Original Article

An Observational Study on Treatments Used in Orthopaedic Patients

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ABSTRACT

Objectives: This research aimed to assess and evaluate pharmacotherapy and non-pharmacotherapy treatments in orthopaedic disorders. **Methods:** This was a prospective and observational study which was performed on 122 subjects in the orthopaedic department. Study was assessed and evaluated by suitable statistical tools. **Results:** The maximum age distribution seen was more than 50 years old. Most of the subjects diagnosed with 34.5% of arthritis with frequently prescribed drugs were analgesics, opioid's, NSAID's, anti-inflammatory, calcium supplements, Vitamin and mineral supplements. In this treatment, non-pharmacotherapy was advised along with pharmacotherapy. Among 122 subjects, 85.2% were shown to have "Recovered", in which a 71.3% recovery rate was observed with adherence to both pharmacotherapy and non-pharmacotherapy compared with individual therapies. In this study, 142 potential drug-drug interactions were monitored with their comorbidity conditions. **Conclusion:** The study reveals that due to an increase in age, changes in lifestyle habits lead to more bone-related problems, which further lead to difficulty in doing their daily activities. The majority of issues in orthopaedic management include both pharmacotherapy and non-pharmacotherapy. Therefore, it is necessary to adhere to both treatments to improve the quality of life and daily living. We can reduce the incidence rate by advising people to do regular exercise with a balanced diet, exposure to sunlight which helps to strengthen the bones and muscles.

Keywords: Orthopaedic, Pharmacotherapy, Non-pharmacotherapy, Adherence, Drug interactions, Comorbidities.

INTRODUCTION

The discipline of medicine known as orthopaedics deals with musculoskeletal trauma and disease. Bones, muscles, tendons, ligaments, joints, peripheral nerves, the vertebral column, and the spinal cord and nerves are all part of it. Medical diseases that damage the bones are referred to as bone disease. It is a disease that affects the skeleton, making bones fragile and prone to fracture. Tendinitis, carpal tunnel syndrome, osteoarthritis, rheumatoid arthritis, fibromyalgia, bone fractures, and other skeletal muscle problems rheumatoid arthritis, ankylosing spondylitis, and systemic lupus erythematosus are examples of autoimmune illnesses. Non-pharmacotherapy of these disorders includes education, rest, exercise, hydropathy, weight loss as needed, calcium Vitamin D intake and avoids smoking and alcohol, electric muscle stimulation. Pharmacotherapy includes acetaminophen < 4g/day and topical analgesics as needed if acetaminophen is ineffective, oral NSAIDS (Non Steroidal Anti-Inflammatory Drugs) may be used in appropriately selected patients, often providing satisfactory relief of pain and stiffness. Adjunctive therapy with tramadol, intra articular corticosteroids, and opioid analgesics, skeletal muscle relaxants, DMARDS (Disease Modifying Antirheumatic Drugs) may be helpful in patients with poorly controlled pain. Alendronate, risedronate, zoledronic acid,

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and denosumab are first line therapies for hip, non-vertebral and vertebral fractures. Only medication that can build bone is teriparatide. Surgery includes arthroscopy, total knee replacement, closed reduction internal fixation, open reduction internal fixation, synovectomy, tensynovectomy, osteotomy, reconservative, arthroplasty.[1]

In carrying out the research, the current study primarily aims to assess and evaluate the pharmacotherapy and non-pharmacotherapy treatments for orthopaedic disorders, to analyse different comorbidity disorders, to assess the nature of drug interactions in orthopaedic patients and to assess the prevalence of orthopaedic disorders.

MATERIALS AND METHODS

Study Area

The study was conducted in orthopaedic department in tertiary care hospital. The data collection format was verified and authenticated by the hospital preceptors for the study.

Study Duration and Population

The study included 122 patients from in-patient and out-patient department who are diagnosed from orthopaedic problems. Data was collected by interviewing the patient, care providers and case sheets for the duration of 6 months.

Study Design

Study is a prospective observational study. The data form included Socio-demographic information included age, sex, weight, date of admission, date of discharge included. We assessed the prevalence of orthopaedic disorders and comorbidities from patient demographics, past medical history, diagnosis, treatment charts, non-pharmacotherapy prescribed by the physicians, patient provided information and therapeutic data such as name of the drug, dose, route of administration, duration. To assess and evaluate the pharmacotherapy and non-pharmacotherapy treatments in orthopaedic patients we used parameters like pain score, degree of mobility and improvement in physical activity. The follow up was documented.

