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Original Research Article

A Study of Prescription Pattern in Musculoskeletal Disorders Causing Low Back Pain in a Tertiary Care Teaching Hospital in Northern India

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Abstract:

Background: Prescription pattern analysis studies are a tool to provide feedback to the prescriber and also create awareness regarding rational use of medicines.

Objective: To explore the pattern of prescriptions in the treatment of acute LBP and to ascertain the level of adherence of health care providers to prescribing patterns according to WHO/INRUD core drug use indicators.

Material & Methods: Total 100 patients >18 years of age having confirmed diagnosis of acute LBP attending the OPD of Orthopedics were enrolled in this study. Prescribing patterns of drugs for LBP were elucidated based on differences in age, gender, etiology, socioeconomic profile & severity of pain. The study was a descriptive observational type.

Results: Ratio between males & females was 1:1.7 ($P<0.05$). Maximum patients (37%) belonged to the upper lower class. 27% were from Upper Middle class. 25 % belonged to Lower middle class, 9% from lower class & only 2% were from upper class. (P0.05) Drugs prescribed in LBP patients were NSAIDs, proton pump inhibitors, H2 blockers, opioids, Muscle relaxants, steroids, Ca++, cholecalciferol and multivitamins. All patients invariably received NSAIDs & Proton pump inhibitors (PPIs)/H2 blockers. 4 patients received opioids. 80 patients received muscle relaxants, 11 patients received steroids. 94 supplementary drugs in the form of Ca++, Vit D3 & multivitamins were prescribed. Each category of patients (age wise, gender wise, socioeconomic wise, etiology wise, severity wise) received same drugs. ($P>0.05$) Total 236 systemic NSAIDs were prescribed. Non-selective NSAIDs were used more than selective (79.23% vs 20.76%). Etoricoxib was the only selective NSAID used. According to WHO/INRUD drugs use core indicators by health care providers in the Institute, average number of medicines prescribed per patient encounter was 5.25. Medicines prescribed by generic name were 10. No antibiotics & injections were given. 100% drugs were from Essential Medicine List.

Conclusion: A very common practice of poly pharmacy was seen in many prescriptions. Health care providers are not adhered to WHO/INRUD drug use Indicators Thus, we can conclude that irrational prescribing exists all around. To minimize this, regular CMEs, workshops, lectures, OPD/ward visits on rational prescribing should be held by competent authorities without hurting anyone's ego.

Keywords: Prescription pattern, Low back pain, WHO/INRUD, Northern India.

Introduction

Movement and function of our body is complex play of bones, Muscle, Nerves, Tendons and ligaments. The lower back carries the weight of the body making it more prone to injury. The greater part of the movement in the lumbar spine is at L3-L4 and L4-L5, so these parts of spine are highly prone to break down from various causes like Degenerative disc diseases, Inflammatory spine conditions, Spondylitis etc. [1] Maximum strain occurs at lower two segments L1, L5 & L5, S1 and there is always possibility of soft tissues to bulge out resulting in excruciating pain in lower back. Muscle strain accounts for the vast majority of episodes of lower back pain. While a muscle strain

doesn't seem like a serious injury, it can prompt issues in the lower back causing extreme suffering. The reality that soft tissues have a fair blood supply, which carries nutrients to the harmed region, works with the recuperating system and prevents the aggravation of low back pain [1,2] Low back pain is one of the most prevalent conditions in our society and is an epidemic in India. It is the most common cause of medical office visits, surgical procedures, and work-related disability.

According to analysis of the Global Burden of Disease (GBD) 2019 data, approximately 1.71 billion people worldwide suffer from musculoskeletal conditions, such as low back pain, osteoarthritis, fractures, cervical pain, amputation and several other injuries.[3] One of the musculoskeletal conditions included in the GBD study is LBP and it served as a basis for the most recent article detailing the global burden of LBP.[4] It is the main reason of movement restriction and non-attendance from work [5,6], and brings about an enormous clinical weight and financial expense. Thus, it is one of the major worldwide general medical conditions. [7,8] LBP was characterized as agony that goes on for somewhere around one day (with/without torment alluded into one or both lower appendages) nearby on the back part of the body from the lower edge of the12 ribs to the lower gluteal folds [9,10]. There is an expansive scope of possible etiologies for LBP. The etiologies vary contingent upon the patients, however, most usually, it is mechanical or vague. Osteoporosis, nerve root pressure, radiculopathy, plexopathy, degenerative disc illness, disc protrusion, spinal stenosis, sacroiliac joint stiffness, joint injury, ankylosing spondylitis etc may be the possible etiologies. [11,12] Rest, NSAIDs, muscle relaxants, calcium, physical therapy are all components of conventional medical treatment.

