

Original Article

The Drug Utilization Pattern and Factors Associated with Knee Osteoarthritis in a Tertiary Care Hospital

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ABSTRACT

Introduction: Knee osteoarthritis is more commonly reported among elderly patients. The prevalence of knee osteoarthritis increases with age. Many prescribing errors can be made during prescription writing for knee osteoarthritis patients. These errors can be detected and resolved by analyzing prescriptions properly.

Methodology: The present cross-sectional, observational study was conducted in Orthopaedic department from April 2018 to March 2019. Total 240 prescriptions were analyzed during the study. All the prescriptions were analyzed using WHO prescribing core indicators. Prescriptions were analyzed for completeness also such as patient's identification, prescriber's identification, duration of treatment etc. Burden and risk factors associated with knee osteoarthritis were evaluated during the study.

Results: During the study it was found that knee osteoarthritis was more common among females (60.8%) than males (39.1%). 55.63% patients presented with grade 3 on Kellgren-Lawrence scale. An average of 4.32 ± 1.2 drugs were prescribed per prescription. NSAIDs were the most commonly prescribed drugs. Regular physical activities, muscle weakness, occupational risks like walking and climbing stairs were the most influencing factors for knee osteoarthritis (p value=0.001). Occurrence of knee osteoarthritis was 31.7%. and increased with age as there were only 20.24% patients having knee osteoarthritis in 45-50 years age group, but in the age group 55-60 years it became 59.50%.

Conclusion: The burden of knee osteoarthritis was reported to be 31.7%. Associated factors of knee osteoarthritis were female gender, age, body mass index, and occupational risks. Most of the drugs were prescribed

from essential drug list and by generic names.

Key words: Prescription analysis, knee osteoarthritis, prescribing indicators.

INTRODUCTION

Osteoarthritis is a localized degenerative disorder of multifactorial etiology. It is characterized by hypertrophy of bones, changes in synovial membrane and joint capsule, subchondral sclerosis, and loss of articular cartilage.¹ Osteoarthritis is the major cause of pain and lower limb disability due to its predilection for lower extremity joints such as knee and hip.² Age is the strongest predictor of development of osteoarthritis; though joint trauma, genetic factors, gender, physically demanding occupations, and inadequate physical activities also enhance the risk of osteoarthritis.³

Treatment of knee osteoarthritis is basically palliative, concerning with management of symptoms of disease (pain). Thus, relief from pain is a major concern for patients.³ Management of knee osteoarthritis includes simple approaches such as weight loss (in obesity), lifestyle changes, exercise, use of topical agents, and analgesics.⁴ Therapeutic approach includes non-pharmacological method (alternative therapy and physical therapy), pharmacological methods (use of analgesics, non steroidal anti-inflammatory drugs, symptomatic slow-acting drugs in osteoarthritis), and lastly joint replacement.⁴ Overuse of drugs leads to intoxication, serious adverse drug reactions, and increased cost and duration of hospital stay.

Rational use of drugs is very essential to minimize the adverse drug reactions and to improve quality of life of patients. Rational use of drugs defines that patients receive

medicines appropriate to their clinical needs, for an adequate period of time, at the lowest cost, and in doses that meet their own individual requirements. Prescriptions hold a special importance regarding the rational use of drug related to safety, cost, and efficacy.⁵

Evaluation and analysis of prescriptions is considered as one of the most effective ways to evaluate and analyze the prescribing attitude of physicians and dispensing practice of pharmacists. Errors are common in prescription writing and may affect up to 82% of prescriptions.⁶ These errors are responsible for development of many serious side effects. About 4 in 1000 prescriptions have errors that lead to serious adverse effects.⁷ Analysis of prescriptions is important because error can occur at any step of prescription like route of administration, dose of drug, choice of drug, and frequency of drug etc. Prescribing errors sometimes lead to drug-drug interactions and side effects. These prescribing errors can be detected by proper analysis and audit of prescriptions.⁶ Periodic assessment of prescriptions increases the therapeutic benefit and decrease the serious adverse effects and drug interactions.

