

Systematic Review On The Use Of Maca (*Lepidium Meyenii*) In Sexual Dysfunction

Alexander Oswaldo Ojeda Crespo Md-Mgs^{1*}, Alexander Xavier Ojeda Cedillo Md²
Dr. Peter Oswaldo Ojeda Cedillo Md³, Dra. Mercedes Elizabeth Sánchez López Md⁴

^{1*}Teacher - Researcher ,
Technical University of Machala, Ecuador.

^{2,3,4}Doctors,
The Ministry Of Public Health, Ecuador.

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ABSTRACT

Introduction: Sexual health is defined as the complete state of physical, emotional and social well-being, related to sexuality. The Maca (*Lepidium Meyenii*), a product originating in the Central Andes of Peru (Junín), resistant to hail, frost and prolonged droughts, which is located in high plateaus, the same that is consumed in the food and beverage, by its nutritional content and for its antioxidant properties, anticancer and as a treatment in the sexual dysfunction. Among the chemical components of maca, that are related to the therapeutic action in the improvement of the sexual health and fertility, are: the fitoestnoles, phytosterols, phytestrogens, polyphenols, alkaloids (lepididinas A and B, macaridina), fatty acids (makaeno) and the amides (macamididas). **Objective:** To evaluate the efficacy of Maca for treatment of sexual dysfunction in both men and women. **Materials and methods:** databases of PubMed / MEDLINE were consulted, and the Cochrane Controlled Trials Register, as well as additional resources such as Scielo seekers and Google Scholar. Randomized clinical trials studying the use of maca as a treatment for sexual health, comparative studies of treatment of sexual dysfunction and systematic reviews of the benefits of maca were identified. 20 studies were included, which have low risk of bias and high methodological quality. **Results:** The results demonstrate that Maca has high effectiveness in improving sexual function, increasing libido and improving erectile dysfunction; also helps reproductive health, increasing sperm count and sperm motility, enhances the anticancer action, favorable effects on menopause symptoms and improves inflammatory responses. **Conclusions:** Despite the effectiveness of maca use is limited by not providing a proper pharmacovigilance. Evidence has shown reduced sexual dysfunctions in men and women.

Keywords: Sexual Dysfunction, Maca, Men and women, Treatment, Efficiency.

Introduction

Sexual health is defines as the full state of well-being physical, emotional and social, related with the sexuality, by that, sexual health is not only the absence of disease, dysfunction or disability sexual, but a right of the human being that must be respected and protected. (World Health Organization, 2016) Maca (*Lepidium Meyennii*), a product originating in the Central Andes of Peru, resistant to hail, Frost, and prolonged droughts, which is located in the high plateaus, mainly in the mountains of Peru, (Junín). (Sifuentes, 2015) Maca is cultivated from the Inca time at altitudes ranging between 3800 to 4500 meters, which is consumed in foods and beverages, nutritional content are: proteins, sugars, starch, Glucosinolates, fatty acids, amino acids, microelements such as tantinos and saponins and essential minerals like iron and iodine. (Chauhan *et al.*, 2014) The composition of dried powdered maca root, is composed of: 23.4% sucrose, 1.55% of glucose, 4.56% of oligosaccharides and 30.4% of polysaccharides (Dini *et al.*, 1994;) Valentova *et al.*, 2006; Wang *et al.*, 2007). There are 18 or 19 amino acids in maca root, emphasizing that 7 of them are essential, and its content is higher than in the potatoes and carrots. The content of unsaturated, such as linoleic and oleic fatty acids is of 52.7% to 60,3% of total fatty acids (Dini *et al.*, 1994;) Wang *et al.*, 2007). The minerals found by 100 g of matter dry of maca include: calcium 247 mg, phosphorus 183 mg and iron 14.7 mg (Garcia *et al.*, 2009).