Gastrointestinal, Kidney, and potential cardiovascular adverse drug reactions should be considered with prolong NSAIDs, use. The United States has the highest estimated rate of surgical treatment for lumbar syndromes, with rates at least 40% higher than those in other nations including India. These surgical procedures can deliver wounds to the back spinal muscles and their nerve supply, which might be a hotspot for proceeded with loss of capability and sufferings.[13] There are very few studies that have looked at the pattern of prescriptions for LBP, especially in India.

The aim of our study was to explore the patients with low back pain (LBP) attending the orthopedics OPD of this Institute and divide them according to age, gender, etiology, financial status and agony seriousness status. In particular, we looked at the patterns of prescriptions and frequencies of prescribed co-medications in the treatment of acute LBP. Additionally, our goal was to ascertain about adherence of health care providers to prescribing patterns according to WHO/INRUD core drug use indicators in this Tertiary Care Teaching Institute in Northern India.

Methodology

The study was carried out in patients of acute low back pain attending the Out Patient Department (OPD) of Orthopedics in a Tertiary Care Teaching Hospital, in Northern India. Prescribing patterns or drug utilization studies of drugs for LBP were elucidated based on differences in age, gender, etiology, socioeconomic profile & severity of pain. The study was a descriptive observational type.

All registered patients of acute LBP during the study period from 1st Jan, 2023 to 31st May, 2023 were included.

Inclusion Criteria: Patients of acute LBP between more than 18 years of either gender having confirmed diagnosis.

Exclusion Criteria

- Pregnant & lactating women
- History of chronic cardiac, renal, hepatic & pulmonary dysfunction
- History of recurrent psychotic disorders, alcohol or drug abuse within the previous year

Unit of Study

LBP patient attending Out Patient Department of Orthopedics after having taken informed consent to be included in the study.

Sample Size:

Estimation of sample size (n) is based on simple random sampling for which central information is required. Assuming 5% significance level & 80% power of the study, sample size was calculated using the following formula

$n = Z2p(1-p)/d2$

This formula provides us with the minimum sample size needed to detect significant differences when z is determined by the acceptable likelihood of error (the abscissa of the normal curve). The value of Z is generally set to 1.96, representing a level (likelihood) of error of 5% and d is the minimal absolute size difference we wish to detect (margin of error, half of the confidence interval) Based on this formula , sample size came out to be 100.

1. All patients of acute LBP were asked about their demographic profile (name, age, gender)
2. Socioeconomic status of patient was explored by filling KUPPUSWAMI'S MODIFIED SCALE [14]

3. Severity of pain of patients was discerned by filling of another form called as BRIEF PAIN INVENTORY [15]
4. 100 patients data was collected
5. At the end of study, data was compiled & analyzed statistically. Study variables were summarized by descriptive statistics. Proportions were expressed as percentages. Chi square statistics was applied wherever needed.
6. The study was conducted in compliance with the protocol. Approval certificate was issued by Institutional Ethics committee (IEC) of the Institute (IEC/IIMS&R/2023/45)

Results

Out of 100 patients, 37 patients (37%) were males and 63 patients (63%) were females. Ratio between male & female was 1:1.7. The difference in distribution of male and female patients in the two groups was significant (P<0.05). Out of 100 patients, maximum patients (37%) belonged to the upper lower class. 27% were from Upper Middle class. 25% belonged to Lower middle class. 9% from lower class & only 2% were from upper class. (P<0.05) (fig 1) Maximum number of patients belonged to 31-50 years of age group in each class.