Therefore, the current study was planned to evaluate and analyze the prescriptions for knee osteoarthritis. Prescriptions were analyzed using WHO prescribing core indicators. Occurrence of knee osteoarthritis and risk factors associated with knee osteoarthritis were also studied in the present study.

METHODS

This cross-sectional, observational study was conducted in Orthopedic department of a government medical college and hospital. The study was permitted by ethics committee of the institute (order number 3706/MC/EC/ 2018). The study purpose and procedure was explained in detail to the patients and subsequently the informed consent was taken in written form. All prescriptions of knee osteoarthritis patients from out-patient department were evaluated from April 2018 to March 2019. A total 233 sample size was calculated using formula $n = 4 pq/L^2$, where p = prevalence of disease, q = 100-p and L = allowable error (20% of p). Prevalence (p) was taken 30% for the current study.⁷ In the current study, total 240 prescriptions of knee osteoarthritis patients were analyzed. All patients of both gender aged between 45-70 years with unilateral knee osteoarthritis

from last 5 to 6 months and radiographically Kellgren-Lawrence grade 2 and 3 were included. Patients with knee replacement, pregnant women, patients of rheumatoid arthritis, and other autoimmune disorders were excluded from the study.

Basic information of patients was collected using a self-designed questionnaire. All prescriptions of knee osteoarthritis were checked using following parameters:

Format of prescription and completeness of prescriptions regarding:

- Identification of patient (name, sex, age, address, and weight)
- Identification details of prescriber (name, department, registration number, doctor's initials)
- Writing (start date, dose/strength/product formulation)
- Dosing (under and over dosing)
- Treatment duration
- Route of administration
- Advice for follow-up
- Allergy status mentioned
- Diagnosis

Following WHO core prescribing indicators were used for analysis of prescriptions⁸:

1. Average number of prescribed drugs was obtained by dividing total number of different drugs prescribed by the number of prescriptions evaluated.
2. Percentage of drugs prescribed by generic name calculated by dividing the number of drugs prescribed by generic name by the total number of drugs prescribed, multiplied by 100.
3. Percentage of fixed dose combinations prescribed calculated by dividing the number of fixed dose combinations prescribed by the total number of drugs prescribed, multiplied by 100.
4. Percentage of encounters prescribed with injections calculated by dividing the number of patient encounters during which an antibiotic or an injection was prescribed by the total number of encounters surveyed, multiplied by 100.
5. Percentage of drugs prescribed from essential drug list (EDL) calculated by dividing the total number of products prescribed from EDL by the total number of drugs prescribed, multiplied by 100.

Statistical Analysis: Data were checked and entered in excel sheet and analyzed using SPSS 21.0 version. Normality distribution of data were checked by applying Shapiro-wilk test. It was found that data were normally distributed. Burden of knee osteoarthritis was presented in percentage. Associations of knee osteoarthritis with various factors were checked using odds ratio. p value less than 0.05 was considered as significant.

RESULTS

Baseline data of patients are tabulated in table 1. From table 1 it can be concluded that out of total 240 patients, most of them (35.4%) belonged to 50-55 years age group followed by 55-60 years age group with 22.5% patients. Only 17.0 % patients belonged to the age group ≥60. Knee osteoarthritis was more common in females (60.8%) than males (39.1%). 46.6% patients had knee osteoarthritis condition from last two years. Majority of patients (55.63%) presented with grade 3 on Kellgren- Lawrence scale. 27.9 % patients were illiterate while 35.0% had education upto primary school. 40.8% patients were unemployed and 31.6% were retired.

Analysis of prescriptions according to WHO core indicators are shown in table 2. Average number of drugs prescribed per prescription was 4.32±1.23 and varied from one drug to 6 drugs. Almost all the drugs (95.0%) were prescribed by generic name. Among the total drugs prescribed, only 6% were fixed dose combinations. Total number of prescriptions with injections was 2.1%. The overall percentage of drugs prescribed from an 'Essential Drug List' was 98.2 % (Table 2).

