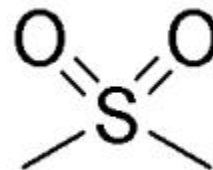


MSM (Methylsulfonylmethane)

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Synonyms/Common Names/Related Substances:


- Crystalline DMSO, dimethyl sulfone, DMSO₂, methyl sulfone, methyl sulfonyl methane, methyl-sulfonyl-methane, methylsulfonylmethane, OptiMSM®, sulfonyl sulfur.
- **Combination product examples:** Flexmax™ Glucosamine with MSM (glucosamine sulfate potassium chloride, methylsulfonylmethane, maltodextrin, cellulose, stearic acid, modified cellulose, silica, glycerine), Flex-A-Min® Complete (glucosamine HCl, MSM, chondroitin complex, white willow, ginger, SAM-e, hyaluronic acid, collagen, *Boswellia*, citrus bioflavonoids), Osteo Bi-Flex: Plus MSM Smoothcap™ (glucosamine HCl, MSM/chondroitin complex, vitamin C, manganese, boron, microcrystalline cellulose, sodium carboxymethylcellulose, yellow 5 lake, crospovidone, magnesium stearate, yellow 6 lake, maltodextrin, dextrose, soy lecithin, sodium citrate, red 40 lake, blue 1 lake).

CLINICAL BOTTOM LINE/EFFECTIVENESS

Brief Background:

- Methylsulfonylmethane, or MSM, is a form of organic sulfur that occurs naturally in a variety of fruits, vegetables, grains, and animals. MSM is a normal oxidation product of dimethyl sulfoxide (DMSO). It arises from a series of reactions that begin on the surface waters of the ocean. MSM is a white, odorless, crystalline substance that is water-soluble and contains 34% element sulfur.
- No evidence suggests MSM is a necessary part of a normal diet. Sulfur is considered an essential mineral, but no dietary requirement has been established for it. MSM as a vital source of dietary sulfur is unsupported by published research.
- In clinical trials, MSM has been associated with improvements in allergic rhinitis symptoms (1) and osteoarthritis (2). However, more high quality research using MSM as a monotherapy is necessary to define its role in treating these conditions.
- The nutrient is generally well tolerated, but long-term effects of supplementation with MSM have not been examined.

Scientific Evidence for Common/Studied Uses:

Indication	Evidence Grade	
Allergic rhinitis	C	 GRADING SYSTEM LINK
Osteoarthritis	C	

Historical or Theoretical Uses which Lack Sufficient Evidence:

- Acne, analgesia, anti-parasitic, antispasmodic, burns, cancer, cardiovascular - blood flow, connective tissue disorders, constipation, cramps, diabetes mellitus, drug hypersensitivity, eye disorders (inflammation), gastrointestinal disorders, headache, heartburn, immunostimulant, insect bites, interstitial cystitis, liver disease, lupus erythematosus, mood enhancement, obesity, periodontal disease, premenstrual syndrome, pulmonary conditions, radiation sickness, rheumatoid arthritis, scar prevention, scleroderma, sinusitis, skin conditions (stretch marks), snoring, synovitis, tendonitis, wrinkle prevention.

Expert Opinion and Folkloric Precedent:

- Although the Arthritis Foundation reports that MSM is used for pain and inflammation, they do not recommend its use due to lack of clinical trials.

Brief Safety Summary:

- **Likely Safe:** Studies have shown safety and tolerability of MSM products when used orally in recommended doses (1).
- **Note:** No studies on the long-term effects of MSM have been conducted.

DOSING/TOXICOLOGY

General:

- Recommended doses are based on those most commonly used in available trials, or on historical practice. However with natural products it is often not clear what the optimal doses are to balance efficacy and safety. Preparation of products may vary from manufacturer to manufacturer and from batch to batch within one manufacturer. Because it is often not clear what the active components of a product are, standardization may not be possible and the clinical effects of different brands may not be comparable.

Standardization:

- There is no well-known standardization for MSM.

Dosing:

Adult (age ≥18):

Oral:

- **General:** MSM comes in various dosages and is an ingredient in many products. Adult dosage may range from 500-8,000mg daily with or after meals.
- **Allergic rhinitis:** 2,600mg per day for up to 30 days has been used (1).
- **Osteoarthritis:** 500mg per day for up to 12 weeks has been used (2).

Children (age <18):

- Insufficient available evidence.

Toxicology:

- Reports of MSM overdose are lacking. MSM is generally considered as non-toxic and safe at therapeutic doses, however there is no documentation of the effect of long-term use (3).

PRECAUTIONS/CONTRAINDICATIONS

Allergy:

- Known allergy/hypersensitivity to MSM.

Adverse Effects/Post Market Surveillance:

- **General:** In two clinical trials, minimal side effects, including mild gastrointestinal discomfort, have been associated with the use of this product (1;2).

Precautions/Warnings/Contraindications:

- Insufficient available evidence.

Pregnancy & Lactation:

- Not recommended due to lack of sufficient data.

INTERACTIONS

MSM/Drug Interactions:

- **Anti inflammatory agents:** Based on an *in vitro* study, MSM may have anti-inflammatory activity ([4](#)).
- **Antioxidants:** Based on an *in vitro* study, MSM may have antioxidant activity ([4](#)).

MSM/Herb/Supplement Interactions:

- **Anti inflammatory herbs:** Based on an *in vitro* study, MSM may have anti-inflammatory activity ([4](#)).
- **Antioxidants:** Based on an *in vitro* study, MSM may have antioxidant activity ([4](#)).