Total 62 patients (62%) were from mild category, 23 patients (23%) from moderate & 15 patients (15%) were from severe category. Their distribution according to age group is depicted in fig 2. Maximum no of patients in mild & moderate category belonged to 31-50yrs of age while in severe category 51-70yrs of age formed the bulk. The etiology included were herniated disc, osteoarthritis, spondylitis including Pott's spine, inflammatory LBP & degenerative disc disease (fig 3). No association between age group & etiology was found. (P>0.05). (Fig 3)

Drugs prescribed in LBP patients were NSAIDs, proton pump inhibitors, H2 blockers, opioids, Muscle relaxants, steroids, Ca++, vitamin D3 (cholecalceferol) and multi vitamins. All patients invariably received NSAIDs & Proton pump inhibitors (PPIs)/H2 blockers. 4 patients received opioids. 80 patients received muscle relaxants, and 11 patients received steroids. 94supplementary drugs in the form of Ca++, Vit D3 & multivitamins were prescribed. Treatment according to age groups is depicted in table 1. Each category of patients received same drugs. No statistically significant difference (p>0.05) was observed in all different categories of severity regarding drug treatment. (Table 2)

All patients of all socioeconomic classes received invariably NSAIDs, PPIs/H2 Blockers & muscle relaxants. There was no significant association between socioeconomic status of patients & prescribing pattern in LBP patients (P>0.05)

There was no significant association between the etiology of LBP & drugs used for the treatment (p>0.05). 100% patients including patients of Herniated disc, Osteoarthritis, Spondylitis, Degenerative disc disease & Inflammatory LBP received NSAIDs, muscle relaxants& anti gastritis drugs. Few patients received opioids & steroids. Ca++, vitamin D3 & multivitamins were prescribed sufficiently. (Table 3) Pattern of use of NSAIDs is depicted in table 4. Total 236 systemic NSAIDs (44.95%) were prescribed. Non-selective NSAIDs were used more than selective. Etoricoxib was the only selective NSAID used.

Table 5 covers the WHO/INRUD drugs use core indicators by health care providers in the Institute Average number of medicines prescribed per patient encounter was 5.25. Medicines prescribed by generic name were 10. No antibiotics & injections were given. 100% drugs were from Essential Medicine List.

Table1: prescription pattern according to age of patients

Age groups	NSAIDs	MR	PPI/H2 Block	Steroids	Ca++/D3& Vitamin
<30	52	05	26	02	24
31-50	82	22	50	03	38
51-70	52	23	20	06	20
>70	44	25	04	-	12

Table 2: prescribing pattern according to severity of patients

Age groups	NSAIDs	MR	PPI/H2 Block	Steroids	Ca++/D3& Vitamin
Mild	63	25	63	02	15
Moderate	82	20	23	06	40
Severe	95	35	14	03	39

Table 3: Prescribing Pattern According to Etiology of Low Back Pain (LBP)

Age groups	NSAIDs	MR	PPI/H2 Block	Steroids	Ca++/D3& Vitamin
Hernaited disc	61	02	33	01	15
Ost.arth.	36	06	12	01	15
Spondylitis (Pott's spine)	48	28	25	02	30
Degenerative Disc disease	41	18	10	04	20
Inflammatory LBP	55	06	18	03	14

NSAIDs- non steroidal inflammatory drugs; MR-Muscle relaxants, PPI-Proton pump inhibitor, Ca++, Vitamin D3, Multivitamin. The chi-square statics is 13.5537 the p-value is <0.631924. the result is not significant at p<0.05.

Table 4: Pattern of NSAIDs used in orthopaedic (OPD)

	No. of drugs	percentage
Total number of NSAIDs	236	100
Total number of systemic non-selective NSAIDs	187	79.23
Paracetamol	71	37.96
Aceclofenac	55	29.41
diclofenac	25	13.36
Nimesulide	05	2.67
ibuprofen	10	5.34
piroxicam	15	8.02
indomethacin	06	3.20
Total number of systemic selective NSAIDs	49	20.76
etoricoxib	49	100
Total number of systemic topical NSAIDs	60	11.42
Total number of drug used for reducing gastritis (PPI/H2 Blockers)	100	

