</b>	11	25.58%	1	14.28%
<b>Cases of Diabetes Mellitus</b>	6	13.95%	0	-
<b>Respiratory Comorbidities</b>	9	20.93%	0	-
<b>Cardiovascular Comorbidities</b>	5	11.62%	0	-
<b>Patients with more than one comorbidities</b>	10	23.25%	0	-



**Figure 4b: Comorbid conditions among cases with and without polypharmacy**



As depicted in Table 4c, we have studied the Gender wise Comorbid conditions reported amongst males and female elderly patients. In Table 4d depicts the geriatric group wise distribution of comorbidities.

Nearly 86% of polypharmacy was found amongst orthopaedics and medicine ward. While excessive polypharmacy i.e., usage of more than 10 drugs was reported in nearly 34% patients.

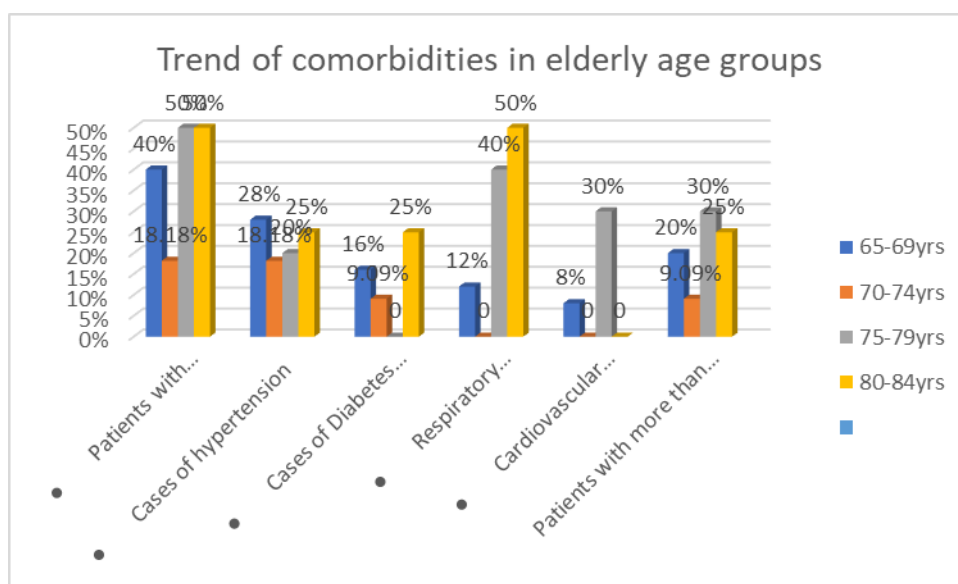
**Table 4c: Reported Comorbid conditions among males and female patients**

<b>Gender-wise Comorbid conditions</b>	<b>Males (n=26)</b>	<b>Percentage Males (%)</b>	<b>Females (n=24)</b>	<b>Percentage Females (%)</b>
<b>Patients with comorbidities</b>	6	23.07%	13	54.16%
<b>Cases of hypertension</b>	2	7.69%	10	41.66%
<b>Cases of Diabetes Mellitus</b>	1	3.84%	5	20.83%
<b>Respiratory Comorbidities</b>	4	15.38%	5	20.83%
<b>Cardiovascular Comorbidities</b>	1	3.84%	4	16.66%
<b>Patients with more than one comorbidity</b>	2	7.69%	8	33.33%

**Table 4d: Reported Comorbid conditions among geriatric age groups**

<b>Geriatric distribution of comorbid conditions</b>	<b>Age 65-69 years (n=25)</b>	<b>Percentage 65-69 yrs (%)</b>	<b>Age 70-74 years (n=11)</b>	<b>Percentage 70-74 yrs (%)</b>	<b>Age 75-79 years (n=10)</b>	<b>Percentage 75-79 yrs (%)</b>	<b>Age 80-84 years (n=4)</b>	<b>Percentage 80-84 yrs (%)</b>
<b>Patients with comorbidities</b>	10	40%	2	18.18%	5	50%	2	50%
<b>Cases of hypertension</b>	7	28%	2	18.18%	2	20%	1	25%
<b>Cases of Diabetes Mellitus</b>	4	16%	1	9.09%	0	0	1	25%
<b>Respiratory</b>	3	12%	0	0	4	40%	2	50%
	2	8%	0	0	3	30%	0	0

<b>Comorbidities</b>	5	20%	1	9.09%	3	30%	1	25%
<b>Cardiovascular Comorbidities</b>								
<b>Patients with more than one comorbidities</b>								