Maca is consumed not only by their nutritional intake in the diet, but also for its antioxidant, anti-cancer properties, and as a treatment in sexual dysfunction, in both men and women (Ernst, Posadzki and Lee, 2011).

Sexual dysfunction is define as any problem in the human sexual response (wish, excitation and orgasm) that usually prevent the development of full erection, affecting the integral health and self esteem of the individual, as well as couple relationship (Amssac.org, 2016).

The treatment of sexual dysfunction in men and women, including from drugs to complementary medicine (Sanchez-Borrego *et al.*, 2014).

There are numerous studies on sexual dysfunction and the use of maca as an adjunctive treatment, as well, as the use of different treatments for sexual dysfunction, including herbs and drugs (Dording *et al.*, 2015).

In recent years attempts have been made to the maca a value-added and many people in the world are opting for consumption since it is a toner and a powerful revitalizer (Hermann and Bernet, 2009).

The chemical constituents of maca, which are related to the therapeutic action in improving sexual health and fertility, include: the fitoestnoles, polyphenols, phytosterols, Phytoestrogens, alkaloids (lepididinas A and B, macaridina),

fatty acids (makaeno) and amides (macamides). (Gonzales, 2012).

This review provides an overview of Maca and its active molecules with demands for improvement in the sexual conduct within the complementary alternative medicine.

Objective

The aim of this systematic review was to assess the effectiveness of Maca as a treatment for sexual dysfunction, in both men and women.

Materials and methods

This systematic review of literature was reported in accordance with the guidelines described in the PRISMA statement and the Cochrane Handbook for systematic reviews of interventions driving, understood as "the meeting of empirical evidence that meets eligibility criteria previously established, in order to answer a specific research question" (Higgins JP, 2015).

Search strategy

The search was conducted in databases such as PubMed, Google Scholar, and Cochrane, from June Junio 01 to July 15, 2016, for the development of sensitive and specific searches in the collection of clinical trials. In addition, this research

included longitudinal descriptive studies, clinical trials randomised trials, systematic reviews and meta-analyses.

Selection criteria

Once completed, the review of the search studies were evaluated independently, the eligibility of all retrieved studies from compliance with the selection criteria, which were established in accordance with the study, design and application of study, participants, intervention, measurement results, and comparisons, (See table 1).

The process of search and selection of the articles featured stages that allowed authors to select the 20 articles of the present review, where identification of 60 studies were exclusively found in databases of which 10 were duplicated scientific texts.

For the second stage, when the screening was conducted in title and summary, a total of 25 were dispensed for failing to meet the criteria for selection proposed (table 1.)

In the third stage of eligibility compliance fully of the selection criteria from the reading of the full text is sought: again excluded 5 items, setting up the fourth and last stage of inclusion, 20 scientific articles with which this study is being conducted.

Table 1: Criteria for selection

<p>Design Systematic Reviews and trials controlled randomized.</p> <p>Participating Adult Men and women and older adults with sexual dysfunction (20-64 years).</p> <p>Intervention The use of maca in participants with sexual dysfunction.</p> <p>Results measurement Analysis of clinical studies Software Chi-square statistics. International index of erectile 5 function (IIEF - 5).</p> <p>Comparisons Conventional treatment with herbal aphrodisiacs.</p>
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Source: Dr. Alexander Ojeda Crespo (2016)

Inclusion and Exclusion criteria

In the realization of this systematic review, the following inclusion criteria were used: design: systematic reviews and trials randomised; Participants: Adult Men and women and older adults with sexual dysfunction (20-64 years); Intervention: the use the maca in participate with sexual dysfunction; Results measurement: analysis of clinical studies, software Chi-square statistic. International index of erectile function-5 (IIEF - 5); and comparisons: conventional treatment with herbal aphrodisiacs.

Exclusion criteria have: men and women younger than 20 years old, and adults and seniors without sexual dysfunction. Studies that do not meet the criteria described in table 1.

