International Journal of Modern Developments in Engineering and Science
Volume 2, Issue 6, June 2023
https://www.ijmdes.com | ISSN (Online): 2583-3138


# Efficacy of Physiotherapy for Osgood–Schlatter Disease Patients

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***Abstract*: *Background:* Osgood–Schlatter disease (OSD) is commonly reported in adolescent athletes. The studies have shown that excessive tension placed on the apophysis as a result of bone expansion causes harm to the apophysis. Further, the quadriceps muscular mass is repeatedly contracted resulting in the softening of the apophyseal ossification center leading to Osteochondritis. The affected person has the pain with or without any swelling. *Objective:* This review aims to assess the efficacy of physiotherapy on OSD in terms of pain reduction, functional improvement, and patient satisfaction. *Method:* The present analysis was performed on the basis of review articles from various databases including the PubMed, Science direct and Scopus. Studies from 2019 to 2023 were included in this study. *Conclusion:* It was concluded that muscle strengthening and core stability exercises can significantly help OSD patients to reduce pain and symptoms of the condition. Physiotherapy also helps them to return to their normal sport activity within a significant shorter time in comparison to the wait and watch policy.**

***Keywords*: Osgood–Schlatter disease, Physiotherapy for OSD, Dry needling for OSD, Cupping for OSD.**

## 1. Introduction

Osgood–Schlatter disease, sometimes known as OSD, is a common osteochondrosis condition that occurs throughout the growing years of adolescents. In most of the cases the clinical diagnosis of this condition is characterized by locally painful modifications in the region of the tibial tuberosity apophysis [1].

This is a most common finding in adolescent athletes who all have immature bone structure. The onset of symptoms coincides with the adolescent period of rapid growth, which occurs between the ages of 8 and 13 years for girls and 10 and 15 years for males. The ailment is more prevalent in males, and it is more likely to show up in athletes who take part in activities that require running and jumping [2]. Among teenagers the prevalence is 9.8 percentage between the ages of 12 and 15, with a rate of 11.4% in boys and 8.3% in females [3].

The most common sign of the disorder is knee pain. The affected person has the pain with or without any swelling. The pain could be either bilateral or unilateral. It causes discomfort in the knee, which is frequently severe enough to induce limping. Patients complain of knee pain when kneeling, descending stairs, kneeling for long periods of time, after sitting for long periods of time with the knee motionless, and when participating in sports [1]. In addition to a prominent enlargement at the tibial tubercle, discomfort can be felt around the area where the patellar tendon inserts into the bone. It's possible that lack of flexibility in the quadriceps and hamstrings are contributing factors in this case. Pain can be brought on by actively or passively flexing or extending the knee while the knee is being extended against resistance [4].

The patellar tendon join to the tibial tubercle, forming a secondary ossification centre. More tension is placed on the apophysis as a result of bone expansion that surpasses the capacity of the muscle-tendon unit to expand [5]. This formation, which is the weakest link in the muscle-tendon-bone connection in adolescents, is susceptible to harm from repetitive stress. The quadriceps muscular mass is repeatedly contracted resulting in the softening of the apophyseal ossification center leading to Osteochondritis [6].

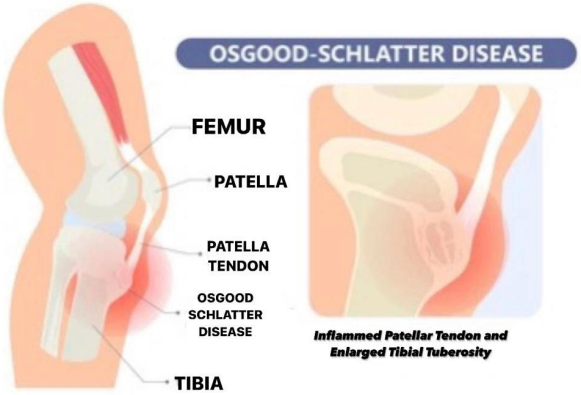


Fig. 1. Osgood–Schlatter disease

Although the condition eventually resolves on its own, in some cases it might take upto 2 years before the fusion of the apophysis. Conservative therapy including icing, casting, and bracing are commonly recommended. Relative rest and reduction of the activity are part of the treatment. NSAIDs and local cold treatment are both effective painkillers [7]. To protect the tibial tubercle from direct impact, a protective knee pad can be put over it [8]. Formal physiotherapy such as strengthening and stretching may be necessary if conservative efforts to

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relieve the discomfort are ineffective. A brief duration of knee immobilization may be recommended in severe, ongoing instances. There is insufficient proof to advise either surgical or injectable therapy for Osgood-Schlatter disease [9]. So, The Aim of this review is to evaluate the efficacy of physiotherapy for OSD patients and to provide recommendations for treatment of the condition for future research.

