

# Treatment of Sprains and Strains

## Do Non Steroidal Anti-Inflammatory Drugs Have a Role?

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### KEYWORDS

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### INTRODUCTION

Sprains and strains of the ankle are the most common sporting injury and ankle strains alone are reported to account for 15% of all sports injuries.<sup>1-4</sup> While these types of injuries are usually considered minor, they can be significant due to their frequency and symptoms and should be taken seriously due to potential to cause chronic pain, swelling and functional instability.<sup>2-5</sup> Measures such as rest, ice, and compression are crucial to aid healing and health professionals are often approached to suggest and provide drug treatments to reduce pain and inflammation. The inflammatory response is a part of the body's natural healing process, and healing cannot occur without it.<sup>6,7</sup> Inflammation acts to limit the amount of damage (i.e., haemostasis to prevent bleeding), protect from further damage (i.e., swelling to immobilise the joint) and initiate healing (via macrophages to remove debris and growth factors to promote regeneration). This acute inflammatory phase is usually transient lasting 24-48 hours,<sup>7-9</sup> and soon after it is initiated, muscle or ligament repair begins.<sup>10</sup>

Currently there is controversy as to whether non-steroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen and diclofenac, provide the best treatment due to their analgesic and anti-inflammatory effects, or if the anti-inflammatory effects impair the healing process.

### METHODS

A Medline search was conducted in March 2005 and keywords used included non-steroidal anti-inflammatory drugs (NSAIDs) (and variations), sprains, strains, soft-tissue injury. Both review articles and experimental articles of potential interest were obtained, and further references cited in the articles were included. The aim was to find clinical evidence that either supports or does not support the use of NSAIDs in acute ankle sprains and/or strains immediately after injury.

### Strains and Sprains

A sprain is when a ligament within a joint is stretched or torn<sup>3,4</sup> and is caused by a sudden forceful movement (such as a sudden change in direction when running), which results in pain and swelling. The swelling occurs soon after the injury due to an inflammatory response, and this can lead to some loss of joint function.<sup>9-11</sup> Sprains usually occur in the ankle, knee and wrist joints.

A strain is when a muscle or tendon is overstretched or torn<sup>3,4</sup> (such as when lifting a heavy object), which results in pain and swelling due to the inflammatory response. Strains commonly occur in the muscles of the back and extremities.<sup>3</sup> It is hard to differentiate a sprain from a strain but both initiate an inflammatory response and are generally treated in the same manner. It is most important for pharmacists to first determine if referral is needed. A good history and observation of a patient's ability to ambulate or use the affected limb may give an indication of the severity of an injury. Pharmacists should refer if there is the possibility of fracture, dislocation, or complete tear or if there is any doubt as to the seriousness of the injury.

### Inflammation

When an injury occurs the body responds with an initial influx of inflammatory cells and blood.<sup>6</sup> The cells act to remove debris and recruit other inflammatory mediators to the injured area.<sup>6</sup> When inflammatory mediators are present the enzyme cyclo-oxygenase 2 (COX-2) (which is not normally found in healthy tissue, but produced by inflammatory mediators) converts arachidonic acid to inflammatory prostaglandins. Prostaglandins in inflammation include PGF<sub>2</sub>, PGD<sub>2</sub>, PDI<sub>2</sub> and PGE<sub>2</sub>, which are responsible for pain, vasodilation and oedema.<sup>12</sup> This conversion also attracts other inflammatory cells to the injured site and leads to the release of bradykinin which acts to 'sensitise skin pain receptors'.<sup>6</sup> It is during this inflammatory response that cytokines, proteins produced by many cells, which are involved in the regulation of the growth and maturation of 'particular cell populations'<sup>13</sup>, are recruited. Growth factors are also recruited and together these form the proliferative phase of healing.<sup>14</sup>

## NSAIDs in inflammation

The inflammatory response can be reduced by the use of NSAIDs. The dosage of NSAIDs needed to achieve an anti-inflammatory effect is usually twice as high as that needed to achieve analgesic effects.<sup>8</sup>

NSAIDs work by inhibiting the COX-2 enzyme (as well as COX-1, necessary for normal physiological processes<sup>6</sup>) thereby inhibiting the conversion of arachidonic acid to prostaglandins. This decreases pain and swelling but may also block the recruitment of cytokines and growth factors, which will slow the early phases of healing.<sup>14</sup> This idea is supported by a clinical study by Reynolds et al. showing that in patients with more severe injuries a placebo group actually had lower pain scores than those taking NSAIDs indicating that healing may have been delayed in this group.<sup>15</sup>

