

The Use Of L-Arginine in Male Reproductive Abnormalities: An Educational Article and Expert Opinion

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Abstract

Dietary health supplements have been increasingly used in the treatment of a variety of conditions. During the previous decades, L-arginine has been reported to have beneficial effects on male reproductive functions. Arginine is an amino acid that is important for being a precursor for the synthesis of nitric oxide, and playing a role in the regulation of blood pressure. The aim of this paper is to review L-arginine research findings relevant to its use in male reproductive abnormalities.

Keywords: reproductive abnormalities; mesterolone; spermatozoa

Introduction

Dietary health supplements have been increasingly used in the treatment of a variety of conditions. During the previous decades, L-arginine has been reported to have beneficial effects on male reproductive functions. Arginine is an amino acid that is important for being a precursor for the synthesis of nitric oxide, and playing a role in the regulation of blood pressure. The aim of this paper is to review L-arginine research findings relevant to its use in male reproductive abnormalities.

Conclusion and expert opinion: A variety of agents have been used in the treatment of poor semen quality of unknown etiology (Idiopathic) with a beneficial effect including mesterolone, zinc sulphate, coenzyme Q10, vitamin E, folic acid, pentoxifylline, and L-carnitine. A beneficial effect of arginine on oligospermia has been suggested as early as 1947. There is convincing research evidence suggesting that L-arginine can improve male reproductive abnormalities and can be useful in the treatment of some forms male infertility and erectile dysfunction. The addition of a safe therapeutic supplement to the already known therapeutic armamentarium is desirable. The current evidence-based opinion suggests that because L-arginine is safe and can be beneficial when used in patients with male reproductive abnormalities, to be aware of such potentially important therapy. The use of health supplements in the treatment of variety of conditions has been increasingly suggested [1-6].

Arginine is an amino acid that is important for being a precursor for the production of nitric oxide, and for playing a role in the regulation of blood pressure, and it has been increasingly used as a health supplement for having beneficial effects in a variety of conditions. L-arginine has been recognized as safe (GRAS-status) when taken in an oral dose of up to 20 g daily [7, 8].

In 1886, Ernst Schulze (Figure-1A) and Ernst Steiger reported the isolation of arginine from yellow lupin seedlings and they called it arginine after “argyrols”, a Greek word means silver, because of the silver-white color of arginine nitrate crystals [9]. In 1897, Ernst Schulze and Ernst Winterstein (Figure-1B) clarified the structure of arginine, and in 1899, they synthesized it from ornithine and cyanamide [10, 11].

A beneficial effect of arginine on oligospermia has been suggested as early as 1947 [12, 13, 14]. During the 1950s and 1960s, several authors including Giarola and Ballerio in 1959, and Pazzaglia and Poggio in 1965 reported the use of arginine in treatment of seminal deficiency [14, 15]. In 1967, Bernard reported the treatment of oligo-asthenospermia with arginine [16]. In 1975, Keller and Polakoski reported that L-arginine can stimulate human sperm motility in vitro [17].

In 1979, Papp et al reported a study which included 40 patients who had normal semen count, oligospermia or azospermia. Low arginine content was found in patients with oligospermia and azospermia, and was attributed to higher arginase activity and to higher conversion of arginine to Guanidinoacetic acid [18].

In 1993, Méndez and Hernández emphasized that L-arginine is the precursor of the polyamine's putrescine, spermidine and spermine which are important in the initiation of the sperm motility processes [19].

In 1994, Scibona et al reported 40 infertile male patients who had a spermatozoa count of more than 20 million/ milliliter (Normal count more than 15 million sperm per milliliter or more than 39 million sperm per ejaculate), but a reduced sperm motility that was not related to infection or to immune disorders. The patients were treated with oral L-arginine (80 ml

of 10%) daily for six months. Treatment was associated with improved sperm motility without any side-effects [20].

In 1995, Aydin and colleagues reported the treatment of 15 patients who had oligospermia and asthenospermia with L-arginine for at least 12 weeks, and three pregnancies were achieved [21].

In 1999, Chen et al reported a placebo-controlled study which included fifty patients with organic erectile dysfunction. 29 patients received oral L-arginine, 5 grams daily, and 21 patients received placebo. Nine (31%) of the patients who received L-arginine, and two of 17 patients who received placebo experienced marked subjective improvement in their sexual function. The beneficial effect of L-arginine was attributed to improved nitric oxide production [22].

In 2022, Menafra et al reported a placebo-controlled study which included 98 patients who had erectile dysfunction attributed to vasculogenic causes. 51 patients received oral L-arginine, 6 grams daily for three months, and 47 patients received placebo. Treatment with L-arginine was associated with marked improvement in erectile dysfunction [23].

Male reproductive abnormalities with poor semen quality (Count and motility) have sometimes been attributed to epididymo-prostato-vesiculitis which can be recognized generally by finding 5 or more pus cells (White blood cells) per high power field in the semen. Epididymo-prostato-vesiculitis associated with associated with poor semen quality is generally treated with antibiotics such as minocycline and norfloxacin [24, 25, 26].

A variety of agents have been used in the treatment of poor semen quality of unknown etiology (Idiopathic) with a beneficial effect, including mesterolone, zinc sulphate, coenzyme Q10, vitamin E, folic acid, pentoxifylline, and L-carnitine [27-33].

Conclusion and expert opinion

The addition of a safe therapeutic supplement to the already known therapeutic *armamentarium* is desirable. The current evidence-based opinion suggests that because L-arginine is safe and can be beneficial when used in patients with male reproductive abnormalities, it is important for physicians treating patients with male reproductive abnormalities to be aware of such potentially important therapy.

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