## 2. Objectives

The objective of the present review is to evaluate the efficacy of physiotherapy for OSD patients and to provide recommendations for treatment of the condition for future research.

## 3. Method

The selection criteria for the studies are depicted in the below mentioned schematic as per PRISMA methodology.

### *A. Inclusion Criteria*

The original research papers, case studies, and articles that have used physiotherapy along with some other treatment modalities were included in this study. The articles were selected based on the keywords such as physiotherapy, Osgood-Schlatter Disease, physical therapy, were used for searching the database.

### *B. Exclusion Criteria*

The exclusion criteria shows the data sources that have been disqualified the duplicates of the articles were removed as shown in the given flow chart. Any articles that were published before 5 years were also removed.

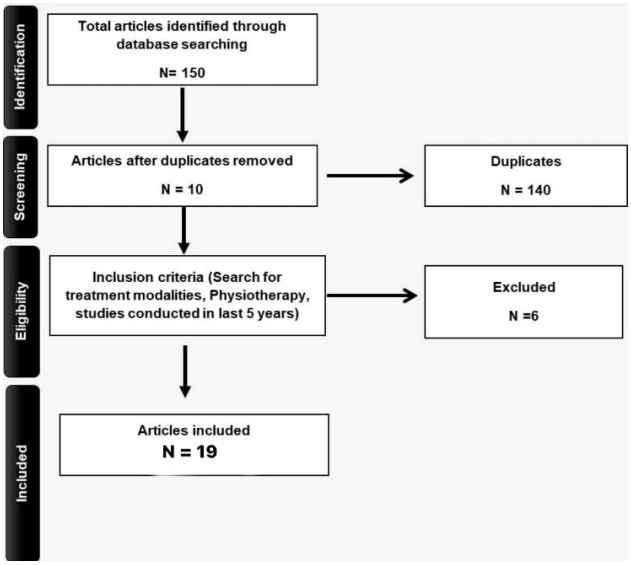


Fig. 2. PRISMA statement for study selection

#### *1) Information sources*

The present analysis was performed on the basis of

Table 1
Literature Review - Treatment of Osgood Schlatter disease (OSD)

| Author | Study Type | Sample Size | Demographic parameters | Duration/Type of Intervention | Outcome measures | Findings |
|---|---|---|---|---|---|---|
| Hiroyuki watanabe et al., 2019, [10] | RCT | 36 Boys, Japanese man | Male Soccer player 10.2 ±0.4 Years | 1 week/Taping | Self-reported measure | Taping is effective in preventing OSD. |
| Rathleff et al., (2020), [11] | Prospective cohort study | 51 | Age:10-14 years, 51% female | 12 Week/Knee strengthening exercises, activity ladder | KOOS score | 80% reported pain reduction, KOOS score improved significantly, improvement in knee and hip abduction strength |
| Bezuglov et al., (2020) [12] | Retrospective cohort study | 280 | Soccer players aged 11 years to 15 years of age | 1 month/Quadriceps Muscle Lengthening and physical therapy | Self-reported symptom removal | Physiotherapy is an effective treatment option for OSD |
| Shull, George Reese.et al., 2020 [13] | Case study | 1 Patient | 8 year old volleyball athlete | 4 days for 2 Consecutive week/Cupping therapy | Numeric Pain scale rating. | Dry Cupping is Beneficial for OSD patient. |
| Gawel et al., (2021) [14] | Case study | 1 | female karate player | 20 Months / Physical therapy including ultrasonic treatment, muscle stretching and strengthening exercise | MRI of knee. | Stretching exercises and physiotherapy are important intervention for OSD. |
| David Ryland et al., 2021, [15] | Case study | 1 | Female soccer player | 1 week/Dry Needling (Periosteal Tibial Tuberosity Packing) | Self-rating scale. | Dry needling is an effective treatment option. |
| Cornelia Neuhaus et al., 2021 [16] | Systemic review | 747 Patient | With affected knees | 1 week/Stretching | NPPS: Nirschl Pain Phase Scale. | Stretching Reduced Pain |
| Bezuglov et al., 2022, [17] | Cross sectional study | 36 | Male soccer player, Aged: 15.3 ± 1.7 years | 1 month/stretching the quadricep femoris muscle, magnet field therapy sessions | IKDC and KOOS questionnaire | Compared to the controls players who were on physiotherapy treatment had better improvement |
| Nabil Abdo Mohamed et al, 2023, [18] | RCT | 50 men | Between 17-21 years old | 3 Times for 2 months / Shock wave therapy | Modified 100 points rating scale which is based on symptoms. | SWD improved the performance in men with OSD |

