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TREATMENT OF OSTEOARTHROTIS OF THE KNEE : SYSTEMATIC REVIEW

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ABSTRACT

Background: *Osteoarthritis (OA) of the knee, also referred to as degenerative joint disease of the knee, is usually caused by gradual articular cartilage loss as well as wear and tear. Seniors are more likely to experience it.*

Aims : *This systematic review is to review the effect and efficacy of the therapy of knee osteoarthritis.*

Methods: *By comparing itself to the standards set by the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020, this study was able to show that it met all of the requirements. So, the experts were able to make sure that the study was as up-to-date as it was possible to be. For this search approach, publications that came out between 2014 and 2024 were taken into account. Several different online reference sources, like Pubmed, ScienceDirect and SagePub, were used to do this. It was decided not to take into account review pieces, works that had already been published, or works that were only half done.*

Result: *In the PubMed database, the results of our search brought up 36.803 articles, whereas the results of our search on SAGEPUB brought up 10.021 articles, our search on SCIENCE DIRECT brought up 51.811 articles. The results of the search conducted for the last year of 2014 yielded a total 22.949 articles for PubMed, 6.322 articles for SAGEPUB and 28.399 articles for SCIENCE DIRECT. In the end, we compiled a total of 8 papers, 2 of which came from PubMed, 2 of which came from SAGEPUB and 4 of which came from SCIENCE DIRECT. We included eight research that met the criteria.*

Conclusion: *In summary, although we discovered that several treatments worked, we were unable to rate the effects since the network as a whole lacked coherence and strong confidence in the treatment comparisons.*

Keyword: *Osteoarthritis, treatment*

INTRODUCTION

Degenerative joint disease, commonly referred to as osteoarthritis (OA) of the knee, is usually caused by gradual loss of articular cartilage due to wear and stress. Seniors are more likely to experience it. Primary and secondary osteoarthritis are the two categories of the condition. Articular degeneration in primary osteoarthritis has no discernible underlying cause. Either aberrant articular cartilage, as in rheumatoid arthritis (RA), or an aberrant concentration of force across the joint, as in post-traumatic reasons, can result in secondary osteoarthritis.[1]

Synovial joints are impacted by the illness known as osteoarthritis (OA). The articular cartilage, subchondral bone, ligaments, capsule, synovial membrane, and periarticular muscles all undergo structural changes as a result. According to a recent population-based cohort research, males had a lifetime risk of 24.6% and women a lifetime risk of 47.2% of symptomatic hand OA. Accordingly, there is a 40–50% lifetime probability of developing symptomatic knee OA. Elderly OA is a major cause of disability and a significant financial burden on society. Osteoarthritis-related medical expenses in a number of high-income nations are projected to be between 1% and 2.5 percent of their GDP, with the majority of these expenses coming from knee replacements.[2]

Usually, osteoarthritis progresses over time and might eventually cause disability. Each person may experience the clinical signs at a different severity. But with time, they usually get worse, happen more often, and become more incapacitating. Also, each person's rate of advancement differs. Common clinical signs include knee stiffness and swelling, discomfort after extended sitting or sleeping, pain that gradually becomes worse, and pain that gets worse with time. When conservative therapy fails, surgical treatments are considered as a further step in the management of osteoarthritis in the knee. There are presently no proven disease-modifying drugs for the treatment of osteoarthritis in the knee, despite the fact that pharmaceuticals can help delay the course of RA and other inflammatory disorders.[3,4]

The classification of knee osteoarthritis is based on the etiology, with primary and secondary forms. Unknown causes of articular cartilage degradation lead to primary osteoarthritis in the knee. This is commonly understood to be age-related deterioration in addition to normal wear and tear. A recognized cause of articular cartilage degradation leads to secondary osteoarthritis in the knee.[5,6]

There are two types of treatment for osteoarthritis in the knee: non-surgical and surgery. When non-surgical treatments are ineffective, the first course of therapy switches to surgical intervention. There are several non-surgical options for the management of osteoarthritis in the knee. Although the underlying illness process is not changed by these therapies, pain and disability may be significantly reduced.[7]

