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**Dr. Raju KP**  
MS (Ortho), Associate Professor,  
Orthopaedics, BGS Global  
Institute of Medical Sciences,  
Bangalore, Karnataka, India

**Dr. Madhuchandra P**  
MS(Ortho), Assistant Professor,  
Orthopaedics, BGS Global  
Institute of Medical Sciences,  
Bangalore, Karnataka, India

**Dr. Pawankumar KM**  
DNB(Ortho), Assistant  
Professor, Orthopaedics,  
BGS Global Institute of Medical  
Sciences, Bangalore, Karnataka,  
India

**Dr. Arun KN**  
MS (Ortho), Professor,  
Orthopaedics, BGS Global  
Institute of Medical Sciences,  
Bangalore, Karnataka, India

**Dr. Nandeesh**  
D(Ortho), DNB(Ortho),  
Senior Resident, Orthopaedics,  
BGS Global Institute of Medical  
Sciences, Bangalore, Karnataka,  
India

**Dr. Ganesh**  
D(Ortho), Senior Resident,  
Orthopaedics, BGS Global  
Institute of Medical Sciences,  
Bangalore, Karnataka, India

## Correspondence

**Dr. Madhuchandra P**  
MS(Ortho), Assistant professor,  
Orthopaedics, BGS Global  
Institute of Medical Sciences,  
Bangalore, Karnataka, India

## Comparison between physiotherapeutic alone and combined physiotherapeutic and pharmacological measures in deep venous thrombosis prophylaxis in joint replacement and spinal surgeries

**Dr. Raju KP, Dr. Madhuchandra P, Dr. Pawankumar KM, Dr. Arun KN, Dr. Nandeesh and Dr. Ganesh**

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### Abstract

**Introduction:** Deep Vein Thrombosis (DVT) is one of the common and dreaded complication of joint replacements, hip and spine surgeries. The incidence of deep vein thrombosis among these cases is significant in spite of the various prophylactic measure such as physiotherapy and pharmacological measures.

**Materials and Methods:** The study was conducted in our Institute between January 2014 to June 2017. The study included patients who underwent total hip and total knee replacements for various cases and spinal surgeries during the same year. We had a total of 195 patients in the study. Among these, 65 patients were given DVT prophylaxis by physiotherapeutic measure such as foot pump and pneumatic compression device and 130 were given combined physiotherapeutic and pharmacological prophylaxis by giving Low molecular weight heparin postoperatively. Post operatively patients were assessed for DVT both clinically and by Doppler Study

**Results:** A total of 8 patients out of 65 among the physiotherapeutic alone group developed thrombosis [12%]. Among 130 patients who were given prophylaxis by combined measures 9 patients developed thrombosis [07%]. So the results of our study have shown that combined physiotherapeutic and pharmacological measure have an edge over the physiotherapeutic measure alone.

**Conclusion:** Researches which have been done previously have shown that there is no difference in the incidence of DVT among patients treated by other physiotherapeutic and pharmacological measures alone. In our study the result of combined methods was found to be better than physiotherapy measure alone. Hence, the incidence of DVT among the replacement and spine surgeries can be reduced by combined modalities of prophylaxis.

**Keywords:** DVT, joint replacements, physiotherapy, pharmacological measure

### 1. Introduction

Total hip arthroplasty (THA) and total knee arthroplasty (TKA) have become standard treatments for patients with osteoarthritis of hip and knee from a number of causes, even in developing countries. Deep vein thrombosis (DVT) is considered to be one of the most significant complications after THA and TKA and spinal surgeries [1]. The significance of DVT lies in the possibility of pulmonary Thromboembolism [2, 3]. Total hip and knee arthroplasty, and spine surgeries are associated with a high risk of deep vein thrombosis (DVT) due to the accompanying vessel trauma, venous stasis, coagulation activation, and older age of most patients. Before thromboprophylaxis was used routinely, DVT, often clinically silent, occurred in 40-60% of these patients. Pulmonary embolism occurred in 5-10%, and fatal embolism, occurring in 1-2% of patients, was the most common cause of death. The incidence of DVT is based on various studies in European and American populations. The Asian population is genetically and socially quite different from American and European populations. Incidence of DVT in Indian patients is very low and is not comparable with American and European populations. It is therefore not cost effective to advise prophylaxis in Indian patients undergoing THA/TKA who have no known risk factors for DVT.