systematic review of literature from various databases including the PubMed, Science direct and Scopus. The choice of the articles was based on the relevance for the topic of treatment modalities of Osgood-Schlatter disease, physiotherapy treatment and its efficacy in OSD.

*2) Selection process*

The selection of investigations was made based on physiotherapy treatment of the patients suffering from the diagnosed OSD. A computer based scientific literature search were conducted among articles that have used physiotherapy treatment alone or in combination with the conservation treatment methods. The selected papers based on the availability of the outcome measures and definite conclusion about the effect of the treatment were chosen. The articles that were published for past 5 years were only included in this review.

*3) Data collection process*

The result of all the included articles were screened and based on the outcome measures they were all recorded in a tabular format. Only the articles that have used physiotherapy as treatment modalities in OSD patients were included.

## 4. Association of OSD Disease with Other Joint Diseases

[1] Guldhammer et al. 2019: stated that the long-term diagnosis of "OSD" is inadequate. The study effectively evaluates the situation 2 to 6 years after the diagnosis of OSD. the present study observed the patients with a diagnosis of OSD from a single orthopaedic department during the time 2010 to 2016 and all the patients were observed by the self-questionnaire about "knee pain and health-related" quality of life. In order to conduct the study, 84 patients had been chosen, among all the patients 43 patients responded. Knee pain is a common disease during adolescence and it also creates difficulties with Osgood-Schlatter disease (OSD). This retrospective cohort study showed that 60% of the patients reported that knee pain needs long-term follow-up. Half of the patients who had OSD reported that they experience knee pain after 4 years of the diagnosis. [19]

[2] Clynes et al. 2020: showed the association of OSD with OA 50 years later was studied. Sample size of 271 patients were studied and about 50% of patients we're having chronic knee pain since their teenage years. [20].

Most of the patients developed OA 50 years after the diagnosis of OSD.

[3] Rathleff et al. 2020: stated that the persistence of knee pain reduces the physical activity of adolescence. Knee pain is also well-thought-out as self-limiting and sometimes it does not have a long-term impact. Lack of knowledge among adolescents about knee pain can create diseases such as "Patellofemoral pain (PFP)", and "Osgood-Schlatter disease (OSD)". The present cross-sectional study discussed "physical activity, quality of life, and knee function in adolescence with OSD and PPE". In this study, self-reported questionnaires were used. In addition, Baseline data from participants who had PFP were published in this study. However, adolescents who have PPE or OSD have a high activity level have long-term knee pain and also have knee difficulties that can impact the sports participation of the affected people. In addition, the study reports also stated that knee pain also impacted the quality of life. [21]

[4] Enomoto et al. 2021: "Osgood-Schlatter disease (OSD)" is the most communal and it can be characterized by "traction apophysitis" of the tibial tubercle and this is usual in active young people. The present study focused on the o examines "Rectus Femoris (RF)" and "Vastus Lateralis (VL)" muscle stiffness in children with OSD. As per the present study, children who had OSD had harder patellar as compared to adults. For conducting the present study 65 male high school player who was associated with basketball playing and this method included the count of the total legs of the participants who are involved in this study. The measurement process of these participants is conducted two several days. On the first day, the examination was conducted for identifying the children who had OSD, and on another day the experiment was conducted to assess muscle rigorousness by using ultrasound "shear-wave elastography". In order to analysis of the data, "SWV analysis" was conducted by use of the "Q-box software" that was built into the ultrasound shear-wave elastography scanner. [22]

[5] Mareddu et al. 2021: presented research which significantly focused on increasing awareness and improving knowledge about the s atypical injury pattern hoping it can give benefit other physicians. This present study analysed the case of a 13-year-old male who had 2 "simultaneous avulsion fractures" in the "distal patella and tibial tubercle" and in addition, a direct blow to the knee while jumping. The study observed the child and did various examinations for finding the proper pre-operative plan and the surgical treatment. The growing cartilage makes bones of children suggestively weaker in comparison with adult people. As per the study, it can be stated that almost half of the inhabitants is affected by the disease that is called Osgood-Schlatter disease. [23]