Table 5: World health organization (WHO)/INRUD drugs use core indicators for prescription in India

	Data	WHO Standard
Average number of medicines prescribed per patient encounter	5.25	(1.6-1.8)
Percent medicine prescribed by generic name	10	(100%)
Percent encountered with an antibiotic prescribed	00	(20.0-26.8%)
percent encountered with an injection prescribed	00	(13.4-24.1%)
Percent medicine prescribed from essential medicine list or formulary 100	100	(100%)

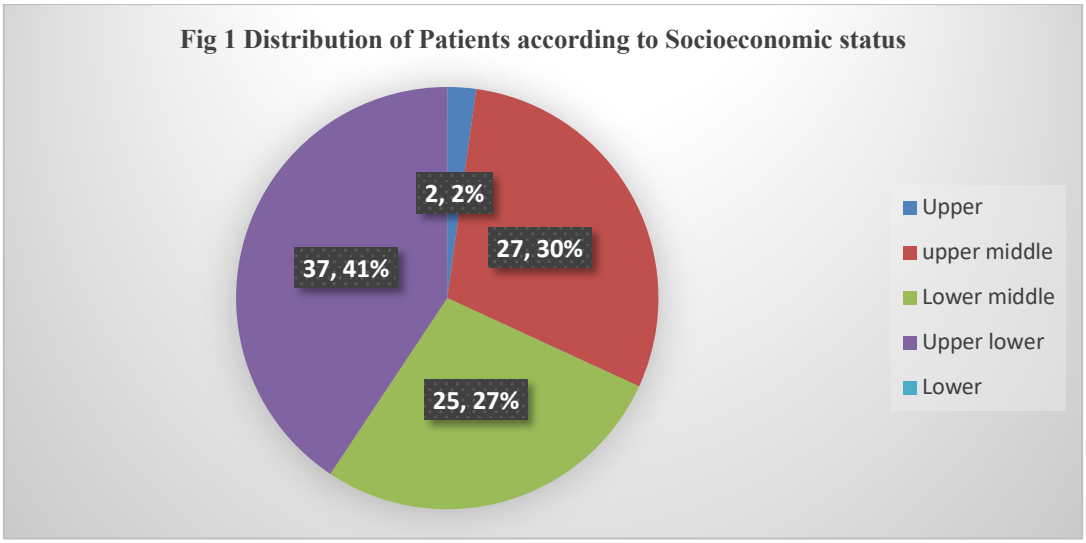

Figure 1: Distribution of Patients according to socioeconomic status

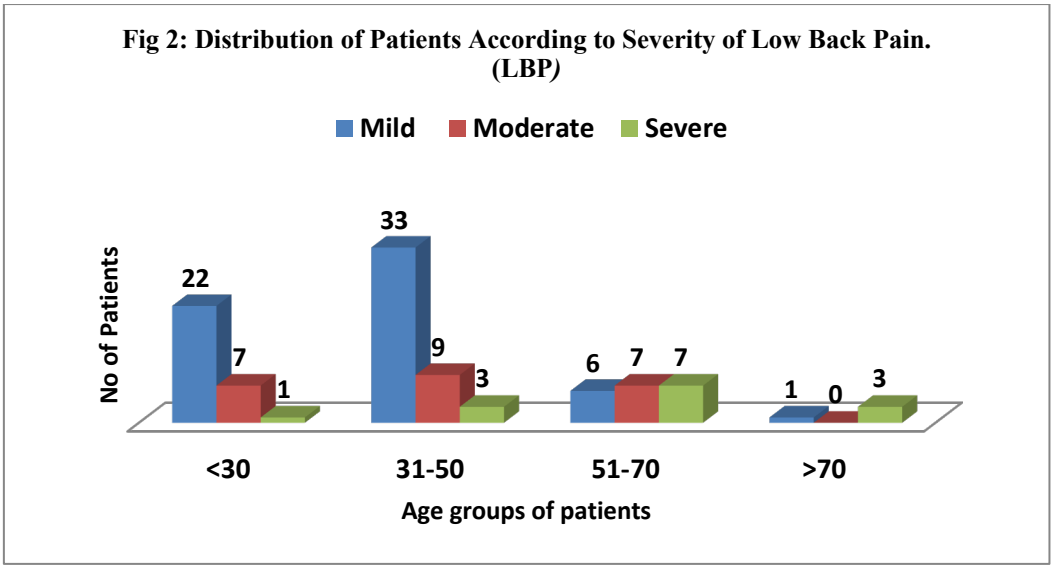

Figure 2: Distribution of Patients According to Severity of Low Back Pain. (LBP)