NSAIDs also inhibit thromboxane A<sub>2</sub> on platelets which may lead to increased bleeding into the injury site, increased swelling and further tissue damage or delays in healing.<sup>14</sup> Other effects include the suppression of neutrophil migration and cytokine production<sup>16</sup>. Proteoglycans, components of the extracellular matrix which regulate the 'connective tissue structure and permeability' also have decreased production.<sup>12-16</sup>

However, the inflammation process is not completely stopped by NSAIDs, as the arachidonic acid can still be converted to leukotrienes via the lipoxygenase pathway.<sup>8</sup>

### To use or not to use?

Concern has been raised over the use of NSAIDs early in therapy because the initial inflammatory response coincides with muscle repair, regeneration and growth.<sup>7</sup> As inflammation is a necessary component, decreasing inflammation may impair the healing process and result in a delay of tissue repair.<sup>3</sup> Current evidence suggests that if these medicines are used too early following injury, they will reduce the inflammatory response and may actually delay acute healing, slow muscle regeneration and compromise long-term healing.<sup>2,6,8</sup> There is also potential for increased bleeding and swelling at the site of injury due to NSAIDs decreasing platelet aggregation.<sup>14</sup>

Clinical studies have shown that NSAIDs are effective in decreasing pain and swelling associated with sprains and strains.<sup>3</sup> As a result of this, the range of motion is increased and pain is decreased.<sup>14</sup> Conversely, one of the roles inflammation and pain play in healing is to limit movement to prevent further damage and returning to activity faster may increase the risk of recurrence.<sup>17,18</sup> A study performed on Australian army recruits strongly recommended the routine use of NSAIDs in the management of acute ankle sprains, as they allowed a more rapid return to activity and reduced the overall morbidity. These effects may be caused by the analgesic effect, which enabled patients to return to normal activity prematurely. However, the study also found treatment with NSAIDs produced greater instability, a decreased range of motion and an increase in the amount of swelling.<sup>19</sup>

It has also been noted that in some subacute injuries, inflammation is no longer present but instead a degenerative process, tendinosis, is occurring.

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In this case, there is no benefit in using NSAIDs as there is no inflammation and patients are being put at risk of the possible side-effects of these drugs e.g. gastrointestinal (peptic ulcers, bleeds), renal (fluid retention, renal failure), cardiovascular (arrhythmias) and respiratory systems (worsening of asthma symptoms).<sup>6</sup>

## RECOMMENDATIONS

The inflammatory response exceeds what is needed for repair; therefore it is desirable to limit both bleeding and swelling as soon as possible after a soft tissue injury.<sup>11</sup> The non-pharmacological intervention RICE has shown to be an appropriate treatment of sprains and strains for the first 48 hours after the injury. RICE comprises <sup>3,11,20</sup>

- Rest - reduce the length of time spent moving the affected joint, preventing further damage.
- Ice - apply for up to twenty minutes every two hours for the first 2-3 days. The effects are to relieve pain and minimise blood flow to the area. The combination of pressure and ice is more efficient than ice alone at controlling swelling.
- Compression - minimises swelling and limits joint movement, reducing further damage.
- Elevation - decreases oedema at the site of the injury.

RICE is important as it acts to minimise bleeding and inflammation without stopping the influx of key factors needed for healing. Pharmacists should consider whether an NSAID is really necessary. They should avoid their use in minor conditions, and not recommend their use in "at risk" patients, such as the elderly and those with a history of peptic ulcers or asthma. Alternative options such as paracetamol or a topical agent should be considered.<sup>11</sup>

Currently in New Zealand, the Accident Compensation Corporation (ACC) recommends RICE for the first 2-3 days after the injury occurs, combined with the use of paracetamol, if required, for pain. ACC recommends the use of NSAIDs (if indicated) after 2-3 days, but advises against using aspirin, as this can increase bleeding and swelling.<sup>20</sup>

Self Care Cards available in many pharmacies provide information about particular conditions. The "Sprains and Strains" card recommends RICE for the first 1-2 days and, contrary to ACC's recommendations (and current evidence), states that anti-inflammatory drugs can be used immediately to reduce pain and swelling.<sup>21</sup>

## CONCLUSION

Currently, while NSAIDs may be used to reduce pain and inflammation, there is little evidence regarding the impact of their anti-inflammatory effects on the healing process of sprains and strains. While NSAIDs have been used as first-line treatment, their use needs to be evaluated given current evidence suggesting potential for problems. With the additional risk of NSAID side-effects and their potential to blunt the normal healing process, it is important to consider whether their use is appropriate for treating sprains and strains and particularly whether they should be avoided in the first 24-48 hours after injury. The optimal treatment appears to be RICE for the injury and paracetamol for pain. Use of NSAIDs immediately after injury should be discouraged. If the patient insists on using NSAIDs within three days of the injury, they should be informed of the risks: predominantly impaired healing, possible long-term effects to the joint, and recurrent injury due to premature activity.

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