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Evidence based physiotherapy management of Chondromalacia Patella-A review study

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Abstract

Chondromalacia patellae (CMP) is an abnormal softening of the cartilage on the underside of the patella. It causes pain in the front of the knees. Due to increased Q angles women are affected more than men. This review analyses the evidence based physiotherapy management of Chondromalacia patellae. The Cochrane library and PubMed search related to physiotherapy treatment of Chondromalacia patellae, Patellofemoral pain syndrome, anterior knee pain was performed until 10th June, 2021. Thirty papers were found, of which eight were reviewed because they were focused on the topic of the article. Different treatments can be tried for CMP, including therapeutic ultrasound, exercise therapy, needling, taping and braces (orthosis). Therapeutic ultrasound appears not to have a clinically important effect on pain relief for CMP patient. The evidence that exercise therapy is more effective in treating CMP than no exercise for pain reduction. The significant difference was found between taping and non-taping. The orthosis reduced pain compared with no treatment.

Keywords: Chondromalacia patellae, Anterior knee pain, Patellofemoral pain syndrome, Taping

Introduction

Chondromalacia patella is one of the most common syndromes involved in anterior knee pain, especially in youth ^[1]. Chondromalacia patellae (CMP) is referred to as anterior knee pain due to the physical and biomechanical changes ^[2]. Chondromalacia patella is also known as the Patellofemoral pain syndrome (PFPS). The articular cartilage of the posterior surface of the patella is going through degenerative changes which manifest as a softening, swelling, fraying, and erosion of the hyaline cartilage underlying the patella and sclerosis of the underlying bone ^[3]. Chondromalacia patellae is one of the most frequently encountered causes of anterior knee pain among young people ^[4]. More women than men are affected, and this is attributed to increased Q angles in women. There does not appear to be a hormonal cause of variation. Active young adults who participate in running sports or workers who increase stress in their Patellofemoral joint by repeated stair climbing and/or kneeling have a higher incidence of Chondromalacia patella.

Post-traumatic injuries, micro trauma wear and tear, and iatrogenic injections of medication can lead to Chondromalacia development. Several paths lead to the development of Chondromalacia. Iatrogenic injection of chondrotoxic medication into a joint is one that patients can avoid. Intra-articular injections of bupivacaine and high doses or frequent intra-articular injections of corticosteroid lead to softening and/or articular cartilage dysfunction. Most often, Chondromalacia is associated with abnormal (micro trauma) wear and tear of the Patellofemoral joint's hyaline cartilage. Lateral positioning of the patella in the patella-femoral joint is a frequent cause of Chondromalacia. Although a tight lateral retinaculum or a lateral synovial plica may be implicated as the cause of this positioning, an abnormal Q angle is often the cause. An abnormally high Q angle indicates lateral pull of the patella in the trochlear groove of the femur and a mechanism of articular cartilage wear and tear. The alignment of the patella in the vertical plane can also be abnormal. Patella Alta (high riding), and patella Baja (low riding), are both conditions that have also been implicated as a cause of Chondromalacia. Chondromalacia is also seen as a complication of injuries, immobilization, and surgical procedures that lead to quadriceps atrophy. The cause is the micro-trauma created by the decreased pull of the quadriceps muscle on the patella. Finally, foot and ankle anatomic variances (Pes Planus) that

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cause an increased valgus orientation of the knee cause increased lateral wear of the Patellofemoral joint. Shoes, for example, high-heel shoes, which create increased stress on the Patellofemoral joint, can also contribute to Chondromalacia [5].

The condition may result from acute injury to the patella or chronic friction between the patella and a groove in the femur through which it passes during knee flexion [6]. Possible causes include a tight iliotibial band, neuromas, bursitis, overuse, malalignment, core instability, and patellar maltracking. Pain at the front or inner side of the knee is common in adults of all ages especially when engaging in soccer, gymnastics, cycling, rowing, tennis, ballet, basketball, horseback riding, volleyball, running, combat sports, figure skating, snowboarding, skateboarding and even swimming. The pain is typically felt after prolonged sitting [7]. Skateboarders most commonly experience this injury in their non-dominant foot due to the constant kicking and twisting required of it. Swimmers acquire it doing the breaststroke, which demands an unusual motion of the knee. People who are involved in an active lifestyle with high impact on the knees are at greatest risk. Proper management of physical activity may help prevent worsening of the condition.