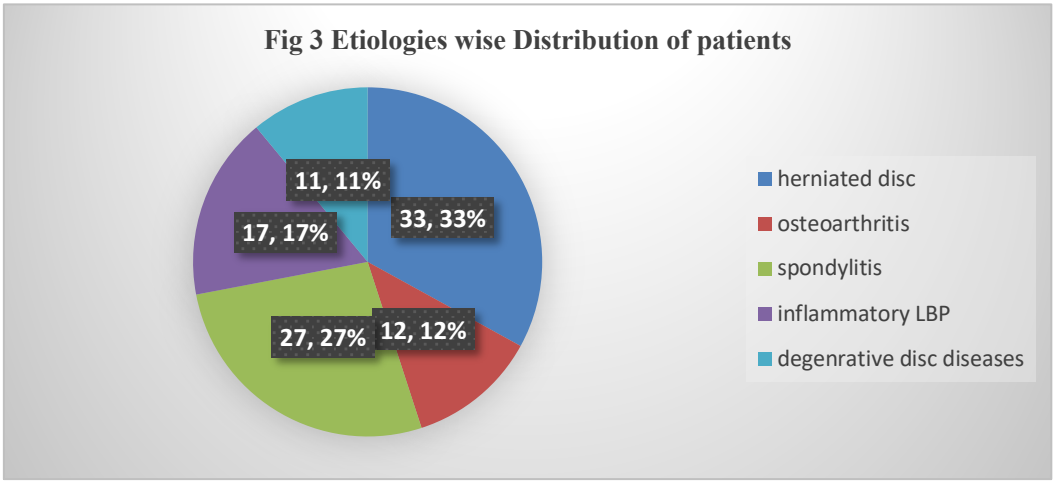

Figure 3: Etiologies wise Distribution of patients

Discussion

LBP is one of the common causes of activity restrictions and absence from work place globally [16,17]. Initially, LBP was considered to be a threat of developed countries but now various studies have explored the high prevalence in developing countries too. [18,19]. Prescription pattern studies are important for clinical, socioeconomic & knowledge purposes.

These studies not only provide feedback to the prescriber but also create awareness regarding rational use of medicines. [20]. Our study focused on demographic profile & prescribing patterns in LBP in a tertiary care teaching Hospital in Northern India. Kopec JA et al., 2004 [21] & Alam N et al., 2012 [22] concluded that prevalence is highest in 3rd decade of life in their study. Our study also explored the same. Maximum no. of patients belonged to 31-50 years of age group. Sex predilection is towards female. Male, female ratio is 1:1.7. that is statistically significant.($p<0.05$). Studies conducted by Linton et al., 1998 [23] and Thomas et al., 1999 [24] demonstrated higher incidence in females while Ganesan S et al., 2017 [25] reported higher prevalence in males (54.7%) as compared to females (45.3%). In the present study, maximum no of patients belonged (37%) to upper lower class, 27% to upper middle class, 25% lower middle, 09% to lower class & 02% to upper class according to Modified Kuppuswami's Scale of socioeconomic scale. Study conducted by Ganesan Set al., 2017 [25] concluded that maximum no. of patients belonged to upper middle (75.8%) followed by lower middle class (13.8%), 9.7% patients belonged to upper class, 0.7% to upper lower class. In our study, 62% patients belonged to mild category, 23% to moderate & 15% to severe category according to Brief Pain Inventor while study conducted by Ghanei I et al., 2014 [26] reported almost same number of patients in mild (45.1%) & moderate (44.9%) category & 9.7% from severe category. In present study,5 major etiologies of LBP were explored. These were

herniated disc, Osteoarthritis, Spondylitis including Pott's Spine, Inflammatory LBP & Degenerative Disc Disease. While comparing the etiology with the age groups of patients no significant association was found (P>0.05) concluding that any etiology is not consistent to any specific age group. We could not find any other study comparing the etiology of LBP with the age group.