Statistical Analysis

Descriptive statistics was done by using SPSS version 2.0 statistical software to determine mean and the standard deviation of collected data. Microsoft word and excel are used to generate tables and graphs respectively. The statistical tool Chi square test was performed to determine the *p*- value. The *p*-value was set at < 0.05 and confidence interval was 95%.

RESULTS

Table 1 represents, the distribution of subjects according to diagnosis. In our study we found total 38 diagnosis, we classified them into 8 categories which includes 42(34.5%) of arthritis, 24(19.7%) of fractures, 5(4.1%) of Low back pain, 4(3.3%) of osteoporosis, 7(5.7%) of spondylosis, 9(7.4%) of sprains, 14(11.4%) of tears, 17(13.9%) of others. From this we observed that almost 35% of patients were diagnosed arthritis followed by fractures (19.7%). Prevalence of our study showed that total no of population visited for hospital for a period of 6 months was 952 (except covid-19 patients) in that total orthopaedic prevalence was 12.5% which includes 4.4% of arthritis, 2.5% of fractures, 0.5% of low back pain, 0.4% of osteoporosis, 0.7% of spondylosis, 0.9% of sprains, 1.4% of tears, 1.7% of others.

Table 2 represents that, distribution of subjects according to their adherence to 4.1% of only non-pharmacotherapy, 12.3% of only pharmacotherapy, 82.8% of both pharmacotherapy and non-pharmacotherapy, and 0.8% of non-adherence to both pharmacotherapy and non-pharmacotherapy. In our study, we found that most of the subjects (82.8%) adhered to both pharmacotherapy and non-pharmacotherapy. Subjects were prescribed with 144 drugs, which mostly included analgesics, opioid analgesics, NSAID's (Non-Steroidal Anti-Inflammatory Drugs), calcium supplements, vitamin and mineral supplements, anticoagulants, skeletal muscle relaxants, and antibiotics.

Among 122 subjects 85.2% were shown outcome "recovery" in which 71.3% recovery rate was seen

Table 1: Distribution of subjects according to type of disorder.

Type of disorders	Frequency	%	Individual Prevalence rate
Arthritis	42	34.5	4.4%
Fractures	24	19.7	2.5%
Low back pain	5	4.1	0.5%
Osteoporosis	4	3.3	0.4%
Spondylosis	7	5.7	0.7%
Sprains	9	7.4	0.9%
Tears	14	11.4	1.4%
Others	17	13.9	1.7%
Total	**122**	**100**	**12.5%**

Table 2: Type of treatment adherence vs outcome.

Type of Treatment Adherence	Outcome			*p*-value	Total
	Recovered	Under recovery	Not Recovered		
Adherence to only non-pharmacotherapy	5(4.1%)	0(0.0%)	0(0.0%)	0.000	5(4.1%)
Adherence to only pharmacotherapy	12(9.8%)	3(2.5%)	0(0.0%)	0.000	15(12.3%)
Adherence to both non-pharmacotherapy and pharmacotherapy	87(71.3%)	14(11.5%)	0(0.0%)	0.000	101(82.8%)
Non-adherence to both non-pharmacotherapy and pharmacotherapy	0(0.0%)	0(0.0%)	1(0.8%)	0.000	1(0.8%)
Total	**104(85.2%)**	**17(13.9%)**	**1(0.8%)**	**0.000**	**122(100.0%)**

*$p<0.05$

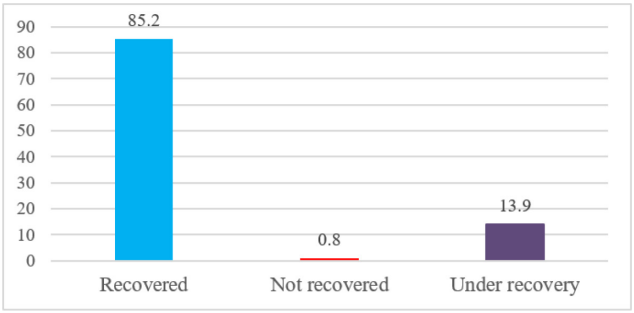

Figure 1: Distribution of subjects according to outcome.

with adherence to both pharmacotherapy and non-pharmacotherapy, when compared with individual therapies. And statistically significant difference was identified at α 0.5, CI 95%.