Anterior knee pain is the most common chief complaint of patients with Chondromalacia. This pain is usually made worse with activities that increase the stress on the Patellofemoral joint, for example, stair climbing, squatting, and running. Differential diagnoses for anterior knee pain include Hoffa disease, Osteochondritis Desiccans of the Patellofemoral joint, patellar tendonitis, patella Alta, patella Baja, patella instability, plica, and bi-partite patella. Specific evaluation of the Patellofemoral joint should include assessment of pain, effusion, quadriceps strength, patella mobility, and crepitation. The physical examination test, which specifically evaluates the knee for Chondromalacia, is Clark's test. This test evaluates Patellofemoral grinding and pain by compressing the patella into the femoral trochlea and having the patient contract their quadriceps muscle-pulling the patella through the groove. X-ray examination of the knee allows for assessment of patella anatomy and positioning in the knee, and MRI allows for additional assessment of articular cartilage water content and wear [5].

Management of the patient with Chondromalacia is difficult, and there is no specific form of treatment that is universally accepted as a standard of care. Medical management should be based on the physical exam findings and can include patella stabilizing braces, physical therapy for quadriceps strengthening, orthotics which decrease pronation of the foot, and nonsteroidal anti-inflammatory medication.

Physiotherapy management of Chondromalacia patella is all debated in literature, but consensus has not been reached so far. The purpose of this review is to analyze the existing strategies for the evidence based physiotherapy management of Chondromalacia patella.

Materials and Methods

The Cochrane library systematic reviews related to physiotherapy treatment of Chondromalacia patellae, Patellofemoral pain syndrome, anterior knee pain was performed until 10th June, 2021. We also searched the PubMed until 10th June, 2021 related to physiotherapy treatment of Chondromalacia patellae, Patellofemoral pain syndrome, anterior knee pain. Overall thirty papers were found, of which eight were reviewed because they were focused on the topic of the article. So, overall eight articles

were analyzed.

Result

Therapeutic modalities like ultrasound:

David lake *et al* [8] reported a systemic review of twelve randomized controlled trials that used a therapeutic modality to treat patients with CMP. They found that therapeutic modalities like ultrasound, cold, Phonophoresis, Iontophoresis, neuromuscular electrical stimulation, electrical stimulation for pain control, electromyography biofeedback, and laser; when combined with other treatments, may be of some benefit for pain management or other symptoms. There was no consistent evidence of any beneficial effect when a therapeutic modality was used alone in the treatment of CMP. None of the therapeutic modalities reviewed has sound scientific justification for the treatment of CMP when used alone.

Exercise Therapy

Exercise therapy to strengthen the quadriceps is often prescribed in PFPS, though its efficacy is still debated. Heintjes *et al* [9] summarized the evidence of effectiveness of exercise therapy in reducing anterior knee pain and improving knee function in patients with CMP. The evidence that exercise therapy is more effective in treating PFPS than no exercise was limited with respect to pain reduction, and conflicting with respect to functional improvement.

There is strong evidence that open and closed kinetic chain exercises are equally effective. A H Bakhtiari *et al* [10] in their study titled "Open versus closed kinetic chain exercises for patellar Chondromalacia"; they concluded that Close kinetic chain exercises within the terminal degrees of knee extension may improve Patellofemoral joint performance by increasing quadriceps muscle strength and patellar alignment correction. Their findings showed that semi-squat exercises may be considered as an effective conservative method of treatment for patients with patellar Chondromalacia. So, here semi-squat exercises (closed kinetic chain) are more effective than SLR exercise (open kinetic chain) in the treatment of patellar Chondromalacia.