Most commonly prescribed drug category was non-steroidal anti-inflammatory drugs (NSAIDs) as 31.2% patients of knee osteoarthritis used Diclofenac. Most commonly prescribed antacid was Esomeprazole. Majority of drugs were given by oral route (Table 3). Intra-articular injections of corticosteroid and hyaluronan were prescribed only when absolutely required by the patient. Nutraceuticals like glucosamine or chondroitin products were also prescribed (1.7%) for management of knee osteoarthritis.

Effect of various factors on knee osteoarthritis was analyzed and is shown in table 4. All the factors mentioned in table 4 were found to be correlated with knee osteoarthritis. Regular physical activities, muscle weakness,

occupational risks like walking and climbing stairs were found to be strongly influencing the symptoms of knee osteoarthritis (p = 0.001).

Table 1: Demographic variables of study participants (n=240)

Variables	Number of participants	Percentage
Age		
45-50 years	60	25.0
50-55 years	85	35.4
55-60 years	54	22.5
>60 years	41	17.0
Gender		
Male	94	39.1
Female	146	60.8
Disease duration		
1 years	67	27.9
2 years	112	46.6
3 years	34	14.1
> 3 years	27	11.2
OA of knee		
Right knee	136	56.6
Left knee	104	43.3
KL scale		
Grade 2	132	55
Grade 3	108	45
Education level		
Illiterate	67	27.9
Primary education	84	35
High school education	54	22.5
Graduation	35	14.5
Occupation		
Unemployed	98	40.8
Retired	76	31.6
Employed	66	27.5
Marital status		
Married	192	80
Unmarried	48	20

Out of total 240 prescriptions, all prescriptions had mentioned the date and all details of patients in printed form. Name of the department and address of hospital was also printed on all prescriptions but very few prescriptions had mentioned doctor's registration number. 94% prescriptions had physician's initials. 4% prescriptions did not mention the dosage forms like tablets and injections

Table 2: Prescription analysis according to WHO Core indicators

WHO Core indicators	
Number of drugs prescribed per prescription (Mean±SD)	4.32±1.23
Fixed dose combinations prescribed per prescription (percentage)	6%
Drugs prescribed by generic name (percentage)	95%
Encounters prescribed with injections (percentage)	2.1%
Drugs prescribed according to essential medicine list of Rajasthan (percentage)	98.2%
Essential drug list or formulary available	Yes

etc. while 8% prescriptions had mentioned incorrect dosage. Other parameters of prescriptions analysis regarding completeness are depicted in figure 1.

Adverse drug reactions observed during the study due to

prescribed drugs are depicted in figure 2. Most common and frequently reported adverse drug reaction was nausea and vomiting (10.0%) which was followed by epigastric pain (5.00%). Only 2.08% patients reported diarrhoea and 1.25% reported headache.

The burden of knee osteoarthritis among study participants was 31.7%. Out of them, 64.10% had restricted movement followed by stiffness in joints (62.70%), pseudo-locking (46.72%), clicking of knee joints in 36.50%, and bony outgrowth in 20.11%. Advancing age was associated with an increased burden of knee osteoarthritis. There were only 20.24% patients having knee osteoarthritis in 45- 50 years age group, but in the age group 55-60 years it became 59.50% (Figures 3 and 4).

DISCUSSION

Assessment of prescription is an essential part of medical audit and it is a significant approach to improve health care system and patient care. Prescription audit is a necessary

Table 3: Administration of major drugs prescribed in prescriptions (n=240)

Categories of drugs	Number	Percentage	Mode of administration
NSAIDs			
Paracetamol	56	23.3	Oral
Diclofenac	75	31.2	Oral
Diclofenac gel	51	21.2	Topical
Ibuprofen	18	7.5	Oral
Indomethacin	40	16.6	Oral
Antacids			
Omeprazole	76	31.6	Oral
Pantoprazole	43	17.9	Oral
Esomeprazole	98	40.8	Oral
Aluminum hydroxide + Magnesium hydroxide + Simethicone + Sodium carboxymethyl cellulose	23	9.5	Oral
Vitamins and mineral supplements			
Calcium	61	25.4	Oral
Vitamin D sachet	78	32.5	Oral
Calcitriol	34	14.1	Oral
Folic acid	49	20.4	Oral
Multivitamins	18	7.5	Oral
Others			
Antibiotics	124	51.6	Oral
Muscle relaxant	23	9.5	Oral
Atorvastatin	65	27.0	Oral
Steroids	28	11.6	Topical