Physical therapy and patient education are the initial lines of treatment for any patient with symptomatic osteoarthritis in the knee. The best outcomes have been seen when a home fitness program is combined with supervised activity. If the workouts are abandoned after six months, these advantages disappear. This course of therapy is advised by the American Academy of Orthopedic Surgeons (AAOS). For symptomatic osteoarthritis in the knee, intra-articular corticosteroid injections may be helpful, particularly if there is a significant inflammatory component. Direct corticosteroid injection into the knee may lessen systemic steroid effects and diminish local inflammation linked to osteoarthritis.[7]

Hyaluronic acid (HA) injections administered intra-articularly are an additional injectable treatment option for osteoarthritis in the knee. The glycosaminoglycan known as HA is present in all parts of the human body and plays a crucial role in the formation of articular cartilage and synovial fluid. As osteoarthritis progresses, HA degrades and has a role in pain, stiffness, and the loss of articular cartilage. In addition to serving as a lubricant, local distribution of HA into the joint may promote the body's natural HA synthesis. Those who are allergic to birds should take caution when using HA since, depending on the brand, it may be made in a lab from bacterial or avian cells. Despite being a common therapeutic option, there is significant evidence against its usage based on the AAOS criteria and it is not well supported in the research.[7]

METHODS

Protocol

The author of this study ensured that it complied with the standards by adhering to Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020 guidelines. This is done to guarantee the accuracy of the results that are derived from the investigation.

Criteria for Eligibility

In order to completse this literature evaluation, we looked at published research that discusses the effect and efficacy of the therapy of knee osteoarthritis. This is done to enhance the patient's therapy management and to offer an explanation. This paper's primary goal is to demonstrate the applicability of the issues that have been noted overall.

To be eligible to participate in the study, researchers had to meet the following requirements: 1) English must be used to write the paper. The manuscript must fulfill both of these conditions in order to be considered for publication. 2) A few

of the examined studies were released after 2013 but prior to the time frame considered relevant by this systematic review. Editorials, submissions without a DOI, already published review articles, and entries that are nearly exact replicas of journal papers that have already been published are a few examples of research that are prohibited.

Search Strategy

We used "knee osteoarthritis " and "treatment" as keywords.The search for studies to be included in the systematic review was carried out using the PubMed and SAGEPUB databases by inputting the words: (("knee"[MeSH Terms] OR "knee"[All Fields] OR "knee joint"[MeSH Terms] OR ("knee"[All Fields] AND "joint"[All Fields]) OR "knee joint"[All Fields]) AND ("osteoarthritis"[MeSH Terms] OR "osteoarthritis"[All Fields] OR "osteoarthritides"[All Fields]) AND ("therapeutics"[MeSH Terms] OR "therapeutics"[All Fields] OR "treatments"[All Fields] OR "therapy"[MeSH Subheading] OR "therapy"[All Fields] OR "treatment"[All Fields] OR "treatment s"[All Fields]) AND ("random allocation"[MeSH Terms] OR ("random"[All Fields] AND "allocation"[All Fields]) OR "random allocation"[All Fields] OR "randomization"[All Fields] OR "randomized"[All Fields] OR "random"[All Fields] OR "randomisation"[All Fields] OR "randomisations"[All Fields] OR "randomise"[All Fields] OR "randomised"[All Fields] OR "randomising"[All Fields] OR "randomizations"[All Fields] OR "randomize"[All Fields] OR "randomizes"[All Fields] OR "randomizing"[All Fields] OR "randomness"[All Fields] OR "randoms"[All Fields])) AND ((ffrft[Filter]) AND (clinicaltrial[Filter]) AND (humans[Filter]) AND (2014:2024[pdat])) used in searching the literature.

Data retrieval

After reading the abstract and the title of each study, the writers performed an examination to determine whether or not the study satisfied the inclusion criteria. The writers then decided which previous research they wanted to utilise as sources for their article and selected those studies. After looking at a number of different research, which all seemed to point to the same trend, this conclusion was drawn. All submissions need to be written in English and can't have been seen anywhere else.

