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REVIEW

Phytotherapy of Benign Prostatic Hyperplasia. A Minireview

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Benign prostate hyperplasia (BPH) is a common condition affecting older men, with an incidence that is age-dependent. Histological BPH, which typically develops after the age of 40 years, ranges in prevalence from >50% at 60 years to as high as 90% by 85 years of age. Typical symptoms include increased frequency of urination, nocturia, urgency, hesitancy, and weak urine stream. Conventional medicines used for the treatment of BPH include alpha blockers and 5-alpha reductase inhibitors. This articles review the mode of action, the efficacy, and the safety, including herb-drug interactions of the most common botanicals (*Serenoa repens*, *Pygeum africanum*, *Urtica dioica*, and *Cucurbita pepo*) and nutraceuticals (isoflavones, lycopene, selenium, and β-Sitosterol) in controlling the lower urinary tract symptoms associated to BPH. Copyright © 2013 John Wiley & Sons, Ltd.

Keywords: benign prostatic hyperplasia; saw palmetto; pygeum; soy isoflavones; nettle; nutraceuticals; isoflavones; lycopene.

INTRODUCTION

Many organs get smaller with age, but for many men, the prostate gland grows larger. In young men, the prostate gland is about the size of a walnut and weighs about 20 g. It is positioned just below the bladder and in front of the rectum, and the gland surrounds the urethra, which carries urine from the bladder to the penis. Prostate gland secretes a milky, alkaline secretion, which accounts for approximately 14–30% of semen. The secretory function is carried out by epithelial cells of prostate. Sperm contains fibrinolysin and acid phosphatase, two enzymes important in promoting maximum motility of the sperm. The prostate gland is susceptible to infection, enlargement, and benign or malignant tumors. Enlargement of the prostate usually starts in men at about age 40 to 45 years. The initial changes are microscopic and do not ordinarily produce symptoms. With increasing age symptoms occur and more than half of all men develop benign prostatic hyperplasia (BPH), that is the most common benign tumor in men (Wein *et al*., 2011).

Pathological BPH is characterized by an increased number of stromal and epithelial cells. Because the prostate surrounds the urethra, the resulting prostate enlargement can obstruct the flow of the urine, making urination difficult. Signs and symptoms include (i) a frequent urge to urinate, especially during the night; (ii) intermittency; (iii) difficulty starting and maintaining a steady stream of urine; (iv) dribbling of urine after urination; and (v) inability to fully empty the bladder. This variety of symptoms is now called *lower urinary tract symptoms* (LUTS), in preference to BPH (Abrams *et al*., 2013). However, symptoms can improve without treatment, but the usual course is a slow progression of symptoms, with acute urinary retention occurring in 1% to 2% of men whit BPH a year.

The diagnostic process contemplates several steps: prostate-specific antigen analysis, rectal ultrasound, a urine flow study, and a cystoscopy.

The cause of BPH is still unclear, but it may be due in part to hormonal changes within the prostate itself. One theory holds that high levels of dihydrotestosterone (DHT), a male sex hormone, in the prostate gland foster the growth of prostatic cells.

Approaches to the treatment of BPH include the use of conventional and herbal medicines.

CONVENTIONAL MEDICINES

There are a number of medicines for mild to moderate BPH (Table 1). A pharmacological approach is to use α-1-adrenoceptor antagonists, such as doxazosin, prazosin, terazosin, tamsulosin, and alfuzosin (Edwards, 2008). All these drugs improve the dynamic component of urination (activation of bladder smooth muscles) and relieve the symptoms of BPH in about 70% of men. They work by relating the muscles located near the prostate, lessening the annoyance of prostate enlargement. Alpha blockers as a group may be associated with an increase in adverse effects such as dizziness, hypotension, somnolence, or syncope. However, adverse effect varies by individual α-blocker (Nickel *et al*., 2008).

Other drugs largely used as prostatics are dutasteride and finasteride (Edwards and Moore, 2002). These drugs inhibit enzyme 5-α-reductase blocking the conversion of testosterone to DHT, a major growth stimulator of prostate gland.

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Table 1. Medical therapies for benign prostate hyperplasia (Edwards, 2008)

Medication	Dosage	Side effects
Alpha blockers		
Doxazosin	Start at 1 mg daily; maximum 8 mg daily	Risk of orthostatic hypotension, dizziness, sonnolence
Prazosin	Start at 1 mg twice daily; maximum 5 mg three times daily	
Terazosin	Start with 1 mg taken at bedtime; maximum 20 mg taken at bedtime	
Selective alpha blockers		
Alfuzosin	10 mg daily	No effect on resting blood pressure; risk of orthostatic hypotension
Tamsulosin	0.4 mg daily	
5-alpha reductase inhibitors		
Dutasteride	0.5 mg daily	Impotence, erectile dysfunction, reduced libido, etc.
Finasteride	5 mg daily	

Finasteride produces a slow reduction of prostate size and consequently improves urinary symptoms. However, 6 months of treatment is needed to achieve symptom relief. Finasteride can cause several unpleasant side effects, including impotence, erectile dysfunction, reduced libido, and ejaculation problems (Edwards, 2008). Sometimes a surgical reduction of prostate gland is a necessary option.