Table 4: Association of different factors with knee osteoarthritis (n=240)

Factors	% of patients	p value	Odds Ratio (CI)
Age			
≥55	57.01	0.03	1.83 (1.04-3.21)
≥56	42.12		
Obesity			
BMI> 30	55.67	0.01	1.99 (1.13-3.50)
BMI<30	38.45		
Meniscal injuries			
Yes	59.29	0.003	2.34 (1.33-4.14)
No	38.87		
Regular physical activities			
Yes	64.35	0.001	3.30 (1.84-5.89)
No	35.13		
Family history of OA			
Yes	58.27	0.01	2.07 (1.17-3.63)
No	40.17		
Trauma of the knee joint			
Yes	53.57	0.01	2.08 (1.18-3.68)
No	45.10		
Muscle weakness			
Yes	62.19	0.001	2.77 (1.56-4.92)
No	37.34		
Occupational risks			
Walking (≥ 1 hours)		0.001	2.58 (1.45-4.58)
Yes	56.89		
No	33.14		
Kneeling (≥ 1 hour/day)		0.003	2.98 (1.56-5.36)
Yes	61.17		
No	39.24		
Digging (≥ 3 hours/ day)		0.01	2.07 (1.17-3.63)
Yes	59.02		
No	41.96		
Climbing stairs (≥ 20 flights/ day)		0.001	3.77 (2.09-6.77)
Yes	65.78		
No	33.45		
Driving (≥ 5 hours)		0.11	1.56 (0.89-2.74)
Yes	50.98		
No	39.92		

Abbreviations : BMI: Body Mass Index, CI: Confidence Interval, OA: Osteoarthritis

step to recognize deficiency in the medical care and is also helpful to improve the same.⁹ The mean age of osteoarthritis affected population in present study was 54.89±11.76 years. This finding was in congruence with the results of previous study conducted by Kulkarni et al⁴ in knee osteoarthritis patients. Demographic data of the study revealed that knee osteoarthritis was more commonly seen in female patients than males. This was in accordance with

the study carried out by Jadhav.¹⁰

The WHO core prescribing indicators were used to measure the rational and appropriate use of medicines. The average number of medicines per prescription was 4.32 ± 1.23. This was comparable with study done by Abidi et al.¹¹ But it was much higher than other studies conducted in secondary care hospitals (3.1) and rural India (3.31).^{12,13} This is an indicator of polypharmacy. It can increase the