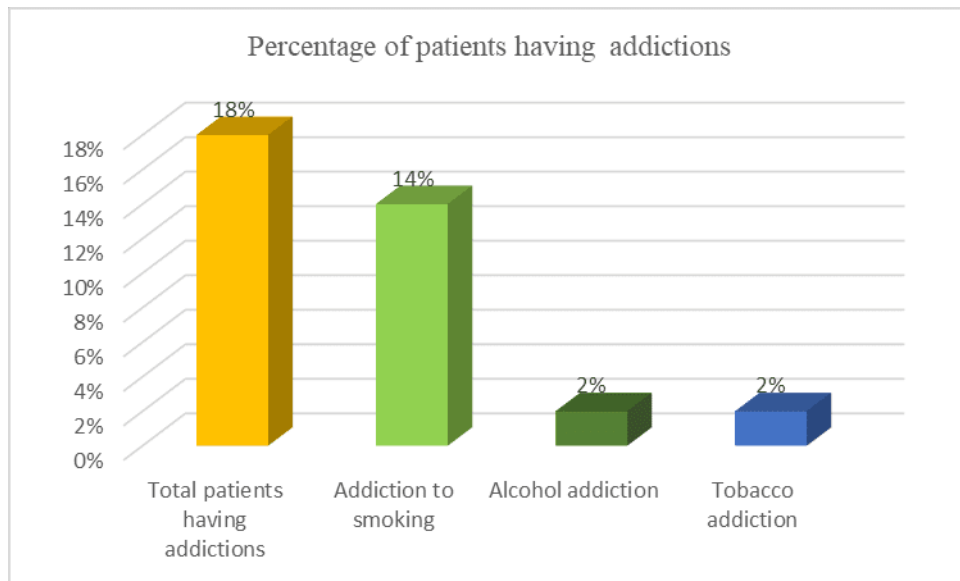


**Figure 4d: Trend of comorbid conditions in elderly age groups**

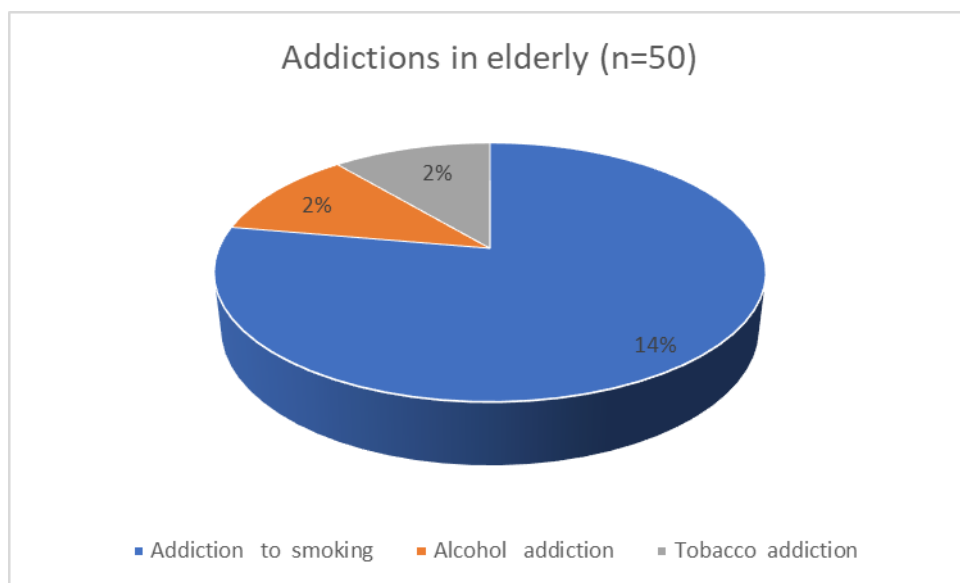
Further, we also noted the addiction habits amongst the patients. 18% of them have addictions. [Table 5a/Figure 5a, 5b]. However, none of them were addicted to more than one substance.

**Table 5a: Addictions amongst patients**

Addictions	Number of patients (n=50)	Percentage (%)
<b>Total patients having addictions</b>	9	18%
<b>Addiction to smoking</b>	7	14%
<b>Alcohol addiction</b>	1	2%
<b>Tobacco addiction</b>	1	2%



**Figure 5a: Addictions amongst patients**



**Figure 5b: Type of addictions in patients.**

Further, we also noted the addiction habits amongst the patients with and without polypharmacy as depicted in Table 5b and gender-wise distribution as shown in Table 5c; and age-wise group distribution in Table 5d.

**Table 5b: Addictions among cases WITH AND WITHOUT POLYPHARMACY**

<b>ADDICTIONS</b>	<b>WITH polypharmacy (At least 5 drugs) (n=43)</b>	<b>Percentage with polypharmacy (%)</b>	<b>WITHOUT polypharmacy (less than 5 drugs) (n=7)</b>	<b>Percentage without polypharmacy (%)</b>
<b>Total patients having addictions</b>	9	20.93%	0	0
<b>Addiction to smoking</b>	7	16.27%	0	
<b>Alcohol addiction</b>	1	2.32%	0	
<b>Tobacco addiction</b>	1	2.32%	0	