MSM/Food Interactions:

- Insufficient available evidence.

MSM/Lab Interactions:

- Insufficient available evidence.

MECHANISM OF ACTION

Pharmacology:

- **Constituents:** Methylsulfonylmethane (MSM) is a natural constituent of the environment found in plants, milk and urine of both bovines and humans. It is a normal oxidation product of dimethyl sulfoxide (DMSO) also found in the natural environment and may be part of the natural global sulfur cycle ([5](#)). MSM is a source of sulfur for methionine and cysteine.
- **Anti-inflammatory activity:** In an *in vitro* study, MSM displayed anti-inflammatory activity by inhibiting the oxidative function of stimulated neutrophils ([4](#)).
- **Antioxidant activity:** In an *in vitro* study, MSM displayed antioxidant activity by inhibiting the oxidative function of stimulated neutrophils ([4](#)).

Pharmacodynamics/Kinetics:

- **Distribution:** MSM crosses the blood brain barrier and is distributed throughout the brain and brainstem with equal concentrations in gray and white matter ([6](#)).
- **Metabolism and excretion:** A study with Rhesus monkeys on the metabolism and excretion of DMSO and DMSO₂ found both were detectable in serum two hours after ingestion ([7](#)). DMSO₂ reached steady state after four days of treatment and was cleared from the blood approximately 120 hours after DMSO administration was stopped. Half-life was calculated to be 38 hours. DMSO and DMSO₂ were excreted in urine and neither was detected in the feces. It was concluded that absorption is similar to humans, but conversion to DMSO₂ and urinary elimination is more rapid in monkeys.

HISTORY

- Methylsulfonylmethane was isolated by Robert Herschler and Stanley Jacob in the 1980s. Research demonstrated that MSM is a natural sulfur compound found in vegetables, fruits, grains and other living organisms, including humans. MSM is also found in milk, meat, and fish; however, it is lost from food by heating, storage, and processing.
- After the 1999 Oscars, actor James Coburn credited a regimen of deep tissue massage, electromagnetic treatments, and MSM with "curing" his arthritis.

EVIDENCE TABLE

Condition	Study Design	Author, Year	N	Statistically Significant?	Quality of Study 0-2=poor 3-4=good 5=excellent	Magnitude of Benefit	ARR	NNT	Comments
Allergic rhinitis	Non-randomized, open study	Barrager, 2002	55	No	1	NA	NA	NA	OptiMSM® 2,600mg for 30 days. Respiratory improvements seen were maintained through the 30-day visit.
Osteoarthritis	Randomized, placebo controlled, double-blind, parallel trial	Usha, 2004	118	Yes	5	Small	NA	NA	MSM 500mg vs. glucosamine 500mg vs. MSM 500mg and glucosamine 500mg vs. placebo daily for 12 weeks. Significant improvement in pain and swelling index in combination group of glucosamine and MSM.

EVIDENCE DISCUSSION

Allergic rhinitis

- Summary:** According to a preliminary clinical study, MSM reduces symptoms associated with seasonal allergic rhinitis (SAR). However, larger, randomized, double-blind, placebo controlled trials need to be conducted to confirm these findings.
- Evidence:** Barrager et al. conducted a multi-center, open label study in 55 patients with SAR receiving 2,600 mg MSM (OptiMSM® 650mg) for 30 days ([1](#)). By day 7, both upper and total respiratory symptoms significantly improved, and by day 14 energy levels increased significantly. Day 7 upper and total respiratory symptoms were reduced significantly from baseline ($p < 0.01$ and $p < 0.005$). Lower respiratory symptoms were significantly improved from baseline by week 3 ($p < 0.001$). All respiratory improvements were maintained through the 30-day visit. Energy levels increased significantly by day 14 ($p < 0.0001$); this increase continued through day 30. No significant changes were observed in plasma IgE or histamine levels. MSM was well tolerated. According to this study, MSM 2,600mg daily for 30 days may be efficacious in reducing symptoms of SAR but more data is needed to validate these results.

Osteoarthritis

- Summary:** In one preliminary human study, MSM was used in the treatment of osteoarthritis alone and in combination with glucosamine. The combination may provide pain relief and reduction in inflammation. Further studies on MSM and its effects on patients with osteoarthritis are warranted.
- Evidence:** Usha et al. conducted a randomized, double-blind, placebo controlled study of 118 patients with mild to moderate osteoarthritis ([2](#)). Patients were treated three times daily with 500mg of glucosamine and placebo, 500mg of MSM and placebo, glucosamine 500mg and MSM 500mg, or both placebos for 12 weeks. Glucosamine, MSM, and the combination produced a significant ($p < 0.05$) analgesic and anti-inflammatory effect in osteoarthritis. Combination therapy showed better efficacy in reducing pain, swelling, and overall functions of the joints than individual agents. All treatments were well tolerated.

PRODUCTS STUDIED

Brands used in clinical trials:

- OptiMSM® 650mg (Cardinal Nutrition, Vancouver WA) ([1](#)).

Brands shown to contain claimed ingredients through third-party testing:

- **Consumer Lab:** NA. Last accessed 4/10/07.
- **Consumer Reports:** NA. Last accessed 4/10/07.
- **NSF International:** Move Free® Advanced Plus MSM; Schiff Nutrition International, Inc. Glucosamine HCl Plus MSM. Last accessed 4/10/07.
- **U.S. Pharmacopoeia:** Kirkland® Glucosamine with MSM; Your Life® MSM 1500mg. Last accessed 4/10/07.

U.S. equivalents of most commonly recommended European brands:

- Not applicable.

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