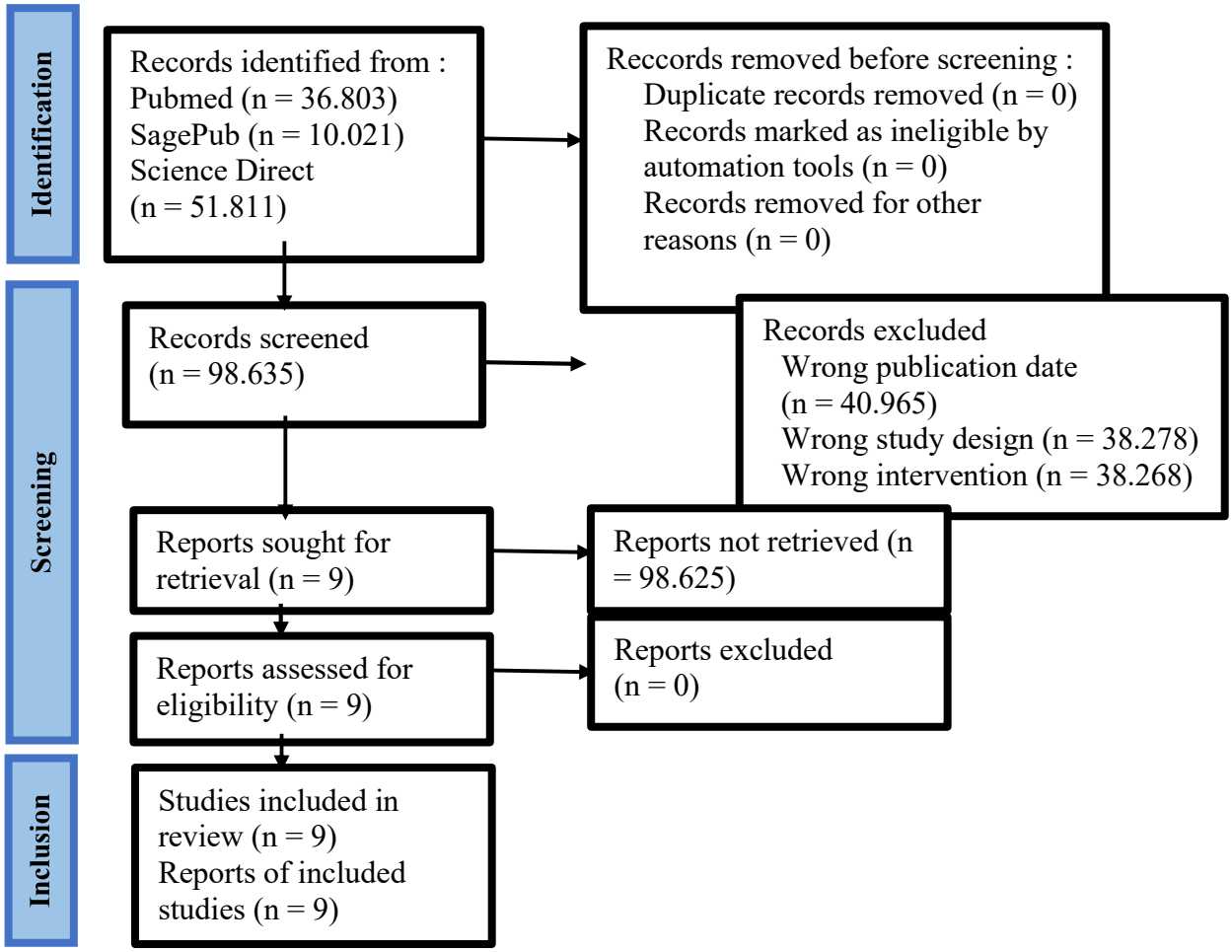

Figure 1. Prisma Flow Diagram

Only those papers that were able to satisfy all of the inclusion criteria were taken into consideration for the systematic review. This reduces the number of results to only those that are pertinent to the search. We do not take into consideration the conclusions of any study that does not satisfy our requirements. After this, the findings of the research will be analysed in great detail. The following pieces of information were uncovered as a result of the inquiry that was carried out for the purpose of this study: names, authors, publication dates, location, study activities, and parameters.

Quality Assessment and Data Synthesis

Each author did their own study on the research that was included in the publication's title and abstract before making a decision about which publications to explore further. The next step will be to evaluate all of the articles that are suitable for inclusion in the review because they match the criteria set forth for that purpose in the review. After that, we'll determine which articles to include in the review depending on the findings that we've uncovered. This criteria is utilised in the process of selecting papers for further assessment. in order to simplify the process as much as feasible when selecting papers to evaluate. Which earlier investigations were carried out, and what elements of those studies made it appropriate to include them in the review, are being discussed here.