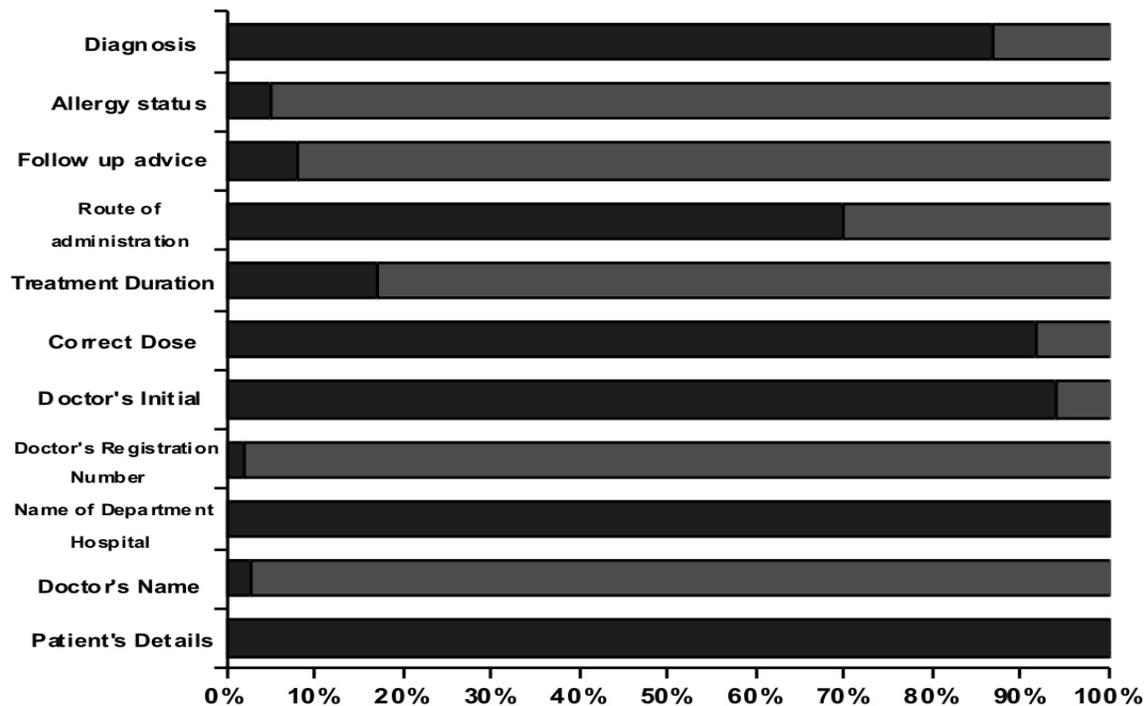


Figure 1: Various parameters of prescription analysis regarding completeness.

risk of drug-drug interactions and also lead to unwanted side effects.

Almost all the medicines were prescribed by generic names in the current study. Mittal et al¹⁴ conducted a study in tertiary care hospital and found that only 21.5% drugs were prescribed by generic names. Generic prescribing decreases the chances of dispensing errors and also decreases the economic burden on the patients.

The treatment options for knee osteoarthritis have primarily focused on alleviating the pain. To manage pain, NSAIDs were the preferred choice. In the present study, NSAIDs were the most commonly prescribed drugs. These findings of present study were consistent with the results of previous study conducted by Gupta and Malhotra.¹⁵ In the present study, Diclofenac was prescribed more as compared to Paracetamol for pain management. Richard et al¹⁶ reported that efficacy of Paracetamol is less as compared to other analgesics in osteoarthritis patients. 98.2% drugs were prescribed from essential drug list. This rate was significantly higher than the study carried out by Hazra.¹⁷ This practice of prescribing drugs from essential drug list helps in improving the rational use of drugs. On analyzing the prescriptions we found that the prescriptions were incomplete with regard to mention of allergy status,

registration number, and follow-up. These results of present study were in line with other previously published studies.^{11,12}

Percentage of injections in the current study was only 2.1% which is well within the limits set by WHO ($\leq 10\%$). Oral route was the most commonly preferred route in the present study. This result of the present study was comparable to other study conducted in tertiary level hospital.¹¹ The rate of injection was much lower than the injection encounters in private settings (20.8%) or secondary level settings (25%).^{12,18} The lower rate of injections is encouraging as injections are associated with increased risk of blood related infections. Lesser use of injection helps to limit health care cost.

The burden of knee osteoarthritis reported in present study was 31.7% which was comparable with other studies. One such study conducted by Salve et al¹⁹ in females noticed the prevalence rate was 33.4%. Another study in a primary health care level reported a prevalence rate of 34.2% among elder patients of knee osteoarthritis.²⁰ The signs and symptoms reported during the study were knee stiffness and restricted movement due to pain. These signs were similar as noticed by Zhang et al.²¹ Factors associated with high prevalence of knee osteoarthritis were increasing age,