Ethical considerations

This study follow the provisions established in the Declaration of Helsinki and approved by the respective committees on

ethics, in which the patient signed the consent form. (Figure 1.)

Data extraction

In this paragraph, 3 authors were in form independently of the process of extraction of data. The data extracted are: authors, year of publication, study design, characteristics of the interventions, age of the patients. However, the authors considered as a limitation of the study under 20 years and discrimination studies on animals.

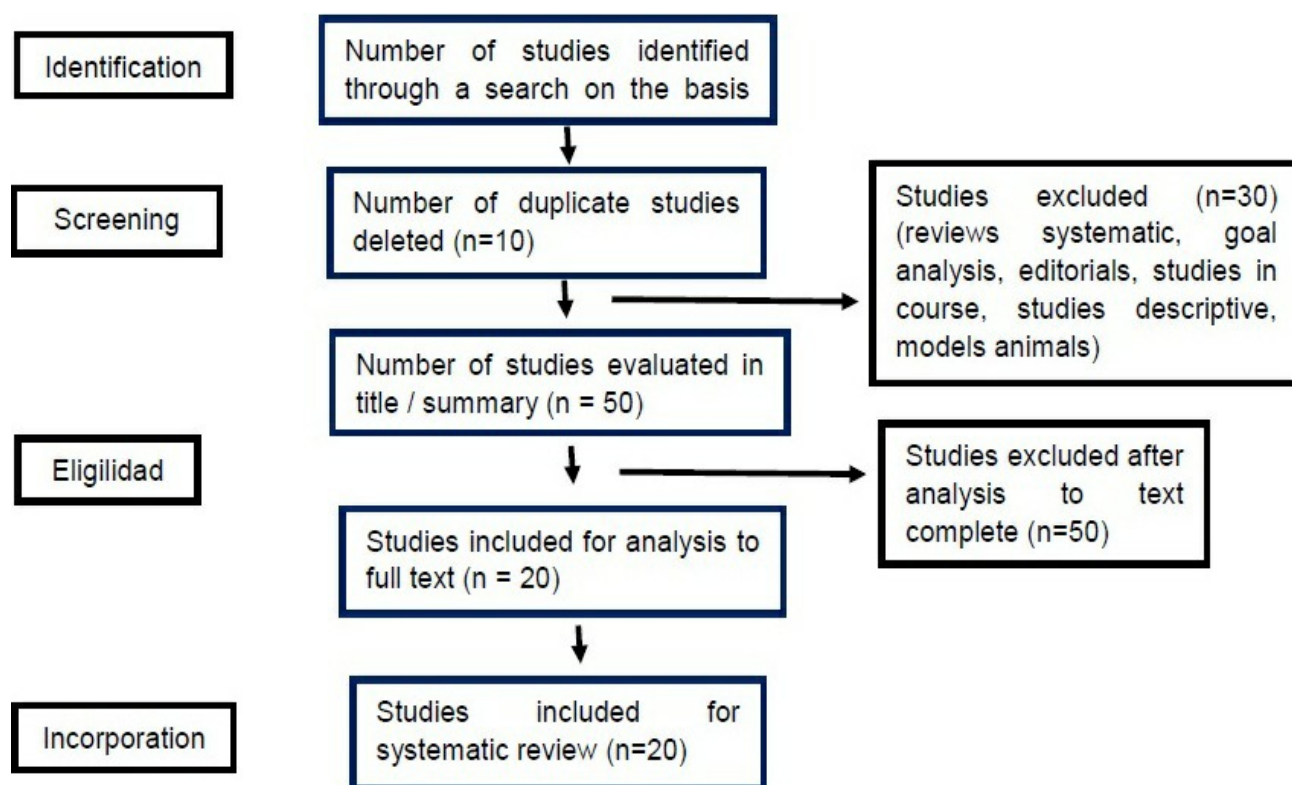


Figure 1.