Although lower incidences have been noted, patients undergoing spinal surgery are also at risk of developing thromboembolic complications. DVT incidence has been reported to range from 0% to 15.5% with PE incidence varying from 0% to 13.1% [4,5]. Current prophylactic methods include pharmacological regimes such as aspirin, warfarin, and low molecular weight heparin (LMWH) and mechanical techniques such as intermittent pneumatic compression devices. The best method of prophylaxis for thromboembolism is controversial [6]. Currently, mechanical and pharmacological modalities are used. The purpose of our study was to compare the efficacy of physiotherapeutic measures alone with combined physio and pharmacological measures in preventing vein thrombosis in knee and hip arthroplasties and spinal surgeries.

## 2. Materials and methods

The study was conducted in our Institute between January 2014 to June 2017 over a period of 3 and half years. The study included patients who underwent total hip and total knee replacements for various indications. We also included patients who underwent spinal surgeries who were obese and underwent surgery for spondylolisthesis and instrumentation for post traumatic indications.

Patients with a previous history of DVT, chronic venous insufficiency, stroke, varicose veins, large malignancy, renal insufficiency, recent myocardial infarction, heart failure, who were taking oral contraceptives, or on steroidal/hormonal/anticoagulant drugs for any medical condition, were excluded from the study

A total of 195 patients were included in study. Age group ranged from 25 years to 75 years. 86 were females and 109 were males. Out of 195 patients, 110 patients were knee joint replacements, 70 were hip joint replacements and another 15 were patients who underwent spinal surgeries (Figure 1).

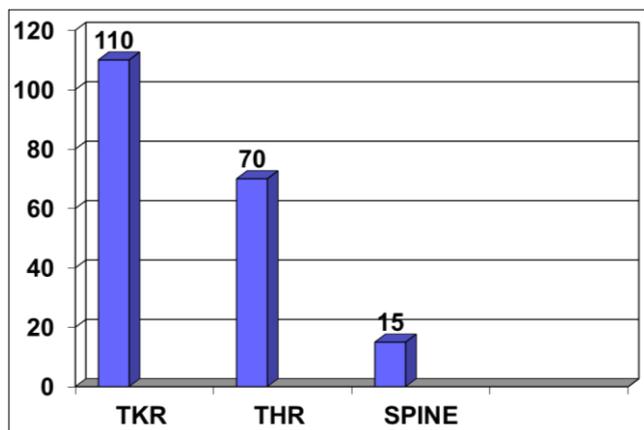


Fig 1: Chart showing distribution of different cases.

Among the 195 patients, 65 patients were given prophylaxis by physiotherapy alone. Mechanical foot pumps, thigh high compression stockings and exercises were the mode of physiotherapeutic measures used. Remaining 130 patients were given prophylaxis by both physio and pharmacological measures using low molecular weight heparin post operatively.

### 2.1. Our protocol

Mechanical measures are started from the day 0 itself. Day 0 – foot pumps are started for 2 hrs daily and continued for 5 days up to 4<sup>th</sup> POD (Figure 2). Stockings were given from 1<sup>st</sup> post op day and continued for 3 to 6 months (Figure 3).

Continuous Passive Motion was started from 5<sup>th</sup> post op day. Calf squeezing, quadriceps and deep breathing exercises were also started simultaneously.



Fig 2: Mechanical foot pumps used for compression.



Fig 3: Graduated compression stockings that were used.

Pharmacological prophylaxis was started from 12 hrs after the epidural catheter is removed which is usually done 2<sup>nd</sup> post operative day. Low molecular weight heparin was used and was continued up to 10<sup>th</sup> post operative day. Oral anticoagulants were used till 2 months post operatively. Patients were daily assessed for any signs of DVT. Patients were assessed for pain and tenderness over the calf region, calf girth was noted down, and was looked for local haemorrhage and haematoma at the operative site. Assessment for postoperative DVT was done by colour Doppler ultrasonography on postoperative days 5 and 9. Assessment included examination of bilateral common femoral, superficial femoral, popliteal, anterior tibial and posterior tibial veins. They were assessed for flow, visualised thrombus, compressibility, and augmentation.

