

Methylsulfonylmethane – MSM
A Current Literature Review of reported
Animal and Human Studies

Methylsulfonylmethane, known commonly as MSM, is a metabolite of DMSO (dimethylsulfoxide) found within nature. Conversion to MSM from DMSO is accomplished enzymatically. Much of the information regarding the efficacy of MSM is an anecdotal form. This paper will review available scientific information on this product, including background, chemical activity, dosage and toxicity levels, and currently known applications.

Background

Dimethyl sulfoxide (DMSO) is known to be a self-solvent and an active carrier, crossing membranes without damage.⁶ Found extensively in nature, DMSO has analgesic properties, works as an anti-inflammatory, stimulates synthesis of growth hormone and also has a bacteriostatic effect.¹⁷ The major drawback to all of this is the associated strong odor, along with the resultant foul breath and skin irritation that result from even mild exposure to DMSO.

Methylsulfonylmethane (MSM), a stable metabolite of DMSO, presents a dramatic improvement over what had previously been available. MSM is an odourless, virtually tasteless, white crystalline substance. The key portion of proteins. One of the essential components in all life forms, sulphur is involved in amino acid production, connective tissue, skin, hair and nails, (in animals, hide and hooves,) enzymes, hormones and immunoglobulins. 4MSM, which contains 34 % bio-available sulphur by weight, is found naturally in many foods (fresh meat, fish, milk, various vegetables and plants), but is volatile and lost with even the mildest processing. For example, this was noted in animal diets because MSM is present in measurable quantities in alfalfa, a legume forage for animals, but it is almost non-detectable in dried hay. 5,13 Similar deficiencies are noted in most processed foods for humans.

In addressing the possibility of sulphur deficiencies, methionine, another bio-available sulphur source, is likely used by the body as a back-up mechanism in an MSM or sulphur-deficient situation. 5 The major difference between suggesting supplementation with methionine or MSM is that methionine has well-defined toxicity levels, while MSM has been compared to water regarding toxic levels. This will be discussed further along in this paper.

MSM has been tested in trials with laboratory rats for its effectiveness against various parasitic infections. Given feed and water ad lib, both containing 2 % by weight MSM, fecal samples carrying pinworms showed clear in 17 days.⁵ Tissues were seen to return to normal, likely due to the binding action on MSM, creating a blocking surface on the soft tissues. 5,6

Applications

Based on the review of numerous animal studies and anecdotal reports, the following potential applications have been indentified:

- Improvement of osteoarthritic conditions – general improvement is seen In overall joint mobility^{3,16,19}
- Reduction of lung dysfunction – without the drawback of immune suppression as found with steroids.^{8,18}
- Moderation of allergic response – reduced negative response to inhaled allergens^{5,6}
- Control of hyperacidity – many performance horses are thought to suffer from some degree of acid-induced ulceration's as a result high carbohydrate diets. MSM appears to bind with the mucous membranes, creating a paint-like coating⁵
- Anti-parasitic action – control of infections of the intestinal and urinogenital tracts⁵
- Active against physiological responses to stress – gastrointestinal distress, inflammation of mucous membranes, allergic reactions⁵
- Regulation of immune function – possible health maintenance benefits, reducing the use of therapeutic drugs^{1,2,4,14}
- Increased growth hormones – treatment of Developmental Orthopedic disease, such as epophysitis^{5,15,18}

Discussion

MSM is a unique substance with properties that have yet to be fully indentified. Its position as a dietary supplement is comparable to that of identified vitamins. What is needed is the further study of the effects of MSM in qualifiable and quantifiable manner. There are a number of beneficial research trials that are possible with the major areas of identification being arthritic, immune and respiratory applications.

MSM has been found to be non-toxic as a dilutent for blood.⁵ LD-50 has been determined in rates, and is in excess of 20 g/kg BW/d.¹⁰ This is in comparison to NaCl, or common salt (generally given in ad lib amounts) which has an LD-50 of 2.5 g/kg BW/d. No toxicity was reported in dogs receiving 3 g/kg BW/d over a period of 30 days, administered both orally and intravenously, although there was a drop in hematocrit during the later stages of the IV study.¹⁰ This drop returned to normal in the post-treatment period.

Maintenance levels of MSM have been determined to be as low as 0.5-1.0 mg/kg BW/daily in man.⁵ Dosage has not been determined for therapeutic applications. In the animal studies, dosage levels varied widely. It was demonstrated that supplementation prior to high stress periods (such as transportation of chickens and calves) produced beneficial results. MSM was supplemented in the range of 1-5 mg/kg BW/d for a period of 2-4 weeks prior to exposure.⁵ MSM has also been used very extensively with horses with beneficial results. Although there have been no definitive dosages determined for horses, maintenance estimates are calculated based on a 500kg horse eating fresh forage. Daily intake in this situation is estimated a 1-2 mg/kg BW/d for maintenance, or 0.15 % to 0.17 % of the total ration.

Other animal studies in mice have demonstrated remarkable experimental responses to the administration of MSM. MSM was given daily, via the drinking water, at a rate of 6-8 g/kg BW/d to auto-immune prone mice. All of the mice showed decreases in development of anemia, lymphadenopathy and antinuclear antibodies.⁴ There was also a marked lifespan extension (to 10 months versus 5.5 month in the control group).⁴ In trials conducted on Humans, there was increased titers of primary IgM and secondary IgG.⁵

Other anecdotal animal studies are also revealing. A mare suffering from Pleuritis showed no response over six weeks to conventional antibiotics and anti-inflammatory medications. The mare was placed on 24 g of MSM, administered twice daily for a period of five days. Response was dramatic, in that by the fifth day, the animal no longer exhibited shallow, rapid breathing and upon auscultation of the chest, was deemed normal. 5

Similar non-scientific field trials in have noted dramatic improvements in poor hoof quality in horses that were not allowed to forage on fresh hay. The amount needed to improve hoof quality is in the range of 2.5-10 g/d.5 Further work needs to be carried out in order to determine correct dosage levels for therapeutic treatments.

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