[6] Sapundzhiev et al. 2021: "Osteoarthritis (OA)" is a common disease of the synovial joints and this disease is rapidly increasing in the global world. These diseases have several symptoms such as joint pain after certain "physical exercises", "mechanical pain", "transitory stiffness that is lasting less than 30 minutes", "crepitus during joint motion", "functional deficiency", "changes of joint outlook – namely swelling", and "consecutive typical for OA deformities". The modern conception shows that OA is not only a disease of joint pain but also a disease of the whole organism. Osteoarthritis is the most articular disease that is the most common cause of frequent joint pain. This disease can reduce the quality of living in life duration and also impact the physical activity of the human. As per the present study, there are several factors that can create the disease more impactful for people. These factors are body weight, physical activity, traumatism, other diseases such as OSD and the Deterioration of biomechanics. The present research study also discussed Osteoarthritis pathogenesis. [24]

[7] Lucenti et al. 2022: quoted that "Osgood–Schlatter disease (OSD)" is a common disorder that can be the result of growth and sports-related knee injury. Other conditions that

should be considered while making a differential diagnosis of OSD include Hoffa's syndrome, Sinding-Larsen-Johansson syndrome, patellar tendon avulsion or rupture, soft tissue or bone tumour, chondromalacia patella, patellar tendinitis, accessory ossification centres, osteomyelitis of the proximal tibia, and tibial tubercle fracture. In this disease, the pain normally occurs at the time of physical activity or during the time of activity, and in this case, the primary symptom is local swelling. In this present study, a systematic review was conducted which is based on the guideline of Systematic Reviews and Meta-Analyses (PRISMA). In order to conduct this study 201 articles were chosen from different sources and among them, 117 articles are chosen by reading the full text. After analysing all the articles at last 16 satisfied articles were selected and used for completing the study. Several theories and articles are discussed in this present study. Most of the credible theories are focused on the variants of "patellofemoral anatomy" and alignment of the "extensor mechanism" which is associated with overuse injuries. [25]

[8] Djurtoft et al. 2023: discussed about the quality of life among adolescents who have "Osgood-Schlatter Disease [OSD] and Patellofemoral Pain (PFP)". The study also focused on other knee injuries in adolescence. The study was conducted on the individual participant's analysis which data from three different clinical trials based on the adolescence associated with OSD and PPE. In order to conduct the analysis 323 adolescents with OSD and PPE were selected. Asper a result, some participants reported that they had an extreme lack of confidence in their knees. Some other participants also reported great difficulty in their knee joints. A large portion of the adolescents who had nontraumatic knee pain experienced a low quality of life. More than half of the participants were aware of their knee problems daily basis. It can be stated as per the study that older adolescents experienced the lowest quality of life. [26]

[9] Neuhaus et al. 2023: quoted that Knee pain is a widespread disease of the child and adolescents and this is rapidly increasing. "The Knee Injury Osteoarthritis Outcome Score for Children (KOOS-Child)" is a valid and self-administered and also dependable questionnaire for children and adolescents who faces issue such as knee disorders including patella dislocation, "Osgood Schlatter disease, and anterior knee pain". The questionnaire of the KOOS-Child is basically a knee-specific instrument that helps to evaluate the patient's opinion about their knee and other associated issues which can influence their quality of life and daily activities highly. In addition, this questionnaire process also discloses the short-term and also long-term consequences of knee injury and the implication of effective treatment. In this present study A forward–backward translation of the questionnaire which is based on the German language was conducted. The adaptation of the "KOOS-Child questionnaire" in the German language has excellent internal consistency and high-test reliability. [27]

[10] Rathleff et al. 2023: discussed about that several topics and used different methods for different topics. As per the study, short-term self-proposed changes can help to improve long-term progress. Self-reported improvement after the treatment duration that was lasting for 4 weeks is associated with better outcomes after 12 months. The present research study also discussed the Osgood Schlatter disease [OSD] properly and created effective results for the impact on the adolescent. OSD is a naturally seen "musculoskeletal pain" condition in active adolescents and this can reduce the quality of life also the pain remains after 5 years of treatment which may lead to OA. According to the present study, no articles discussed the long-term impact of knee pain in later life. This study is useful in disclosing the issue properly with proper methods. [28]

The above-mentioned articles discussed about the association of OSD with other joint diseases such as Osteoarthritis, stiffness of rectus femoris and vastus lateralis and avulsion fractures. In most of the cases it was observed that untreated cases of OSD develop into other joint diseases because of inflammation and stress on the knee joint can cause damage to the cartilage and joint surfaces over time. In rare cases even after effective conservative and physiotherapy treatment of OSD some patients suffer from persistent knee pain.

