Non-Steroidal Anti-Inflammatory Drugs

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The non-steroidal anti-inflammatory drugs (NSAIDs) are the most used drugs in knee OA (osteoarthritis) treatment. Despite their efficiency in pain and inflammation alleviation, NSAIDs accumulate in the environment as chemical pollutants and have numerous genetic, morphologic, and functional negative effects on plants and animals. Ultrasound (US) therapy can improve pain, inflammation, and function in knee OA, without impact on environment, and with supplementary metabolic beneficial effects on cartilage compared to NSAIDs. These features recommend US therapy as alternative for NSAIDs use in knee OA treatment.

Keywords: non-steroidal anti-inflammatory drugs ; ultrasound therapy ; health benefits ; environment pollutants

1. Introduction

In the absence of disease-modifying treatment, the burden of osteoarthritis (OA) is increasing globally. The ageing and the increasing of obese population make this syndrome more prevalent than in previous decades [1]. OA showed a significant increase of 31.4% from 2007 to 2020, after another significant increase of 63.1% between 1990 and 2007 [2]. Approximately 85% of the burden of OA worldwide is connected with knee OA [3]. The prevalence of knee OA increased significantly over the last decades and continues to rise [4]. For knee OA, in 2020, the global prevalence was 16.0% (95% confidence interval (CI), 14.3–17.8%) and global incidence was 203 per 10,000 person-years (95% CI, 106–331) [5]. However, an ideal treatment for knee OA does not exist at this time [6].

2. US Therapy Versus NSAIDs Treatment

To date, there are a small number of studies that compare US therapy with NSAIDs, and they are focused only on the topical administration of NSAIDs.

Ibuprofen phonophoresis with US at 1 MHz frequency, 1 watt/cm^2 intensity, and ibuprofen cream containing 5% ibuprofen were found not significantly different in pain and function improvement rates compared to US therapy at the same parameters, administrated alone, in knee OA [7], but one study communicated that the ibuprofen gel phonophoresis improved pain and Western Ontario and McMaster Universities (WOMAC) physical function score better than the ibuprofen cream phonophoresis [8].

US therapy, at 1 MHz frequency and 1.5 watt/cm^2 intensity, had similar effectiveness as phonophoresis with topical gel containing 1.16% diclofenac diethylamonium on pain and physical activities improvement in knee OA patients, immediately after treatment and at 3-month follow-up period, except walking duration, when phonophoresis was more successful [9].

In a previous study, diclofenac gel phonophoresis had similar efficacy on pain and functional status improvement in patients with knee OA for both continuous and pulsed mode (20% duty cycle) of US therapy (at 1 MHz frequency and 1.5 watt/cm^2 intensity), and both modalities of US therapy were more effective on pain and functional status than topical application of diclofenac gel [10]. Instead, Diclofenac sodium phonophoresis that used US at 1 MHz frequency and 1 watt/cm^2 intensity was found to be more effective compared to isolated US therapy on pain, stiffness, physical function, and walking time improvement in patients with knee OA [11].

US in continuous mode, 1 W/cm^2 power, and 1 MHz frequency had comparable efficacy to piroxicam gel phonophoresis (20 mg of piroxicam drug) on pain and total WOMAC score improving in knee OA, without significant differences [12].

The association between US and TENS did not provide additional benefits, this mode of treatment having no significantly different results, compared to piroxicam gel, on pain and total WOMAC score improving in knee OA patients [13].

Compared to US therapy (1 MHz frequency and 1.5 W/cm^2 intensity), ketoprofen phonophoresis (US at a frequency of 1 MHz, and intensity of 1.5 W/cm^2 + 100 mg of ketoprofen as 2.5% ketoprofen gel) had no significantly different efficacy on pain relief, WOMAC score, and 15 min walking test improvement [14].

Unfortunately, all studies published to date compared the association of US and topical NSAIDs, namely phonophoresis, with US therapy and none of the studies compared the isolated administration of NSAIDs with US therapy.

3. Conclusions

Prescription and the consumption of NSAIDs increased enormously in the recent years and will continue to increase, due to the fact that OA, the main disease for which NSAIDs are indicated, has a growing prevalence.

In the absence of alternatives for OA treatment, NSAIDs will continue to pollute the environment and cause genetic, morphological, and functional changes in plants and animals.

US therapy has been shown to have beneficial effects in reducing pain and improving joint function in OA. In addition to NSAIDs, US can reduce cartilage destruction by reducing inflammation and MMP synthesis and by reducing chondrocyte apoptosis, in parallel with increasing collagen and proteoglycan synthesis, without polluting effects on the environment. For these reasons US must be considered as a safe and effective method for OA treatment and a viable alternative to NSAIDs use.

To strengthen this recommendation, new clinical and experimental studies that directly compare the effectiveness of US therapy versus NSAIDs, as well as studies analyzing barriers that may stand in the way of this treatment, are required.

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