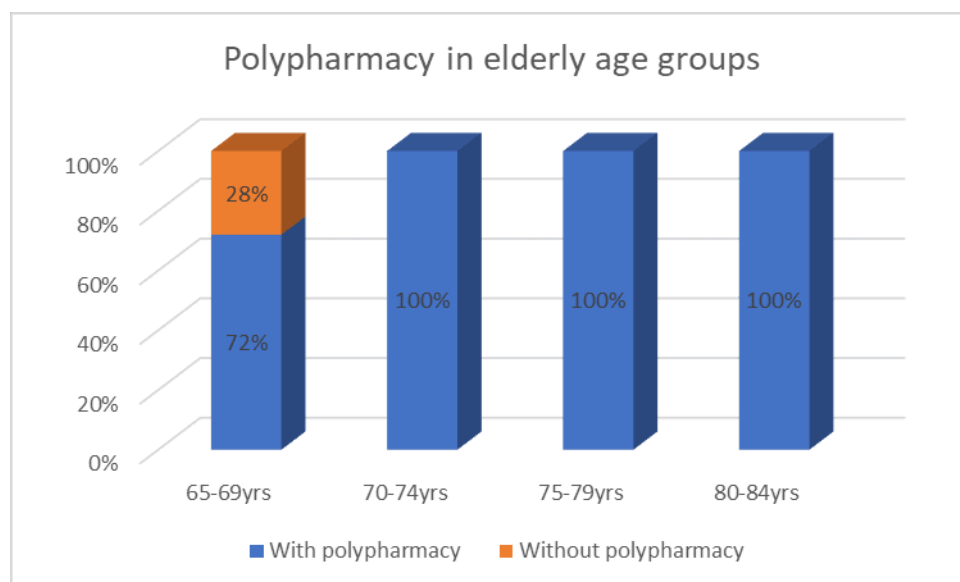
**Table 5c: Addictions among males and females in the study**

<b>Gender wise Addictions</b>	<b>Males (n=26)</b>	<b>Percentage males (%)</b>	<b>Females (n=24)</b>	<b>Percentage Females (%)</b>
<b>Total patients having addictions</b>	8	30.76%	1	4.16%
<b>Addiction to smoking</b>	6	23.07%	1	4.16%
<b>Alcohol addiction</b>	1	3.84%	0	0
<b>Tobacco addiction</b>	1	3.84%	0	0

Comparing to a study on elderly in India showed polypharmacy prevalence of 49% and excessive polypharmacy of 34%, the present study demonstrated strong prevalence of concomitant use of various drugs. Taking four such elderly age-groups (four age groups) comprising of 65-69 years, 70-74 years, 75-79 years and 80-84 years respectively, a trend of increasing polypharmacy with age was found as depicted in [Table 6/Figure 6].

**Table 6: Geriatric Age-Group Distribution of occurrence of polypharmacy**

Geriatric distribution of occurrence of polypharmacy	Age 65-69 years (n=25)	Percentage 65-69 yrs (%)	Age 70-74 years (n=11)	Percentage 70-74 yrs (%)	Age 75-79 years (n=10)	Percentage 75-79yrs (%)	Age 80-84 years (n=4)	Percentage 80-84 yrs (%)
Less than 5	7	28%	0	0	0	0	0	0
More than 5	12	48%	4	36.37%	2	20%	3	75%
More than 10	6	24%	7	63.63%	8	80%	1	25%
With polypharmacy (at least 5 drugs)	18	72%	11	100%	10	100%	4	100%
Without polypharmacy( less than 5 drug)	7	28%	0	0	0	0	0	0



**Figure 6: Geriatric Age-Group Distribution of occurrence of polypharmacy**

## DISCUSSION & CONCLUSION

Our present retrospective study was carried out in a rural tertiary care teaching hospital located in Piparia village of Gujarat. Out of total 50 patient case files filled from the record section of Dhiraj hospital, we studied the majority of prescriptions of patients admitted in orthopedic and medicine wards. In this study with aim to find out the usage of NSAIDs, the most significant outcome was, Aspirin, paracetamol, diclofenac and combination of paracetamol + diclofenac was found to be the main NSAIDs drugs prescribed to the geriatric patients in medicine and orthopedic wards as depicted in [Table3/Figure 3]. Comparing to a study on elderly in India showed polypharmacy prevalence of 49% and excessive polypharmacy of 34%, the present study shows strong prevalence of concomitant use of various drugs. In the geriatric population, majority burden of comorbidities was seen in age groups 75-79 years, 80-84 years, while more than one comorbidity were maximum in 75-79 years of group, implying the increase in burden of comorbidity with increasing age.

Hence the present study concludes that the high polypharmacy prevalence calls for an insight into the necessity and rationality of concurrent use of multiple medications among elderly patients. Among the elderly population, those with polypharmacy in prescriptions have more comorbidity and addictions. Further research are required upon assessment of whether the frequent use of NSAIDs along with frequent polypharmacy in patients is necessary; or is avoidable; according to the conditions and comorbidities of patients. Also, there is need for demarcation between how positive and how negative an impact can polypharmacy imposes upon different medical conditions among elderly groups.

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**Conflict of interest:** None declared

**Ethical approval:** The study was approved by the Sumandeep Vidyapeeth Institutional Ethics Committee (SVIEC).

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