Source: Own elaboration with provisions laid down in the Declaration of Helsinki

Results

Characteristics of included studies

Of 20 items, provided valid estimates for the model of meta-analysis, the evaluation was conducted in 3 clinical studies and 17 systematic reviews. The average publication year was 2014. Most of the studies were carried out in Asia and America (Table 2).

Results of the studies

The trials were: double-blind, randomized; in a study of Asian origin on the effects of *Lepidium Meyenii Walp* in the semen and hormone levels in serum from blood in healthy older men involved, 20 volunteers aged 20-40 years were study for 6 to 12 weeks of which 2 men were diagnosed with *oligozoospermia* during the study. Therefore, they were not included in the trial.

Of the 18 remaining volunteers, 7 consumed 11 maca and placebo, this active management of gelatinized maca given in powder form (gelatin capsules enterosolvent 350 mg of maca in each capsule) with a dose of 5 capsules per day which is equivalent to 3 grams daily increase was observed as the final result after 12 weeks of treatment a statistically significant concentration of spermatozoa in 55% and 84% motile sperm count (Cheorl-Ho Kim 2016).

In the study of the safety and efficacy of dietary supplements in Japan, were given six tablets containing 200 mg of Ginseng extract of Meyer, 250 mg *l. meyenii* (maca), 250 mg of extract yeast (0.2% of polyamine) root, extract 250 mg of egg white peptide, *M. pruriens* extract 150 mg, 150 mg ginger extract black 125 mg of polyphenols (ViNitrox), 50 mg of L-arginine, 50 mg L-carnitine fumarate, 30 mg Coenzyme Q10, 10 mg Datocofeol, 10 mg of black pepper extract, and 2.5 mg of zinc.

With placebo containing functional foods were two trials, where in the first study of 15 participants with consent informed, with the supplement diet and the second study of 14 participants (randomized, double placebo (blind) of 8 weeks found that the level of testosterone free in serum and the testosterone total level did not changed in any of the groups during the study.

It was determined that thanks to supplement dietary aphrodisiac, showed an improvement in the IIEF-5 (international index of erectile function 5) and a higher level of serum free testosterone after 8 weeks of the intervention (Kamohara, 2014).

The concentration of Sera IL-6 levels increased during exposure to the heights, according to the analysis of the article the role of maca (*Lepidium meyenii*) consumption of serum Interleukin-6 levels and health status of the populations living in the Peruvian Andes for more than 4000 m above sea level.

Sera Il-6 levels were below the range expected in inflammatory diseases. If the levels of IL-6 also increase in the populations of height, then this could affect health status. Inflammatory marker Interleukin-6 (IL-6) is a strong predictor of the emergence of health-related events (Gonzales *et al*, 2014).

These nutritional supplements can delay age-related diseases, maca is the optimal treatment of patients with late-onset Hypogonadism, there is overwhelming evidence that testosterone replacement therapy has many beneficial effects and increases longevity (Comhaire, 2015).

The Ethnobiology and Ethnopharmacology of *Lepidium meyenii* (Maca), a plant of the Peruvian Sierra, was administered in two doses (1.5 g / day and 3-0 g / day) in patients with selective reuptake of serotonin inhibitor (SSRI)

induced sexual dysfunction. Arizona scale (ASEX) sexual experience and the General Hospital of Massachusetts questionnaire of sexual function (MGH-SFQ) were used to measure sexual dysfunction. The subjects on 3.0 g / day maca had a significant improvement in ASEX and MGH-SFQ scores, but subject to 1.5 g / day maca did not (Gonzales, 2013).

Adverse effects

In the Ethnobiology and Ethnopharmacology of *Lepidium meyenii* (Maca), a plant of the Peruvian Sierra, no adverse effects were found in the volunteers using the Silymarin (0.8 g / day), Silymarin + yacon (0.8 + 2.4 g / day), and Silymarin + maca (0.6 + 0.2 g / day).