Figure 1 shows the distribution of subjects according to outcome and it was observed that 104 (85.2%) were recovered, 17(13.9%) were under recovery, 1(0.8%) were not recovered. If we observe the overall outcome of our study subjects, 85.2% were completely recovered and very minimal were under recovery.

Table 3 represents, distribution of subjects according to Pain score and observed that majority of subjects were given a score for their pain 1 to 2 (22.9%) followed by 2 to 4 (18.8%) and 5 to 6 (16.4%). Our observations found that majority of subjects suffered with pain at a score level of 0 to 4 before treatment through Wong Baker Faces pain rating scale. After treatment same subjects were assessed again for their pain, it was identified that almost 86% of patients reported no hurt-to-hurt little bit faces. It represents the quality of treatment provided by the healthcare professionals in our hospital settings were quite impressive.

Table 4 represents, distribution of subjects according to degree of mobility and ROM (range of motion), it was observed that degree of mobility and ROM (range of motion) 122(100%) was painful, 104(85.2%) was

Table 3: Distribution of subjects according to pain score before treatment.

Sl. No	Pain score before treatment	Number	%
1	1 TO 2	28	22.9
2	10	1	0.8
3	2	1	0.8
4	2 TO 3	5	4.0
5	2 TO 4	23	18.8
6	3 TO 4	18	14.7
7	3	1	0.8
8	4	8	6.5
9	4 TO 5	5	4
10	4 TO 6	4	3.3
11	5 TO 6	20	16.4
12	5	1	0.8
13	6	4	3.3
14	7 TO 8	2	1.6
15	7	1	0.8
16	Total	122	100

Table 4: Distribution of subjects according to degree of mobility and ROM before treatment and after treatment.

Degree of mobility and ROM	Before treatment	After treatment
Restricted and painful	122	18
%	100	14.8

improved before and after treatment respectively. Degree of mobility varies according to joints.

Figure 2 shows, a total of 142 potential drug interactions were identified. Out of this >50% of drug interactions were assessed as moderate followed by major at 65 (45.8%).

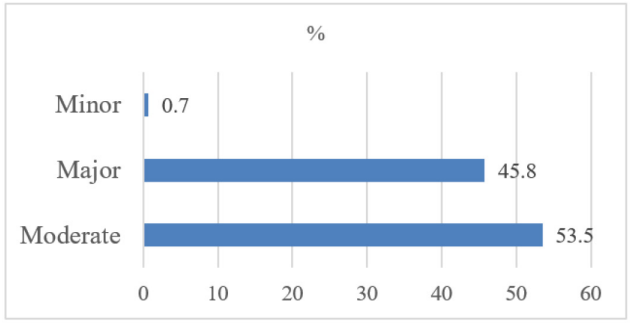

Figure 2: Severity of drug interactions.

In our study, a total of 142 potential drug interactions were identified. Out of this >50% of drug interactions were assessed as moderate followed by major at 65 (45.8%).

DISCUSSION

A prospective observational study, on treatments used in orthopaedic patients was conducted in tertiary care hospital. Using the data collection forms, a total of 122 patient's data was collected.

In our study, we observed that a higher number of subjects who attended for orthopaedic problems belonged to the age group > 50 years old with a mean age of 54.64 and a standard deviation of 18.955. As a result, treatment is required in elderly people to improve their ability to do daily life activities and their quality of life.

Similar findings were found in the study conducted by Katalin Horvath, Agota Kulisch, Andras Nemeth, and Tamas Bender where patients between 50 and 70 years of age are more likely to have arthritis.[2]

In the present study, 35% of patients were diagnosed with arthritis, followed by fractures (19.7%), total orthopaedic prevalence was 12.5%. 36 comorbidity conditions were found, which mostly includes HTN (18.8%), DM (11.5%), Hypothyroidism (8.6%). Out of 122 subjects, 56 subjects were not found with comorbidities, 66 subjects were found with comorbidities.

Subjects were prescribed with 144 drugs, which mostly included analgesics, opioid analgesics, NSAID's (Non-Steroidal Anti-Inflammatory Drugs), calcium supplements, vitamin and mineral supplements, anticoagulants, skeletal muscle relaxants, and antibiotics.