RESULT

In the PubMed database, the results of our search brought up 36.803 articles, whereas the results of our search on SAGEPUB brought up 10.021 articles, our search on SCIENCE DIRECT brought up 51.811 articles. The results of the search conducted for the last year of 2014 yielded a total 22.949 articles for PubMed, 6.322 articles for SAGEPUB and 28.399 articles for SCIENCE DIRECT. In the end, we compiled a total of 8 papers, 2 of which came from PubMed, 2 of which came from SAGEPUB and 4 of which came from SCIENCE DIRECT. We included eight research that met the criteria.

Atalay, et al[8] (2021) showed that in terms of pain, functional status, and quality of life, twice-weekly acupuncture and physiotherapy treatments last for six weeks and have comparable results. When treating KOA, there were no appreciable differences in pain alleviation, enhanced functional status, or quality of life between the acupuncture and physiotherapy groups. When compared to baseline values, both acupuncture and physiotherapy treatments produced noticeably better outcomes.

Bennell, et al[9] (2021) showed that intraarticular PRP injection did not significantly alter symptoms or joint structure at 12 months as compared to saline placebo injection among individuals with symptomatic mild to moderate radiographic knee OA. The use of PRP to treat knee OA is not supported by these results.

Branch, et al[10] (2023) showed that PRP by itself or in combination with HA was equally effective for treating osteoarthritis (OA) for up to 24 months. The results did not show that PRP with HA was better than PRP alone.

Vallejo, et al[11] (2023) showed that when utilizing an MRFA (10 mm/16G active tip) or CRFA (4 mm/17G active tip), RFA of the knee genicular nerves is beneficial for 52 weeks after ablation in treating chronic pain associated with osteoarthritis. While no discernible variations were found at 52 weeks, the advantages of CRFA appear to be more long-lasting than those of MRFA after 24 weeks.

Table 1. The litelature include in this study

Author	Origin	Method	Sample	Result
Atalay et al, 2021[8]	Turkey	Randomized controlled study	100 patients	In terms of pain, total WOMAC, and SF-36 scores at baseline, during treatment, and at the 12-week mark following treatment, there was no statistically significant difference between the acupuncture group and the physiotherapy group (P > 0.05).
Bennell et al, 2021[9]	Australia	Randomized controlled study	288 patients	After a year, knee pain ratings changed on average by −2.1 vs. −1.8 points for PRP therapy and −1.8 points for placebo injection. In terms of medial tibial cartilage volume, the mean change was 1.4% compared to 1.2%. 29 out of the 31 predetermined secondary outcomes had no discernible group differences.
Branch et al, 2023[10]	USA	Randomized controlled study	64 patients	Perceived discomfort was the same in all groups and was consistent with standard-of-care HA injection regimens. There were no illnesses or problems noted. From one to twenty-four months after injections, every PROM score showed improvement over the baseline. Between the groups, there were no statistically significant differences.
Vallejo et al, 2023[11]	USA	Randomzied controlled study	79 patients	At 24 weeks, both CRFA and MRFA significantly reduced chronic knee pain (41 mm and 39 mm, respectively). Pain was maintained at a lower level for CRFA (42 mm) at the 52-week visit, but appeared to be declining for MRFA (31 mm).
Gomoll et al, 2023[12]	USA	Randomized controlled study	95 patients	At every time point examined, there were no statistically significant differences between the crossover cohorts and the initial ASA randomized group. This suggests that the results of the ASA therapy were not significantly impacted by previous unsuccessful HA or saline treatment.
Gobbi et al, 2022[13]	Italy	Randomized controlled study	60 patients	At six months, group NT-HA scores declined (P <.05), but group T-HA continued to increase IKDC, KOOS, and VAS (P <.05). For T-HA, IKDC went up to 66.98 (60.92-78.79), while for NT-HA, it went down to 59.77 (35.34-73.03).

Cai et al, 2019[14]	Australia	Randomized controlled study	117 patients	There were no group-to-group variations, and the BML size change was minimal across all groups. After six months, VOLT01 but not ZA exhibited a trend toward reducing knee pain and better knee function as compared to placebo.
Eftekharsadat et al, 2015[15]	USA	Randomized clinical study	70 patients	The mean improvement in the VAS, TUG, and WOMAC subscales during the trial, as well as the subscale values before and after treatment, did not differ significantly between the groups.

Gomoll, et al[12] (2023) showed that following a crossover injection of ASA, patients who had previously failed therapy with HA or saline showed statistically significant improvements in pain and function ratings, as judged by KOOS and VAS, which lasted for a full year. The injection was safe, and no significant side effects were noted.