## 3. Results and analysis

The study was conducted in our Institute between January 2014 to June 2017 over a period of 3 and half years. A total of 195 patients were included in study. Age group ranged from 25 years to 75 years. 86 were females and 109 were males. Out of 195 patients, 110 patients were knee joint replacements, 70 were hip joint replacements and another 15 were patients who underwent spinal surgeries. 65 were given physiotherapeutic prophylaxis where as rest 130 were given combined prophylaxis.

A total of 8 patients out of 65 among the physiotherapeutic alone group developed thrombosis (12%). Among 130 patients who were given prophylaxis by combined measure 9 patients developed thrombosis (07%) (Figure 4).

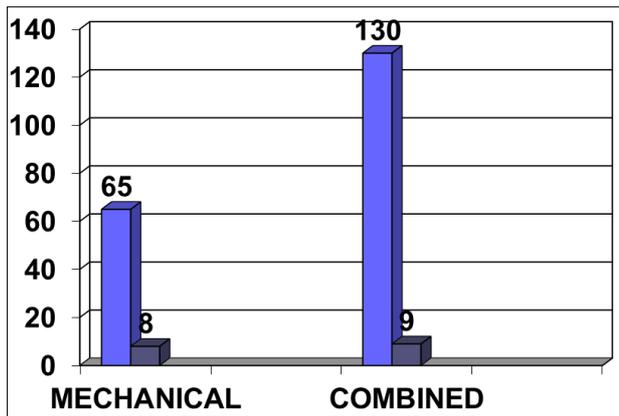


Fig 4: Comparison of incidence of DVT in both treatment groups.

Among the 65 cases who took mechanical prophylaxis 35 were total knee, 25 were total hip and 5 were spinal surgery cases. 5 out of 35 knees developed thrombosis (14%). 3 out of 25 hips developed thrombosis (12%) (Figure 5).

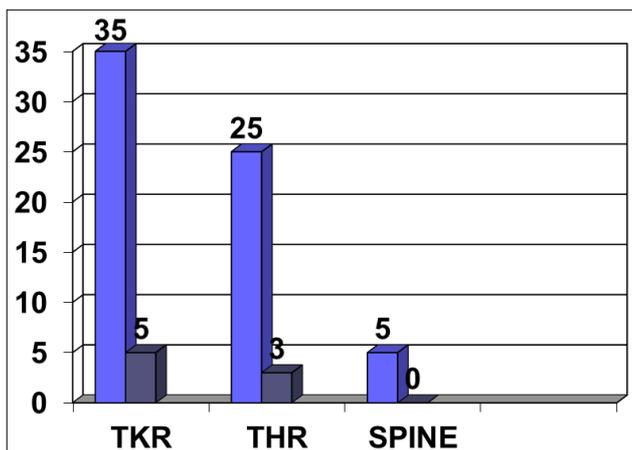


Fig 5: Distribution of DVT occurrence in patients treated by Physiotherapy.

Among 130 cases who received combined prophylaxis, 75 were knees, 45 were hips and 10 were spine cases. 9 patients of this group developed thrombosis of veins. 6 out of 75 knees developed thrombosis (8%). 3 of the 45 hips had thrombosis (7%). None of the spine patients had thrombosis (Figure 6).

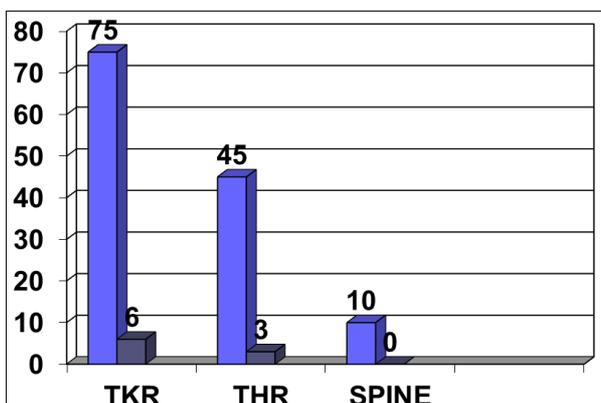


Fig 6: Distribution of DVT occurrence in patients treated by both methods.

