

The Effect of Glucosamine With or Without Chondroitin Sulphate on Glucose Monitoring Parameters in Humans – A Systematic Review

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ABSTRACT

Musculoskeletal diseases that included OA was the second greatest contributor to disability as measured by years lived with disability. The goals of OA treatment are to reduce pain, improve function and quality of life and decrease disability. The objective of this systematic review is to summarise the findings of the effect of glucosamine with or without chondroitin sulphate on glucose monitoring parameters in humans. An English language literature search of electronic bibliographic databases such as Medline, Web of Science, Science Direct, Scopus and Cochrane since inception to June 2020 was conducted. Two reviewers independently analysed the studies for quality and content using the Downs and Black Checklist. The thirteen studies that were included in the review consists of randomised control trials ($n=7$), non-randomised control trials ($n=3$), prospective cohort studies ($n=2$) and pre-post studies ($n=1$). Five studies detected the effect of glucosamine on glucose parameters. Studies that recruited patients with baseline impaired glucose tolerance or insulin

resistance were more likely to detect an effect on glucose metabolism. Patients taking glucosamine have a higher risk of diabetes especially those who have high baseline glucose levels or have diabetes or have impaired glucose tolerance. Only two studies investigated the effect of glucosamine on glucose parameters in patients having osteoarthritis.

Key words: Diabetes, Glucosamine, Glucose metabolism, Osteoarthritis, Systematic review.

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INTRODUCTION

The estimate by the Global Burden of Disease 2010 was that 251 million people suffered from knee osteoarthritis (OA) worldwide. OA, a musculoskeletal related disease was the second greatest contributor of disability as measured by years lived with disability.¹ Data from the National Health Interview Survey estimated that 14 million people in the US have symptomatic knee OA (KOA), that included more than 3 million racial or ethnic minorities.² OA is usually considered a physiological part of aging and rarely associated with mortality in the elderly.³

Glucosamine is a dietary supplement widely used for OA especially of the knees. It is described as not only efficacious but also safe for many patients.⁴ It is available over the counter as a nutraceutical in several countries and it is also available as a prescription pharmaceutical in Europe.^{5,6} In the United States alone, glucosamine was the fourth most commonly used herbal/ dietary supplement by over five million people annually.⁷

Previous short-term research studies have shown that glucosamine sulphate is safer than standard therapy such as Non-steroidal Anti-inflammatory Drugs (NSAIDs), especially concerning the gastrointestinal tract.⁸ However, there are concerns regarding the effect of glucosamine on glucose metabolism causing insulin resistance. This has been proven in several animal based studies.⁹ More recent studies suggest that it may also affect the glucose transport and insulin resistance in humans, especially when impaired glucose tolerance is present.¹⁰⁻¹² However, these studies differed in terms of the route of administration, duration

as well as dosage of glucosamine. This review was aimed to summarise the findings of the use of glucosamine with or without chondroitin at pharmacological doses and its effect on glucose monitoring parameters in humans.

MATERIALS AND METHODS

This review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Studies were located through a comprehensive literature search of electronic bibliographic databases such as Medline, Web of Science, Science Direct, Scopus and Cochrane since inception to June 2020. These databases were searched for intervention trials investigating the effects of glucosamine alone or in combination with chondroitin on glucose monitoring parameters such as HbA_{1c}, fasting plasma glucose, fasting insulin levels, fructosamine and other relevant parameters. Studies were selected for review as per Diagram 1.

Search Strategy

The subject headings (SH) and keywords used are based on the aspects of the PICO framework such as osteoarthritis, temporomandibular Joint and arthritis for the population; glucosamine and chondroitin as the intervention and hyperglycaemia, fructosamine, insulin resistance, glucose tolerance test and glucose toxicity as part of the outcomes.

The search was conducted by a combination (using Boolean operators) of the search terms. Search limiters were English language, human

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