

***Lepidium meyenii* (Maca) improved semen parameters in adult men**

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Abstract

Aim: The present study was designed to determine the effect of a 4 month oral treatment with tablets of *Lepidium meyenii* (Maca) on seminal analysis in nine adult normal men aged 24-44 years old.

Methods: Nine men received tablets of Maca (1500 or 3000 mg/day) for 4 months. Seminal analysis was performed according to guidelines of the World Health Organization (WHO). Serum luteinizing hormone (LH), follicle stimulating hormone (FSH), prolactin (PRL), testosterone (T) and estradiol (E₂) were measured before and after treatment. **Results:** Treatment with Maca resulted in increased seminal volume, sperm count per ejaculum, motile sperm count, and sperm motility. Serum hormone levels were not modified with Maca treatment. Increase of sperm count was not related to dose of Maca. **Conclusion:** Maca improved sperm production and sperm motility by mechanisms not related to LH, FSH, PRL, T and E₂.

1 Introduction

Maca is the root of a Peruvian plant *Lepidium meyenii* (Brassicaceae), growing in the Central Andean Region of Peru between 4000 and 4500 m altitude, mainly in Junin and Cerro de Pasco. This species is described in the catalogue of the flowering plants and gymnosperms of Peru^[1]. Maca is traditionally employed, among others, to improve sexuality and fertility. Oral administration of Maca significantly improved the sexual behavior in male rats and mice^[2,3]. More recently, it has been demonstrated that Maca improves spermatogenesis in male rats^[4], however, its effect on sperm production in men has not been assessed. The present investigation was designed to study the effect of oral administration of Maca on the semen parameters and serum luteinizing hormone (LH), follicle stimulating hormone (FSH), prolactin (PRL), testosterone (T) and estradiol (E₂) levels in normal male volunteers.

2 Materials and methods

2.1 Maca

Maca (Maca Gelatinizada La Molina) tablets were provided by the Laboratorios Hersil (Lima, Peru). Each tablet contains 500 mg of the root. This product could be purchased in the pharmacy as a nutrient.

2.2 Subjects and treatment

Twelve healthy men, 24-44 years of age, were recruited in the study, but 3 dropped out due to personal reasons during the 4 month treatment period. They had not received any kind of medical treatment for at least 3 months before the study. All the subjects gave written consent to participate in the study after being informed of the purpose, benefit and possible risks of the study. Among the 9 men with complete data, 6 were married and 3, single. Semen samples were collected by masturbation after a 3 day abstinence and fasting blood samples obtained between 08.00-09.00 h before and at the end of the treatment. Sera were kept frozen until hormone assay. Six subjects received 1500 mg/day, whereas 3, 3000 mg/day of Maca for 4 months. The study was approved by

the Institutional Review Board of the Scientific Research Office, at the Universidad Peruana Cayetano Heredia.

2.3 Semen analysis

The ejaculate volume, semen consistency, sperm motility, sperm morphology and sperm concentration were assessed according to the WHO manual^[5]. Spermatozoa were graded “a” (rapid progressive motility), “b” (slow or sluggish progressive motility), “c” (nonprogressive motility), or “d” (immotility) as recommended by the manual.

2.4 Hormone assay

LH, FSH, and PRL were measured by immunoradiometric assay (IRMA), whereas T and E₂ were measured by radioimmunoassay using commercial kits (Diagnostic Product Co, California).

2.5 Statistical analysis

Data were expressed in mean±SEM, if applicable. Statistical analysis was performed by the Student’s *t*-test. The difference was considered significant when P<0.05.

3 Results

Data on semen analysis are presented in Table 1. The semen volume, total sperm count, motile sperm count, and sperm motility (Grades a+b) were significantly increased after treatment with Maca (P<0.05). Motility Grade a sperm was also increased, but statistically insignificant. There were no significant differences between the two dosage levels of Maca used. In 4 of the 9 subjects, who had low basal serum FSH levels, the sperm count was not increased after Maca treatment. Maca treatment did not significantly change the levels of the hormones assayed (Table 2).