Irrational prescribing practices prevail globally & ultimately lead to hazardous health outcomes. Rational prescribing includes that patient should receive right drug, in right dose, by right route, for right duration and right documentation [27]. WHO/INRUD (International Network of Rational Use of Drugs) core drug use indicators in 1990s discovered a set of indicators to know the pattern of drugs utilization by health care facilities. [27]

The irrationality exists in the form of polypharmacy, use of unnecessary expensive drugs, overuse of antibiotics & injections and behavior of prescriber.

Average no of patients per encounter was 5.25 in our study while it was 3.83 in a study [28], 2.5 [29] & 5.3 [30] in other studies which is much higher than WHO indicators (standard 1.6-1.8) indicating poly pharmacy i.e. irrational prescribing. This is a usual practice that is often seen but number of drugs should be minimum to avoid drug- drug interactions & adverse drug reactions. Use of antibiotics & injectables were none in our study. Other studies reported use of antibiotics in 19.6% & very few injectables [30]. All the drugs prescribed were from essential drug list /formulary; this is in accordance with Wendie et al., 2021, [31] who reported 100% prescribing by essential drugs list too, while it was 84% by Nagla A et al., 2016. [30] 10% drugs were prescribed by generic name in our study, similar to our findings, authors of a study [30] reported just 2% prescribing by generic name, on contrary, various studies are there where drugs were prescribed by generic name even up to 98%. [31] Prescribing drugs by generic name is an indicator of quality of prescription. It curbs the cost of per prescription & can determine the compliance level of health care facility.

The drugs prescribed were NSAIDs, opioids, muscle relaxants, Proton pump inhibitors/H2 blockers, corticosteroids, Calcium salts, Vitamin D3 & multivitamins. Hot packs & exercises were also advised to different patients. No association was found between age groups & prescribed drugs, between socioeconomic status & drugs prescribed, between etiology & drug treatment and also no association between severity of pain & prescribed drugs.(p>0.05). We could not find any other study which explored the above-mentioned associations regarding LBP treatment. Regarding pattern of NSAIDs used in LBP, total used systemic NSAIDs was 236. (44.95%), while it was 39.6% by a study [30]. Out of these, 187 drugs (79.23%) were non-selective & 49 (20.76%) were selective (COX-2 selective) NSAIDs. Study by Sharma T et al., 2006 [32] showed 56.3% non- selective & 43.6% selective NSAIDs. Use of selective NSAIDs has declined probably because of their cardiovascular adverse drug reactions. 60 (11.42%) topical NSAIDs were prescribed like diclofenac, methyl salicylate & fentanyl. Among non-selective, paracetamol constituted highest number i.e. 37.96% followed by aceclofenac (29.41%), diclofenac (13.36%). Among others were, ibuprofen (5.34%), piroxicam (8.02%), nimesulide (2.67%) & indomethacin (3.2%). Study by Motagahre VM et al., 2016 [28], concluded ibuprofen (55.58%) to be most commonly used NSAID while other study [22] reported diclofenac to be most frequently used drug (40.66%). The study also showed more use of non-selective than selective indicating the increasing concern towards cardiovascular toxicity of selective COX-2 inhibitors. In our study, the only COX-2 selective drug used was etoricoxib (100%) considered to be relatively safer than valdecoxib. Along with analgesics, thiocolchicoside, a muscle relaxant was prescribed to a fair number of patients (15.23%)

Other drugs like proton pump inhibitors constituted 19.04% of total drugs used. Nagla et al., 2016 [30] also concluded the same i.e. 20.2%. Multivitamin, Calcium salts & vitamin D3 constituted 17.90% while these were only 5.3% in Nagla et al., 2016. [30] 2.09% corticosteroids were prescribed. Another study [33] also reported less than 5% of corticosteroid use.