Table 2: Features of the studies included in the journal systematic and meta-analysis

Database	Design	Study	Participants (n)	Intervention	Measurement of Results
Pubmed (2015)	Randomized clinical trial	Maca as a treatment for sexual dysfunction induced by antidepressants in women.	Experimental group: 55 years (41.5 +- 12.5)	They conducted the study in 45 patients external female with dysfunction induced by ISRZ. 45 of 57 women were assigned to the random 42: (30 premenopausal and 12 postmenopausal women)	Scale of Arizona sexual experience (ASEX) and the questionnaire of sexual function of the Massachusetts General Hospital (MGH-SFQ)
Pubmed (2015)	Randomized clinical trial	Effect of maca in the levels of hormones in the blood and the semen.	Experimental group: 30 years of average (20-40)	Carrying out checks at 6 and 12 weeks of administration of maca. Maca powder dispensed in the gelatin capsules enterosolvent.	Software statistics Chi square.
Cochrane	Two clinical studies Randomized Placebo, double-blind.	The safety and efficacy of a dietary supplement that contains ingredients for functional foods for erectile dysfunction.	Two clinical studies average age of 44.5 years (35 +/-1.9) (43.9 +/-5.5)	The first: 15 participants informed with diet of herbal supplements and the second study consent: 14 participants (randomized, double blind placebo).	Level of testosterone free in serum and the testosterone total not changed in any of those groups. It showed that thanks to the supplement dietary aphrodisiac showed an improvement in the IIEF-5 (international index of function erectile 5).
Cochrane	Systematic comparative review between animals and man.	Maca: Botany of Andes	41 articles.	Study of maca, in the mountains of the Peru, studied its components, properties and analysis of These animals and men.	In men, it enhances the production of semen, and women maca reduces psychological, such as anxiety and depression symptoms dysfunction independent of estrogenic and androgenic activity postmenopausal women.
Cochrane	Systematic review of comparison with other aphrodisiac herbal maca.	Natural aphrodisiacs: a review of selected sexual enhancers.	50 articles: clinical cases and clinical studies of maca and other herbal randomized control.	To what sexual dysfunction were selected, mechanism of action, support data for use both maca and ginkgo, ginseng, tribulus, arginmax, and zestra was analyzed.	Maca benefits to patients as well as selective inhibitors of the reuptake of serotonin, SSRIS; related with low libido and erectile dysfunction, and low libido in women at the menopausal stage.

Table 2: Characteristics of the studies included in the meta-analysis and systematic magazine					
Database	Database	Database	Database	Database	Database
Pubmed	Systematic use shape review of sexual herbal including the maca.	The drug surveillance supplements herbal sexual enhancers.	21 studies of the use of herbal sexual expanded worldwide, use and monitoring.	Study of application and monitoring worldwide of herbal maca.	There is scientific evidence showing that the use of maca improves erectile dysfunction () secondary to conditions such as diabetes, hypertension and aging, despite not receiving a registered pharmaco-vigilance.
Cochrane	Systematic review: assessment multilingual full.	Products sexual of the enhancement to the sale in line: how generate awareness of the effects psychoactive of yohimbine, Maca, Horny Goat Weed, and Ginkgo biloba.	Multilingual evaluation with qualitative and exploratory searches including 203 web sites.	They were identified, an exhaustive search of the literature was conducted using PubMed and PsycInfo. Of these 203 web sites, 106 were considered relevant for this study.	Maca compounds known as MTCA (3S-1-methyl-1, 2, 3,4-tetrahydro-β-carbolina-3-carboxilico) have been suggested to be associated with the behavior, sexual desire, which is common in addictions. Adverse effects were found.
Pubmed	Review systematic	Spanish consensus on sexual health in men and women older than 50 years.	47 articles.	Analysis of the factors that influence sexual health of men and women over the age of 50 in 47 articles.	The use of Maca (<i>Lepidium meyenii</i>) to reduce sexual dysfunction, regardless of the levels of hormones and antidepressants. However, the evidence regarding the use of Maca (<i>Lepidium l.</i>) It is very limited but effective.
Pubmed	Review systematic	The contribution of andrologistas to a better life for the men of advanced age: part 2.	Studies of nutraceuticals.	These supplements nutrition can delay the diseases related with the age. Containing additives that give health and which has medicinal benefits.	The maca to the reduce the IL. 6 improves erectile dysfunction in men.
Pubmed	Cross-sectional observational study	Role of the consumed maca (<i>Lepidium meyenii</i>) on serum levels of Interleukin-6 and State of health of the populations living in the Central Andes of the Peru more than 4000 m above sea level.	Comparative study between 50 subjects of Junín (4100 m): 27 subjects were consumers of maca and 23 were not consumers. (21 men and 29 women) from ages 35-69 years.	27 consumer home of maca, as juice in 96% of cases, due to its nutritional properties (100%), and for its medicinal properties (12%). The time of consuming maca was 25.8 ± 3.2 (mean ± standard error of the mean) years (range 2-55 years).	If the levels of IL-6 also increase in the populations of height, then this could affect sexual dysfunction in men and women with other chronic inflammatory diseases; and State scores were higher in subjects who consumed maca.