Table 1

Semen variable	Pre-Maca (n=9)	Post-Maca (n=9)	P value
Volume (mL)	2.23±0.28	2.91±0.28	<0.05
pH	7.47±0.09	7.44±0.07	NS
Sperm count (10 ⁶ /mL)	67.06±18.61	90.33±20.46	NS
Total sperm count(10 ⁶ /mL)	140.95±31.05	259.29±68.17	<0.05
Motile sperm count (10 ⁶ /mL)	87.72±19.87	183.16±47.84	<0.05
Sperm motility grade a (%)	29.00±5.44	33.65±3.05	NS
Sperm motility grade a+b (%)	62.11±3.64	71.02±2.86	<0.05
Normal sperm morphology (%)	75.50±2.02	76.90±1.23	NS

Table 2

Hormones	Pre-Maca (n=9)	Post-Maca (n=9)	P value
FSH (mIU/mL)	4.30±1.00	3.51±0.83	NS
LH (mIU/mL)	6.05±0.69	4.76±0.68	NS
PRL (ng/mL)	14.41±2.74	13.00±1.51	NS
T (ng/mL)	6.53±0.81	5.34±0.38	NS
E ₂ (pg/mL)	32.63±4.46	41.53±6.52	NS

4 Discussion

Semen volume resulted from the contributions of seminal vesicles (60%), prostate (30%) and epididymis(10%)^[6]. All these glands are androgen dependent^[7]. Sperm motility was also androgen dependent^[6]. Maca treatment was able to increase both the semen volume and sperm motility. However, we failed to find any increase in serum testosterone levels during Maca treatment, which may suggest that either bioavailable testosterone or testosterone receptor binding might be augmented.

Another possibility is that Maca may act without the participation of androgen mechanism. This seems to be supported by the fact that the weight of seminal vesicle, a target for androgen action, was not influenced by Maca in adult male rats^[4].

In adult male rats, Maca has been shown to be beneficial to spermatogenesis^[4]. In the present study, sperm count was increased by Maca without affecting the FSH level. It is possible that Maca may improve the response of Sertoli cells to FSH. We have demonstrated in women that oral administration of Maca for 2 weeks resulted in an increase in the size of the dominant follicles (unpublished data), which also suggested that Maca may improve the response to FSH. Further studies will be required to clarify this issue. In conclusion, Maca administration as tablets may improve sperm production and sperm motility.

References

- [1] Brako L, Zarucchi JL. Catalogue of the Flowering Plants and Gymnosperms of Peru. St Louis: Missouri Botanical Garden; 1993. p 229.
- [2] Zheng BL, He K, Kim CH, Rogers L, Shao Y, Huang ZY, et al. Effect of lipidic extract from *Lepidium meyenii* on sexual behavior in mice and rats. *Urology* 2000; 55: 598-602.
- [3] Cicero AF, Bandieri E, Arletti R. *Lepidium meyenii* Walp improves sexual behaviour in male rats independently from its action on spontaneous locomotor activity. *J Ethnopharmacol* 2001; 75: 225-9.
- [4] Gonzales GF, Ruiz A, Gonzales C, Villegas L, Córdova A. Effect of *Lepidium meyenii* (Maca) rotos, a Peruvian plant on spermatogenesis of male rats. *Asian J Androl* 2001; 3:231-3.
- [5] World Health Organization. WHO laboratory manual for the examination of human semen and sperm cervical mucus interaction. 4th ed. Cambridge: Cambridge University Press; 1999. p 1-10.
- [6] Gonzales GF. Functional structure and ultra structure of seminal vesicles. *Arch Androl* 1988; 22: 1-13.
- [7] Gonzales GF. A test for bioandrogenicity in men attending an infertility service. *Arch Androl* 1988; 21: 135-42.