1 patient who underwent bilateral knee replacement who was in the combined modality category had pulmonary embolism and expired.

#### 4 Discussions

Deep vein thrombosis (DVT) is considered to be one of the most significant complications after joint replacement and spinal surgeries. It is very important to diagnose and treat these patients accordingly as it can result in a seriously dreaded complications such as pulmonary embolism, sometimes even causing the death. Hence, prophylaxis measures to prevent DVT have a great role in saving the lives and preventing the morbidity. Although changes in surgical and anesthetic techniques, and early mobilization, may have reduced the risk of venous thromboembolism, routine thromboprophylaxis remains extremely important and is standard of care. Effective prophylaxis has been shown to reduce the rate of DVT by at least 50%.

The best method of prophylaxis for Thromboembolism still remains controversial. Current prophylactic methods include pharmacological regimes such as aspirin, warfarin, and low molecular weight heparin (LMWH) and mechanical techniques such as intermittent pneumatic compression devices; graduated compression stockings. The ultimate goal of any prophylactic regime in any arthroplasty is to prevent the formation of DVT and postphlebotic syndromes and the occurrence of pulmonary embolism. Currently, both physiotherapeutic and pharmacological modalities are used for the prophylaxis of Deep vein thrombosis.

Numerous non-pharmacological methods for the prevention of thromboembolism have been developed. They do not entail the risks of prophylactic anticoagulation. Active exercises of both lower extremities help reduce venous stasis and thrombus formation. External sequential pneumatic compression boots may reduce the overall incidence of deep vein thrombosis. But prophylaxis with mechanical devices has its own limitations. It is less effective in reducing the formation of proximal thrombi. Incidence of DVT when used alone is 21% in THRs and 17% in TKRs. Patient dissatisfaction with these devices is common, and compliance may be a problem [7].

It also is generally agreed that pharmacological prophylaxis should be used in almost all patients, although the ideal agent has not been clearly established. The most commonly used agents are warfarin, low-molecular-weight heparin (LMWH), fondaparinux, and aspirin. Low molecular weight heparin has got the benefits of a standard dose regimen and it does not require routine laboratory monitoring. The disadvantages include greater medication cost, subcutaneous administration, and increased incidence of bleeding [8].

Low-dose warfarin has proved to be effective, however, while maintaining an acceptably low risk of bleeding complications. Although aspirin is relatively safe and inexpensive and requires no laboratory monitoring, it has been largely ineffective in preventing postoperative thromboembolism in orthopaedic patients when used alone. Reported incidence of DVT with aspirin 31% after THR and 53% after TKR. With warfarin its 23% after THR and 45% after TKR. With LMWH its 18% after THR and 29% after Total knee replacement [9].

Westrich and Sculco [10] compared the efficacy of the PlexiPulse device (foot pump) combined with aspirin with aspirin alone. The incidence of DVT in subjects receiving pharmacological prophylaxis was 59%, while the incidence in patients receiving combined prophylaxis was 27%. In our study, in the first group where mechanical prophylaxis alone

used the incidence is 14% with TKR and 12 % after THR. In the 2<sup>nd</sup> group where in combined mechanical and LMWH was used, the incidence is 8% after TKR and 7% after THR. Altogether, the incidence is 12% in mechanical prophylaxis alone group and 7% when combined methods were used. So it has been observed that when both the methods are used together, its more effective in preventing the occurrence of DVT.

## 5. Conclusion

Deep vein thrombosis is a dreaded complication of joint replacement and spinal surgeries. Our goal should aim at preventing the occurrence of DVT rather than waiting for it to happen. By our study, we have come to conclusion that a combination prophylactic method of giving pharmacological and mechanical measures is a far more effective method than giving the physiotherapeutic measures alone in preventing Deep vein thrombosis.

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**8. Conflicts of interest:** None

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