HERBAL MEDICINES AND NUTRACEUTICALS

Herbal medicines represent nearly half the medications dispensed for treatment of BPH in Italy, compared with 5% for α-adrenergic antagonists and 5% for 5-α-reductase inhibitors. In other European countries (Germany and Austria), phytotherapy is the first-line treatment for mild-to-moderate LUTS and represents about 90% of all drugs prescribed for the treatment of BPH. In the USA, phytoterapies for BPH are above all available as dietary supplements. Nutritional and herbal therapies are also widely accepted in oriental countries. Among the herbal medicines recommended in BPH (Table 2), saw palmetto is perhaps the most important. Controlled clinical studies indicate a strong evidence for the efficacy of saw palmetto and moderate evidence for pygeum and nettle, whereas preliminary studies support the use of all other agents for the treatment of BPH (Table 3). Some nutraceuticals (Table 2) are also supposed to prevent BPH (Kim *et al*., 2012).

BOTANICAL MEDICINES

Saw palmetto. The fruits of *Serenoa repens* (Batram) Smell (=*Sabal serrulata*) (Fam. *Arecaceae*), a shrub-like palm native to the southeastern USA and West Indies, contain fatty acids and their glycerides (oleic, caprilic, myristic, etc.), sterols (e.g., β–Sitosterol, campesterol, and cycloartenol), and sitosterol derivates. Other constituents are organic acid, polysaccharides, flavonoids, volatile oil, and so on (Capasso *et al*., 2003).

Sterols and fatty acids are thought to inhibit enzyme 5-α-reductase blocking the conversion of testosterone to DHT, a major growth stimulator of the prostate gland. But saw palmetto has a number of other possible mechanisms of action that may be beneficial in treating BPH, including blocking the activity of estrogen receptors in the prostate and its antiinflammatory and spasmolytic activities on bladder muscle.

Recently, the effect of saw palmetto (Permixon®) on the expression of inflammation-related genes has been analyzed in primary cell cultures of human prostate carcinoma (Silvestri *et al*., 2013). The inhibitory effects of Permixon® on cell growth could be associated to the down-regulation of inflammatory-related genus and to

Table 2. Herbal medicines and nutraceuticals used for the treatment of benign prostate hyperplasia

Common name	Main mechanisms of action	Daily dosage	Side effects
Nettle	↓ action of sex hormones; ↓ proteolytic enzyme	4–6 g	No serious side effects
Pygeum	↓ 5α-reductase; antiinflammatory activity	10–20 g	Mild and similar in frequency to placebo
Rye grass pollen	↓ 5α-reductase; blockade α_1 receptors, antiinflammatory activity	80–120 mg	N.R.
Saw palmetto	Blockage α_1 receptors; ↓ cell proliferation; ↑ apoptosis; antiinflammatory activity; antioxidant activity	1–2 g	Mild, infrequent, reversible (GI upset, headache, rhinitis, and ↓ libido
Soy isoflavones	↓ 5α-reductase; ↑ activity of antioxidant enzymes; ↓ NF-KB upregulation of apoptosis	25–50 g	N.R.
Lycopene	↓ 5α-reductase; ↓ cell proliferation; ↑ apoptosis; antiinflammatory activity; antioxidant activity	5–10 mg	N.R.
Selenium	↓ cell proliferation; ↑ apoptosis; antiinflammatory activity; antioxidant activity	200 mcg	N.R.
β-Sitosterol	Antiinflammatory activity		GI upset
Pumpkin	DHT reduction; tonic effect on the bladder	10 g	N.R.

↓ inhibition; ↑ activation; GI, gastrointestinal; N.R., not reported; DHT, dihydrotestosterone; NF-KB, nuclear factor-kappa B.
Other constituents of the plants used in treatment of BPH are oenothein B, icaritin, xanthohumol, diarlyheptanoid, 2,6,4′-trihydraxy-4-methoxybenzophenone, emodin, fatty acids, atraric acid, n-butylbenzene-sulfonamide, curbicin, theaflavin-3, 30-digallate, sinalbin, and so on. (Azimi *et al*., 2012).