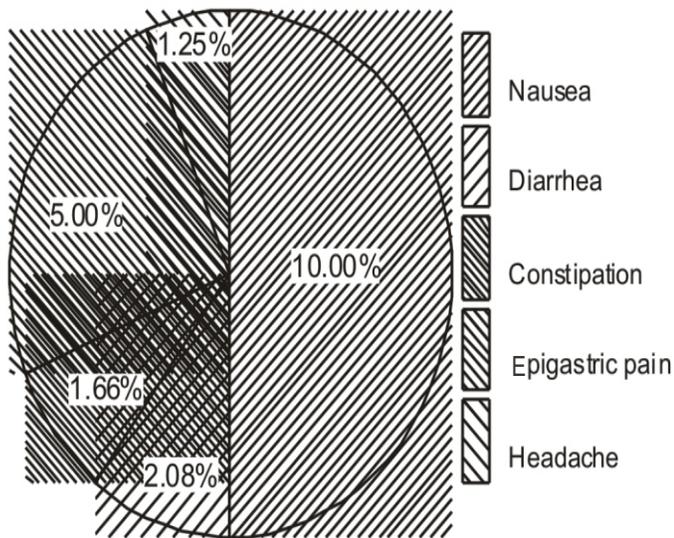


Figure 2: Adverse drug reactions reported among knee osteoarthritis patients.

muscle weakness, higher body mass index, and occupational risks such as walking and climbing. Gelber et al²² observed that body mass index, age, and muscle weakness were the major risk factors for knee osteoarthritis.

CONCLUSION

The present study showed that knee osteoarthritis is more common among females as compared to males. Most of the drugs were prescribed from essential drug list and by generic name. But still, there is a scope of improvement in prescription pattern. Burden of knee osteoarthritis is

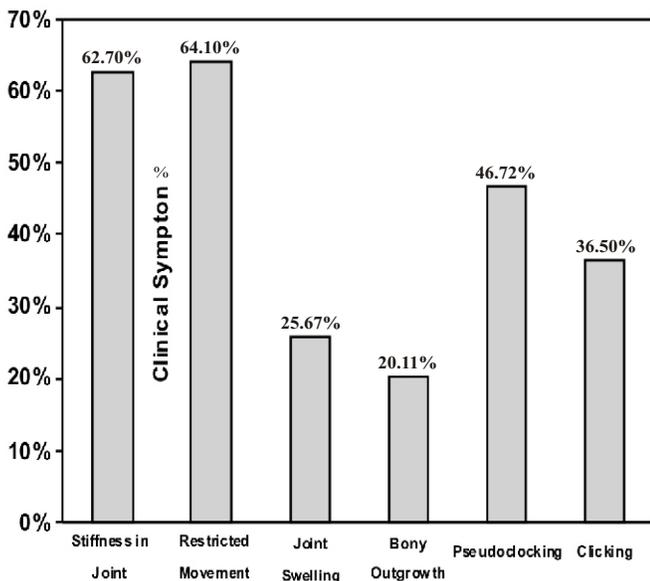


Figure 3: Clinical features of knee osteoarthritis among study participants.

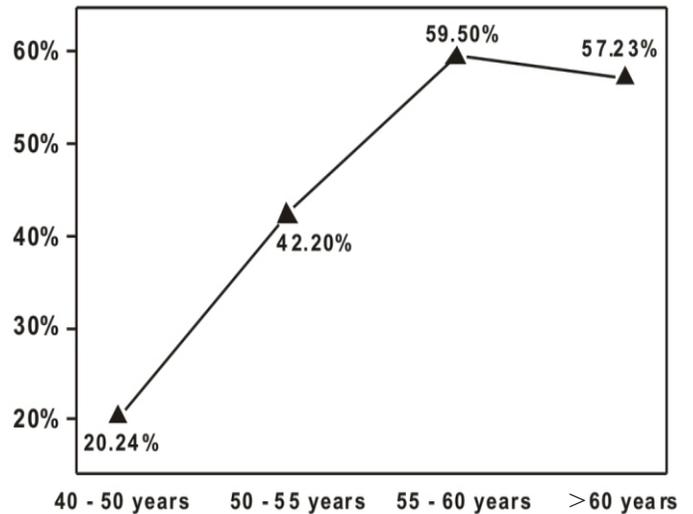


Figure 4: Prevalence of knee osteoarthritis according to age.

increasing with age. Risk factors associated with knee osteoarthritis were age, higher body mass index, and occupational risks.

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