Similar findings were found in the study conducted by Franceso Marras and Paolo Tranquilli Leali which showed NSAID's (Non-Steroidal Anti-Inflammatory Drugs) should be the preferred choice of treatment for acute pain but not for chronic pain. In the case of chronic pain, opioids should be used for bone related pain.[3]

Subjects were advised to do 78 types of non-pharmacological therapies, which mostly included quad exercises, strengthening exercises, hot fomentation, and ice packs. But these non-pharmacological therapies differ from one individual to another individual based on their diagnosis and surgical procedures [total knee replacement followed by arthroscopic ACL (Anterior Cruciate Ligament) reconstruction (18.1%), closed reduction internal fixation (10.9%)].

Similar findings were found in the study conducted by Gina Shaw, saying that it's also important to know that medications are not the only option available to treat pain associated with bone related problems. Sometimes non-pharmacological therapies like physiotherapy, radiotherapy, and balanced diet will be helpful in treating pain associated with bone related problems.[4] Jasvinder A. Singh *et al*., which says a significant increase in use of TKR (total knee replacement) is possible if the current trends continue across age groups in both females and males.[5]

Among 122 subjects 85.2% were shown outcome "recovery" in which 71.3% recovery rate was seen with adherence to both pharmacotherapy and non-pharmacotherapy, when compared with individual therapies. And statistically significant difference was identified at α 0.5, CI 95%.

In the present study, patients were assessed for their pain through Wong Baker Faces pain rating scale, we have observed that majority of patients were given a score for their pain 1 to 2 (22.9%) followed by 2 to 4 (18.8%) and 5 to 6 (16.4%). Our observations found that majority of patients suffered with pain at a score level of 0 to 4. After treatment same patients were assessed again for their pain, it was identified that almost 86% of patients reported no hurt-to-hurt little bit faces. Also we observed that degree of mobility and ROM (range of motion) was painful 122 (100%) and 18 (14.8%) before treatment and after treatment respectively.

Similar findings were found in the study conducted by Nancy Wells, Chris Pasero, Margo Mc Caffery showing that pain reduced after treatment by safe use of analgesics and NSAID's.[6]

If we observe the overall outcome of our study subjects, 85.2% were completely recovered and very minimal were under recovery. As people become older, their living patterns alter which causes more bone problems and makes it more difficult for them to accomplish their

everyday duties. Management of majority of orthopaedic problems includes both pharmacotherapy and non-pharmacotherapy. To improve the patient's prognosis and avoid additional devastation, it is vital to adhere to both pharmacotherapy and non-pharmacotherapy treatments.

CONCLUSION

Orthopaedic speciality is the branch which manages trauma and disease of musculoskeletal system. It includes bones, muscles, tendons, ligaments, joints, peripheral nerves, vertebral column and spinal cord and its nerves. Bone related disorders are growing in current life style due to some deficiency in nutrition, occupational risk, comorbid conditions, hormonal imbalance, obesity and increase in age leads to increase in bone related problems and further progressed to complications.

Musculoskeletal problems continue to represent a growing source of disability world-wide. Management of majority of orthopaedic problems includes both pharmacotherapy and non-pharmacotherapy. Therefore, it is necessary to adhere for both pharmacotherapy and non-pharmacotherapy treatments to improve the patient's outcome and to prevent further destruction.

As an incidence of bone abnormalities has become high, the treatment is to be given high priority to provide and ensure the improvement in quality of life and daily living. An appropriate selective treatment options can improve the patient condition. We can reduce the incidence rate by advising the people to do regular exercise with balanced diet which helps to strengthen the bones and muscles, exposure to sunlight to obtain Vitamin D which improves the bone strength.

In this study we attempt to describe the comparison between treatments used in orthopaedic patients along with their comorbidities, potential drug-drug interactions and prevalence of orthopaedic disorders.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

Ethical Approval

Ethical committee clearance was obtained by the Institutional Ethical Committee of Sagar Hospitals, Bengaluru.

ABBREVIATIONS

ACL: Anterior Cruciate Ligament; **CI:** Class Interval; **DMARD:** Disease Modifying Anti-Rheumatic drugs; **DM:** Diabetes Mellitus; **HTN:** Hypertension; **NSAIDS:** Non-Steroidal Anti-Inflammatory Drugs; **ROM:** Range of Motion; **TKR:** Total Knee Replacement.

Authors contribution

- Introduction: [Diptanu Paul].
- Methodology: [Tejaswini R].
- Analysis and investigation: [Yeluru saivineesha].
- Review and editing: [Mrs Mahadevamma Lingaiah].

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