Source: Dr. Alexander Ojeda Crespo (2016).

The study of the safety and efficacy of dietary supplements in clinical studies was not reported adverse events in either group at doses of 250 mg of *L. Meyenii* (Kamohara, 2014).

However, in systematic reviews we must stress that these adverse effects that were presented were minimal in relation to other treatments applied.

In a systematic study "products of sexual enhancement for the sale in line: awareness of the psychoactive effects of the yohimbine, the maca, epimedium, and Ginkgo biloba" reported adverse effect is less than the 1% and these were: alteration of the menstrual cycle (modifications of length, anovulatory cycles), painful intestinal cramps, severe gastritis, the increase of blood pressure, changes of humor, increase of heart frequency, insomnia, Depression / anxiety, symptoms of premenstrual syndrome. (Corazza, 2014).

Discussion

Of the 20 articles studied, two articles reported the occurrence of adverse effects and the induction of psychological symptoms, such as changes of humor, anxiety and hallucinations, as well as addictive behaviors, these minor symptoms might be induced by other pharmacological treatment.

In relation to erectile dysfunction, maca has the same effect as the SSRIS serotonin reuptake inhibitors.

Concerning low libido in women of menopausal stage, the maca helps to improve it, due to the phytosterols and Phytoestrogens it has (West *et al.*, 2015).

The randomized clinical trials showed that there are beneficial effects of maca on symptoms of menopause, healthy perimenopause, after early menopause, and final postmenopausal women.

The Maca reduces the psychological symptoms, as well as anxiety and depression, and reduces measures of sexual dysfunction in postmenopausal women independent of the activity estrogenic and androgenic. (Rosales *et al.*, 2015).

It showed that maca improves uniquely hormone luteinizing (HL) and serum levels of pituitary hormones.

The results obtained showed the efficiency of the maca in the sexual dysfunctions, as well as helped to the increase sperm count and their motility.

Conclusion

Study has shown the use of Maca (*Lepidium meyenii*) to reduce sexual dysfunction, regardless of the levels of hormones and antidepressants. However, the evidence with respect to the use of the Maca, is very limited but effective. (Sanchez-Borrego, 2014). Since it gains not only for its benefits in sexual function but also for other diseases and disorders. Being a very energizing plant with nutritional components rich in vitamins, minerals etc. It has also been recommended for women with different hormonal disorders since it acts as a powerful endocrine regulator. The maca is an important food product food that is presented in different sizes and colors, each color representing its composition, which are manganese, calcium, zinc, potassium etc.

Then, within the natural products most widely used in the population, maca is leading the ranking of greatest demand

for natural medicine that is marketed abroad, due to its high effectiveness for erectile dysfunction followed by ginkgo biloba, yohimbine, and giseng.