Gobbi, et al[13] (2022) showed that early symptoms of osteoarthritis can be safely and successfully treated with both T-HA and NT-THA. Compared to NT-HA, T-HA offers symptom alleviation that lasts longer. To ascertain the full range of long-term impacts of T-HA, more research is required.

Cai, et al[14] (2019) showed that compared to zoledronic acid (ZA) or a placebo, intravenous methylprednisolone administration with ZA did not alter knee bone marrow lesion (BML) size or lower acute phase responses (APRs) over a 6-month period; nonetheless, it could be advantageous for knee osteoarthritis symptoms.

Eftekharsadat, et al[15] (2015) showed that patients with knee OA may have considerable pain reduction and improved physical function with short-term therapy using both APS and IFT. These findings suggest that for knee OA pain treatment, both physical techniques can be utilized in addition to or instead of pharmaceuticals.

DISCUSSION

The most common type of joint illness is osteoarthritis, which most often affects the knee. Atalay, et al did study of acupuncture and physiotherapy groups were randomly assigned to a hundred KOA patients. At the 12-week follow-up of the study, both treatments significantly reduced the level of pain assessed by VAS (acupuncture, from 8.32 ± 1.61 to 5.54 ± 2.34; and physiotherapy, from 7.86 ± 1.9 to 5.68 ± 2.42; $P < 0.05$) and improved functional status (from 63.8 ± 20.81 to 53.72 ± 19.43; and physiotherapy, from 59.04 ± 21.49 to 52.28 ± 19.54; $P < 0.05$).[8]

Bennell, et al in their study of treatment with PRP versus placebo injection produced a mean change in knee pain scores of −2.1 vs −1.8 on an 11-point scale (range, 0-10) and a mean change in medial tibial cartilage volume of −1.4% vs −1.2% at 12 months for 288 adults aged 50 years or older with mild to moderate radiographic knee osteoarthritis. It was not statistically significant to compare the two.[9]

Study in 2 years observation by Branch, et al with 64 participatnts with osteoarthritis randomzied into 2 groups and scheduled to receive 3-injections. Platelet rich plasma (PRP) by itself or PRP in conjunction with hyaluronic acid (HA) performed comparably throughout a 24-month period. The results did not show that PRP with HA was better than PRP alone.[10] Long term study also performed by Vallejo, et al with result functionality improvements were also noteworthy and maintained with both treatments, but they tended to decline with MRFA after 52 weeks. Throughout the course of the trial, the majority of patients also felt that the therapies had a very excellent or good benefit.[11]

Twelve months of study performed by Gomoll, et al in 95 patients from a 200-patients that chooswen by single blind randomized controlled trial. In this study, at every time point examined, there were no statistically significant differences between the crossover cohorts and the initial ASA randomized group. This suggests that the results of the ASA therapy were not significantly impacted by previous unsuccessful HA or saline treatment.[12] Gobbi, et al did study with double blind randomized clinical trial in 60 patients with persistent symptomatic knee osteoarthritis with results early OA symptoms can be safely and successfully treated with trehalose-hyaluronic acid (T-HA) and non trehalose hyaluronic acid (NT-THA). On the other hand, T-HA relieves symptoms for a longer period of time than NT-HA.[13]

The primary cause of pain, physical impairment, and persistent disability in older adults is knee osteoarthritis (OA). Knee OA is treated using electrotherapeutic techniques, such as action potential simulation (APS) and interferential therapy

(IFT). In study by Eftekharsadat, et al, showing the mean improvement in the VAS, TUG, and WOMAC subscales during the trial, as well as the subscale values before and after treatment, did not differ significantly between the groups.[15]

To compare the efficacy and safety of zoledronic acid (ZA) and intravenous methylprednisolone (VOLT01) for treatment of knee osteoarthritis, Cai, et al did study fro 117 patients with knee osteoarthritis. VOLT01 but not ZA exhibited a trend toward reducing knee pain and better knee function as compared to placebo. Compared to ZA or a placebo, intravenous methylprednisolone administration with ZA did not alter knee BML size or lower APRs over a 6-month period; nonetheless, it could be advantageous for knee osteoarthritis symptoms.[14]

CONCLUSION

In summary, although we discovered that several treatments worked, we were unable to rate the effects since the network as a whole lacked coherence and strong confidence in the treatment comparisons.

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