Erik P. Meira *et al* [11] conducted a study on "Influence of the Hip on Patients with Patellofemoral Pain Syndrome: A Systematic Review" and concluded that There is a link between the strength and position of the hip and Chondromalacia patella (PFPS). These patients have a common deficit once symptomatic. Hip strengthening and a coordination program may be useful in a conservative treatment plan for CMP (PFPS).

Taping

Aditya Derasari *et al* [12] conducted a study on "McConnell Taping Shifts the Patella Inferiorly in Patients With Patellofemoral Pain: A Dynamic Magnetic Resonance Imaging Study" and concluded that Patellar taping resulted in a significant Patellofemoral inferior shift. The inferior shift in patellar displacement with taping partially explains the decrease in pain due to increases in contact area.

Naoko Aminaka *et al* [13] reported a systemic review from 16 RCTs of patellar taping in Patellofemoral pain syndrome. They found that although patellar taping seems to reduce pain and improve function in people with Patellofemoral pain syndrome during activities of daily living and rehabilitation exercise, strong evidence to identify the underlying mechanisms is still not available.

Bracing

Wolf Petersen et al^[14] conducted study on “Evaluating the potential synergistic benefit of a realignment brace on patients receiving exercise therapy for Patellofemoral pain syndrome: a randomized clinical trial” and concluded that the use of a medially directed realignment brace leads to better outcomes in patients with PFPS than exercise alone after 6 and 12 weeks of treatment. So, there is a synergistic effect of a patellar realignment brace and exercise for patients with CMP, which is most important during the first 3 months after the beginning of treatment.

Warming Needle

QIU Ling *et al*^[15] conducted study on “Chondromalacia Patellae Treated by Warming Needle and Rehabilitation Training” and concluded that the warming needle plus rehabilitation training was superior in the therapeutic effect and duration of producing relief of pain to medication plus rehabilitation training in treating Chondromalacia patellae.

Discussion

Delayed onset of electromyographic activity of the vastus medialis obliquus-vastus lateralis is one of the contributing risk factors to the development of CMP^[16]. The currently most plausible pathophysiologic theory for the etiology of pain in patients with CMP involves abnormal mechanical stress to the Patellofemoral joint. At this time, there was very few body of research evidence to guide the physiotherapy management of patients with CMP. This means that therapists have to rely to some extent on a mechanism based approach. Decreased quadriceps flexibility and muscular endurance have been identified as possibly relevant impairments in patients with CMP^[17].

According to Bolgla et al general quadriceps strengthening continues to reduce pain in patients with PFPS^[18]. Although emerging data suggested the importance of hip strengthening exercise, ongoing investigations are needed to better understand its effect on CMP.

In conclusion, CMP is common among adolescents and young adults. The most common symptom is pain surrounding the patella when sitting with bent knees for prolonged periods of time or when performing activities like ascending or descending stairs, squatting or athletic activities. Different treatments can be tried to reduce the pain and difficulties experienced during daily activities, including pharmacotherapy, taping, bracing, therapeutic modalities like ultrasound, warming needle and exercise therapy.

Conclusion

A review of therapeutic modalities like Ultrasound showed that none of the therapeutic modalities reviewed has sound scientific justification for the treatment of CMP when used alone to have a clinically important effect on pain relief for patients with CMP. The review of exercise therapy found the evidence that exercise therapy is more effective in treating CMP than no exercise; in that also the semi-squat exercises (closed kinetic chain) are more effective than SLR exercise (open kinetic chain) in the treatment of patellar Chondromalacia. The review of patellar taping found that the inferior shift in patellar displacement with taping partially explains the decrease in pain due to increases in contact area, so the patellar taping seems to reduce pain and improve function in people with Chondromalacia patella during activities of daily living and rehabilitation exercise. The review of patellar realignment bracing found that there is a

synergistic effect of a patellar realignment brace and exercise for patients with CMP, which is most important during the first 3 months after the beginning of treatment. The review of warming needle found that the warming needle plus rehabilitation training was superior in the therapeutic effect and duration of producing relief of pain to medication plus rehabilitation training in treating Chondromalacia patellae.

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