Limitations of the study –single center study, small sample size& cost per prescription cannot be discerned

Conclusion

A very common practice of poly pharmacy was seen in many prescriptions. Total number of drugs was 525. Number of drugs per prescription was 5.25 higher than WHO/INRUD indicators (1.6-1.8). Analgesics, muscle relaxants, gastric acid reducing agents, corticosteroids, Calcium, multivitamin & vitamin D3 were commonly used drugs. Among NSAIDs, (44.95% of total drugs used) non-selective NSAIDs constituted 79.23% & selective ones was 20.76%. Opioids formed 0.76% of total drugs used. Muscle relaxants & corticosteroids constituted 1.5% & 2.09% respectively. Calcium, multivitamin & vitamin D3 formed 17.90% of total drugs used. Drugs prescribed by generic name were 10% while it should be 100% according to WHO indicators. Percentage of encounters with antibiotics & injectables were nil (WHO standards – antibiotics 20-27%, injectables 13.4-24%)). 100% drugs were

prescribed from National List of Essential Medicines (NLEM) which complied with WHO standards. Cost per prescription cannot be discerned. Maximum number of patients belonged to 31-50 years of age-group.

Females & males ratio having Low Back Pain (LBP) was 1.7:1, which was significant. No association was found between age, socioeconomic status, severity and etiology of LBP with the drug treatment. Thus, we can conclude that irrational prescribing exists all around. To minimize this, regular CMEs, workshops, lectures, OPD/ward visits on rational prescribing should be held by competent authorities without hurting anyone's ego.

References

1. Scioscia T. Spinal Anatomy and Back. Spine-health, 2017
2. Sridevy S. Effect of therapeutic Back Massage on Non- Specific Low Back Pain. Nightingale nursing times 2008; 14(12):65-67.
3. Cieza A, Causey K, Kamenov K, Hanson S W, Chatterji S, Vos, T. Global estimates of the need for rehabilitation based on the Global Burden of Disease study 2019: a systematic analysis for the Global Burden of Disease Study 2019. The Lancet, 2021; 396(10267): 2006–17.
4. Hartvigsen J, Hancock MJ, Kongsted A, et al. What low back pain is and why we need to pay attention. Lancet 2018; 391:2356-67. [CrossRef] [Google Scholar]
5. Lee H, Hubscher M, Moseley GL, et al. How does pain lead to disability? A systematic review and metanalysis of mediation studies in people with back and neck pain. Pain 2015; 156:988-97.
6. Driscoll T, Jacklyn G, Orchard J, et al. The global burden of occupationally related low back pain: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis 2014; 73:975-81.
7. Buchbinder R, van Tulder M, Öberg B, et al. Low back pain: a call for action. Lancet 2018; 391:2384-8.
8. Erdem MN, Erken HY, Aydogan M. The effectiveness of non-surgical treatments, re-discectomy and minimally invasive transforaminal lumbar interbody fusion in post-discectomy pain syndrome. J Spine Surg 2018; 4:414-22.
9. Hoy D, March L, Brooks P, et al. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis 2014; 73:968-74.
10. Hoy D, March L, Brooks P, et al. measuring the global burden of low back pain. Best Pract Res ClinRheumatol 2010; 24:155-65.
11. Barros G, McGrath L, Gelfenbeyn M. Sacroiliac Joint Dysfunction in Patients with Low Back Pain. Fed Pract. 2019 Aug; 36(8):370-375.
12. Cohen SP, Chen Y, Neufeld NJ. Sacroiliac joint pain: a comprehensive review of epidemiology, diagnosis and treatment. Expert Rev Neurother. 2013 Jan;13(1):99-116
13. Sharma NK, Olotu B, Mathew A, Lemuel R, Waitman, Rasu R. Lumbar Spine Surgeries and Medication Usage During Hospital Stay: One-Center Perspective. Hosp Pharm. 2017 Dec; 52(11): 774–80.
14. Sood P, Bindra S. Modified Kuppuswamy socioeconomic scale: 2022 update of India. Int J Community Med Public Health. 2022 Oct; 9(10):3841-3844
15. Jumbo SU, Macdermid JC, Kalu ME, Packham TL, Athwal GS, Faber KJ. Measurement Properties of the Brief Pain Inventory-Short Form (BPI-SF) and the Revised Short McGill Pain Questionnaire-Version-2 (SF-MPQ-2) in Pain-related Musculoskeletal Conditions: A Systematic Review Protocol. Arch Bone Jt Surg. 2020 Mar; 8(2): 131–41.
16. Andersson GB. Epidemiological features of chronic low-back pain. Lancet 1999; 354-585.
17. Papageorgeiou AC, Croft PR, Ferry S, Jayson MI, Silman AJ. Estimating the prevalence of low back pain in general population: evidence from the South Manchester Back pain Survey. Spine (Phila Pa 1976) 1995; 20:1889-1894.
18. Hoy D, Toole MJ, Morgan D, Morgan C. Low back pain in rural Tibet. Lancet 2003; 361:225-26.
19. Jin K, Sorock GS, Courtney TK. Prevalence of low back pain in three occupational groups in Shanghai, People's Republic of China. J Safety Res 2004; 35:23-28.
20. Uppal R, Nayak P, Sharma PL. Prescribing Trends in internal Medicine. Int J Clin Pharm Ther Toxicol 1984; 22:373-6.
21. Kopec JA. Sayre EC, Esdaile JM. Predictors of back pain in a general population cohort. Spine (phila Pa 1976) 2004; 29:70-7.
22. Niyaz A, Bhardwaj A, Tiwari R, Sharma S, Dabas V. Drug utilization pattern of patients using NSAIDs in south Delhi hospital. Int J Pharm Sci 2012; 4(3):703-7.
23. Linton SJ, Hellsing AL, Halldon K. A population –based study of spinal pain among 35-45-year old individuals. Prevalence, sick leave and health care use. Spine (Phila pa 1976) 1998; 23:1457-63.
24. Thomas E, Silman AJ, Croft PR, Papageorgiou AC, Jayson MI, Macfarlane GJ. Predicting who develops chronic low back pain in primary care: a prospective study. BMJ 1999;318:1662-7

