

Applications of Photobiomodulation Therapy to Musculoskeletal Disorders and Osteoarthritis with Particular Relevance to Canada

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Abstract

Background: Musculoskeletal disorders caused by osteoarthritis (MSDs/OA) are a growing problem in the modern industrialized society in Canada. Overall aging of the general population and a progressive lack of exercise contribute to this alarming increase. Moreover, a range of chronic conditions including cardiovascular and mental diseases show significantly higher comorbidity with MSDs/OA. Conventional medical treatment for MSDs/OA includes nonsteroidal anti-inflammatory drugs and opiate pain killers. These drugs have major drawbacks such as a relative lack of efficacy, potential for addiction, and even death (Vioxx scandal). Photobiomodulation (PBM) was discovered over 50 years ago but has still not attained widespread acceptance by the medical community. This is partly due to uncertainty about the precise molecular mechanisms of action and a bewildering array of different wavelengths and dosimetric parameters employed in reported studies.

Objective: The goal of this review was to survey literature reports of PBM, also known as low-level laser therapy used for treatment of MSDs/OA, concentrating on the growth over time, different wavelengths employed, and application to different joints.

Methods: We searched the PubMed database for publication of study on PBM to treat the most common joints.

Results: We show that the field of PBM to treat MSDs/OA is expanding exponentially over the past 20 years. A trend has emerged over time for more power to achieve better effective treatments, and the understanding of the physiological effect of safe parameters has improved. There is, however, no consensus on the best set of parameters to treat a specific patient indication.

Conclusions: Finally, we highlight gaps in our knowledge and the barriers to further clinical trials. We suggest that the growing body of evidence indicating efficacy, and the almost total lack of side effects, should encourage continued clinical research to support clinical applications where better rehabilitation treatments are much needed.

Keywords: literature search, Canada, arthritis, photobiomodulation

Introduction

Musculoskeletal disorders caused by osteoarthritis

MUSCULOSKELETAL DISORDERS CAUSED by osteoarthritis (MSDs/OA) represent growing problems for the public health of our modern industrial society. Possible factors responsible for this increasing trend include increasing sedentary lifestyles, high incidence of obesity, and an overall increase in the aging of the population. MSDs/OA involve damage or disease that affects structural tissues, such as

cartilage, ligaments, tendons, muscles, nerves, bones, and blood vessels. Common MSDs/OA conditions encompass the following indications: carpal tunnel syndrome, tendonitis, tendinosis, muscle strain, subacromial impingement syndrome (shoulder), epicondylitis (elbow), hip, knee OA, degenerative spinal disc disease, and a number of other embodiments of arthritis.

To illustrate the steadily increasing interest in MSDs within the medical community, Fig. 1 shows a graph of the growing number of MSDs publications cited in PubMed,

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