Recommendations

The use of maca should have a pharmacovigilance in international health statutes, also recommended its application in diabetic people with sexual dysfunction as it has a desinflammatory feature that help improve chronic diseases. It is recommended to take into account the protocols of treatment to women in menopause, the use of maca, as adjunctive therapy to the symptoms associated with this stage of life.

Ethical responsibilities

Protection of people and animals. The authors state that this research experiments was not performed in humans or animals.

Confidentiality of the data

The authors state that patient data do not appear in this article.

Right to privacy and informed consent

The authors state that patient data do not appear in this article.

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Conflict of interest

The authors declare not to have any conflict of interest.

References

1. Bhagavathula, A., Elnour, A. and Shehab, A. (2016). Pharmacovigilance on sexual enhancing herbal supplements. *Saudi Pharmaceutical Journal*, 24(1), pp.115-118.
2. Brooks, N., Wilcox, G., Walker, K., Ashton, J., Cox, M. and Stojanovska, L. (2008). Beneficial effects of *Lepidium meyenii* (Maca) on psychological symptoms and measures of sexual dysfunction in postmenopausal women are not related to estrogen or androgen content. *Menopause*, 15(6), pp.1157-1162.
3. Chauhan, N., Sharma, V., Dixit, V. and Thakur, M. (2014). A Review on Plants Used for Improvement of Sexual Performance and Virility. *BioMed Research International*, 2014, pp.1-19.
4. Cobo-Mejia, e., Prieto-Peralta, M. and Sandoval-Cuellar, C. (2016). Effects of physical activity on the quality of life related to health in adults with systemic hypertension: systematic review and meta-analysis. *Rehabilitation*, 50 (3), pp.139-149.
5. Comhaire, F. and Mahmoud, A. (2015). The andrologist's contribution to a better life for ageing men: part 2. *Andrology*, 48 (1), pp.99-110.
6. Corazza, or., Martinotti, G., Santacroce, R., Chillemi, E., Di Giannantonio, M., Schifano, F. and Celtek, S. (2014). *Sexual Enhancement*
7. Cui, T., Kovell, r., Brooks, D. and Terlecki, r. (2015). A Urologist's Guide to Ingredients Found in Top-Selling Nutraceuticals for Men's Sexual Health. *The Journal of Sexual Medicine*, 12 (11), pp.2105-2117.
8. Dording, C., Schettler, P., Dalton, E., Parkin, S., Walker, R., Fehling, K., Fava, M. and Mischoulon, D. (2015). A Double-Blind Placebo-Controlled Trial of Maca Root as Treatment for Antidepressant-Induced Sexual Dysfunction in Women. *Evidence-Based Complementary and Alternative Medicine*, 2015, pp.1-9.