25. Ganesan S, Acharya AS, Chauhan R, Acharya S. Prevalence and Risk Factors for Low Back Pain in 1355 Young Adults: A Cross-Sectional Study. Asian Spine J 2017;11(4):610-17.
26. Ghanei I, Rosengren BE, Hasserius R, Nilsson JA, Mellstrom D, Ohlsson C, Ljunggen O, Karisson MK. The Prevalence and Severity of Low Back Pain and associated Symptoms in 3009 in Old Men. Eur Spine J 2004; 23(4):814-20.
27. World Health Organization. Promoting rational use of medicines: core components, Geneva: World Health Organization 2002.
28. Motgahre VM, Bajait CS, Turankar A, Pimpalkhute SA, Dholpure M. Precription Pattern and adverse drug reaction profile of drugs prescribed with focus on NSAIDs for orthopaedic indications at a tertiary care hospital. Indian Journal of Pharmacy and Pharmacology 2016;3(4):178-81
29. Atif M, Sarwar MR, Azeem M, Naz M, Amir S, Nazir K. Assessment of core drug use indicators using WHO/INRUD methodology at primary health care centers in Bahawalpur, Pakistan. BMC Health Serv Res 2016; 16:684-96.
30. Nagla A. Wadagbalkat P, Raipurkar S, Patel P. Precription pattern study of drugs in Orthopedics Outpatient department (OPD) of a Rural Medical College Hospital & research centre in MP. Indian Journal of Orthopedics surgery 2016; 2(4):367-71.
31. Wendie TF, Ahmed A, Mohammed SA. Drug use pattern using WHO core drug use indicators in public health centers of Dessie, North East Ethiopia. BMC Med Inform Decis Mak 2021; 21:197-213.
32. Sharma T, Dutta, S, Dhasmana DC. Prescribing Pattern of NSAIDs in Orthopedic OPD of a Tertiary Care Teaching Hospital in Uttaranchal. JK Science Journal of Medical Education & Research 2006;8(3):160-2.
33. Belavy DL, Tagliaferri SD, Buntine P, Saueressig T, Sadler K, Ko C. Clinician education unlikely effective for guideline-adherent medication prescription in low back pain: systematic review and meta-analysis of RCTs. e Clinical Medicine 2022;43: 1-15.