## 5. Recent Advances

Extracorporeal shock wave therapy [29] and magnetic field therapy [30] are two other potential methods of treatment for the condition. It has been demonstrated that the former is able to effectively alleviate tendon pain because of the analgesic effects it possesses as well as the remodeling. Further it was also showed to have repairing effects on the surrounding soft tissue [31]. It has been demonstrated that the latter effectively enhances cartilage and bone healing by expanding the bone matrix.

Though in literature conservative treatment is preferred in patients who are suffering from the symptoms that are persistent and not getting cured even after the conventional intervention surgery is recommended [14]. In adolescent patients, surgery is never recommended. Removal of the ossicle fragmentation in these patients can cause permanent fusion of the tibial tubercle [32].

In other cases, surgery can be required even when there was no displacement of the fracture. Tibial tuberosity fixation percutaneously [33], deprivation of the tendon, ossification centre extraction, or use of arthroscopic techniques for contouring are some of the other methods and algorithms that have been presented. There is also the possibility of doing a tibial tuberoplasty or adding bone grafts [34]. Both of these procedures are elective. In spite of the many various ways that have been suggested, each one has both benefits and drawbacks [35].

## 6. Discussion

OSD is a condition that arises because of the repetitive stress in the quadriceps muscle. This condition is more common in the young athletes, especially among players who start their sports training early in their childhood [36]. In a systematic review, it was reported that 9.83 percent of the children aged between 9

years to 15 years suffers from this condition more [37].

In the past, different treatment modalities were used. Physical activity reduction was proposed by Nührenbörger et al [38]. Application of cold is another intervention that was reported by Yen et al [39]. Nakase et al in a study evaluated the dextrose injection in OSD patients. However, this study showed no significant improvement in the outcome measures among test and the control group who received saline injection [40]. In contrast, Wu et al reported a significant improvement in hyperosmolar dextrose injection group compared to the patients who received saline injections [41].

It has also been reported to apply pressure to the patellar tendon to lessen the tractional load on the insertion. Some studies have reported that patients can benefit from physiotherapy in addition to stretching their leg extensor muscles to lessen the tension created by their extensor apparatus. When it comes to the latter, it is absolutely necessary to keep the insertion free from an excessive amount of strain [42].

The most frequently employed treatment strategies for OSD are quadriceps femoris stretching, exercise avoidance, and physiotherapy for the management of inflammatory symptoms. It is debatable whether immobilization is a useful tool for managing OSD. Several experts advise using a detachable splint for short-term immobilization. Others do not support immobility [43]. Earlier studies on the length of OSD treatment and its methods have generated controversy [44].

In a previous study, it was reported that reduction in the physical activity along with physical therapy can significantly results in disappearance of the pain and symptoms of discomfort. Moreover, this study also showed that without the physiotherapy, restriction in the physical activity took a longer period of time for symptoms to disappear [45].

In another study by Bezuglov et al it was reported that physiotherapy along with restriction of the movement resulted in disappearance of the symptoms in the soccer players. Among the participants 35.7% of the players resumed their activity without any discomfort after the intervention were completed [13].

Rathleff et al., reported that compared to the passive treatment regimen of wait and watch that are commonly suggested for OSD in adolescents, an intervention modality comprises of modification of activity, strengthening of hip muscles, and monitoring of pain can prove to be an effective alternative [10].

## 7. Conclusion

In this review, it is proven that physiotherapy is an effective treatment approach that can help in reduction of pain and symptoms for OSD. Strengthening exercises and core stability exercises can help OSD patients to return to their sport activity within a significant shorter time in comparison to the wait and watch policy. However, we believe that extensive studies and efforts are necessary as presently there is little amount of literature exists. In order to adequately describe the current state of knowledge regarding this pathology, with a focus on the appropriate treatment modality.

## 8. Future Scope

More studies can be conducted to know the effectiveness of Dry needling, Tapping and cupping therapy on large sample size in multicenter. Another treatment protocol such as SWD can be beneficial for these patients so large sample size, multicentric and multidisciplinary approach still needed.

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