9. Ernst, e., Posadzki, p. and Lee, M. (2011). Complementary and alternative medicine (CAM) for sexual dysfunction and erectile dysfunction in older men and women: An overview of systematic reviews. *Maturitas*, 70 (1), pp.37-41.
10. Garcia R.M.; Gomez-Sanchez IP; Espinoza B.C.; Bravo West; Ganoza M.L. 2009. Tables Peruvian of composition of food. Lima, Peru
11. Gonzalez, g., Villaorduna, l., Gasco, M., Rubio, j. y González, C. (2014). MACA (*Lepidium meyenii* WALP), a review on its biological properties. *Revista Peruana de Experimental Medicine and public health*, [online] pp.100-10... Available at: http://www.scielo.org/scielo.php?script=sci_arttext&pid=S1726-46342014000100015 [Accessed 16 July 2016].
12. Gonzales, g. (2012). Ethnobiology and Ethnopharmacology of *Lepidium meyenii* (Maca), a Plant from the Peruvian Highlands. *Evidence-Based Complementary and Alternative Medicine*, 2012, pp.1-10.
13. Hajdu, z., Lorantfy, l., Jedlinski, N., Boros, k., Hohmann, j. and Csupor, D. (2015). Quality control of maca-containing (*Lepidium meyenii* Walp.) dietary supplements. *ACTA Alimentaria*, 44 (3), pp.461-467.
14. Hermann, M.; Bernet, T. 2009. The Transition of Maca from Neglect to Market Prominence: Lessons for Improving Use Strategies and Market Chains of Minor Crops. *Agricultural Biodiversity and Livelihoods Discussion Papers 1. Bioversity International*, Rome, Italy.
15. Hsieh, C., Tsai, H., Hsu, g., Chen, C. and Hsu, C. (2015). Herb formula enhances treatment of impotent patients after penile venous stripping: a randomised clinical trials. *Andrology*, p.n/a-n/a.
16. Higgins JP, Green S. (editors). *Cochrane Handbook for Systematic Reviews of Interventions* Version 5.1.0 updated March 2011. The Cochrane Collaboration, 2011 [accessed 15 May 2015]. Available in: www.cochrane-handbook.org
17. Kamohara, S., Kageyama, M., Sunayama, S. and Denpo, k. (2014). Safety and efficacy of a dietary supplement containing functional food ingredients for erectile dysfunction. *Personalized Medicine Universe*, 3, pp.38-41.
18. Melnikovova, i., Fait, T., Kolarova, M., Fernandez, e. and Milella, l. (2015). Effect of *Lepidium meyenii* Walp. on Semen Parameters and Serum Hormone Levels in Healthy Adult Men: A Double-Blind, Randomized, Placebo-Controlled Pilot Study. *Evidence-Based Complementary and Alternative Medicine*, 2015, pp.1-6.
19. World Health Organization. (2016). sexual and reproductive health. [online] Available at: <http://www.who.int/reproductivehealth/es/> [Accessed 13 July 2016].
20. Rosales-Hartshorn, M. (2015). Maca: Botanical Medicine from the Andes. *Advanced in Food Technology and Nutritional Sciences-Open Journal*, 1 (2), pp.e1-e6.
21. Bridges, J. and Hurrell, j. (2016). Plants Andean and their products traded with purposes medicinal and food in the Area Metropolitana Buenos Aires-the silver, Argentina. *Newsletter Latin America and from the Caribbean's plants medicinal and aromatic*, 14 (3), pp.206-236.
22. Rosales-Hartshorn, M. (2015). Maca: Botanical Medicine from the Andes. *Advanced in Food Technology and Nutritional Sciences-Open Journal*, 1 (2), pp.e1-e6.
23. Sánchez Borrego, r., Molero, f., Brown, r., Castelo-Branco, C., Honore, M., jury, a., Laforet, e., Prieto, r., hair, f., Larrazabal, M., Sánchez, f., Florido, j. y Mendoza, N. (2014). Spanish consensus on sexual health in men and women over 50. *Maturitas*, 78 (2), pp.138-145.
24. Sifuentes-Penagos, G., Leon-Vasquez, S. and Paucar-Menacho, L. (2015). Study of the maca (*Lepidium meyenii* Walp), growing Andean with properties therapeutic *Scientia agricultural*, 6 (2), pp.131-140.
25. Valentová, K.; Buckiová, D.; Kren, V.; Peknicová, J.; Ulrichová, J.; Simánek, V. 2006. The in vitro biological activity of *Lepidium meyenii* extracts *Cell Biology and Toxicology* 22: 91–99
26. Wang, Y.; Wang, Y.; McNeil, B.; Harvey, L.M. 2007. Maca: An andean crop with multipharmacological functions. *Food Research International* 40: 783–92.
27. West, E. and Krychman, M. (2015). Natural Aphrodisiacs—A Review of Selected Sexual Enhancers. *Sexual Medicine Reviews*, 3(4), pp.279-288.