Table 3. Treatment of benign prostate hyperplasia: summary of systematic reviews

Bibliography	Total no of patients	Comparison (treatment duration)	Comment
Tacklind *et al*. (2012)	582	Saw palmetto vs placebo (72 weeks)	Saw palmetto was not superior to placebo in reducing LUTS or prostate size in men with LUTS consistent with BPH.
Safarinejad (2005)	287	Nettle vs placebo (6 months)	Nettle induced a significant reduction in IPSS, serum PSA and prostate size.
Ghorbanibirgani *et al*. (2013)	100	Nettle vs placebo (8 weeks)	Nettle had a better effect in relieving clinical symptoms in BPH patients compared to placebo.
Wong *et al*. (2012)	176	Soy isoflavones vs placebo	Slight superiority of isoflavones over placebo. Tolerability of isoflavones was excellent.
Wilt *et al*. (1998)	644	Saw palmetto vs placebo (6–18 months)	Saw palmetto improved urinary tract symptoms and flaw measures.
Wilt *et al*. (2000)	519	β-Sitosterol vs placebo (maximum 26 weeks)	β-Sitosterol significantly reduced IPSS (improved urological symptoms and flaw measures). The studies included in the SR were limited by their short follow-up period.
Wilt *et al*. (2002)	1562	Pygeum vs placebo (maximum 16 weeks)	Pygeum improved urinary symptoms and flaw measures. The studies included in the SR were limited by their short follow-up period.
MacDonald *et al*. (2000)	163	Cernilton® vs placebo	Cernilton improved subjective symptoms and nocturia compared with placebo. The studies included in the SR were limited by small sample sizes and short follow-up period.
Mantovani (2010)	70	Saw palmetto vs baseline or pygeum (4 weeks)	Saw palmetto improved clinical symptoms in BPH patients with a good tolerability profile. The studies were limited by a short follow-up period.
MacDonald *et al*. (2012)	657	Saw palmetto vs placebo (6–18 months)	Saw palmetto was not better than placebo, even at escalating doses.
Boyle *et al*. (2004)	17	Permixon® vs placebo	Permixon® showed a significant improvement in peak flaw rate and reduction in nocturia above placebo.

SR, systematic review; LUTS, lower urinary tract symptoms; IPSS, International Prostate Symptom Score, PSA, prostate-specific antigen; BPH, benign prostate hyperplasia.

the activation of nuclear factor-kappa B pathway in prostate tissue.

Saw palmetto has been widely used for relieving symptoms related to BPH (Bent *et al*., 2006). Some studies have assessed the benefits of this herbal medicine. Two Italian studies carried out on patients with BPH have shown that saw palmetto (320 mg/day for 30 days) was effective in terms of reduction of the micturition rate and of prostate size (Mantovani, 2010). An Iranian study showed that saw palmetto had equivalent effectiveness to tamsuloxin and in combination to nettle revealed similar effects to finasteride with less side effects (Azimi *et al*., 2012). Some studies have also documented the efficacy of saw palmetto in reducing dysuria in men affected with BPH (Bertaccini *et al*., 2012). And also three reviews assessed the efficacy and drawbacks of saw palmetto. Boyle *et al*. (2004) reported positive effects of Permixon®, a lipido-sterolic extract of saw palmetto, in improving peak urine flow rate and reducing nacturia compared with placebo. Wilt *et al*. (1998) estimated some saw palmetto preparations (Permixon® (Pierre Fabre Pharma s.r.l., Milan, Italy), Prostagutt® (Dr. Willmar Schwabe GmbH, Karlsruhe, Germany), Prostavigol® (Harras Pharma Curarina Arzneimittel GmbH, Munchen, Germany), etc.) and reported positive effects on urinary tract symptoms and flow measurements. On the contrary, a review carried out by Tacklind *et al*. (2009) concluded that saw palmetto did not improve urinary flow or prostate size. The difference may be the consequence of two high-quality, large-scale, long-term follow-up clinical trials that Tacklind and coworkers discussed in their review. However, also a recent systematic review carried out by MacDonald *et al*. (2012) shows that the high-quality long-term trials found saw palmetto therapy not superior to placebo in reducing LUTS, even at escalating doses. Some clinical studies showed that the majority of adverse events are generally mild, infrequent, and reversible, comparable with placebo and include stomach and abdominal upset, diarrhea, nausea, headache, rhinitis, and decreased libido (Agbabiaka *et al*., 2009). No evidence for drug interactions with saw palmetto has been published (Izzo, 2012). Two clinical studies demonstrated that saw palmetto had no significant effect on CYP1A2, CYP2D6, CYP2E1, or CYP3A4 in healthy volunteers (Markowitz *et al*., 2003; Gorski *et al*., 2004).

Pygeum. The bark of *Pygeum africanum* (Fam. *Rosaceae*), a tale tree of 30-m native to Africa, contains phytosterols (β-Sitosterol, β-Sitosteryl glucoside, and β-Sitostenone) and other sterols and steroid intermediates; triterpenoid pentacyclic acids (ursolic, oleanoic, and their homologs sometimes acylated by fenolic acid); alcohols such as docasanol and fatty acids, especially palmitic acid; and abietic acid. Africans have long used a tea made from the African prune (pygeum) to treat

urinary disorders. Pygeum is thought to counter BPH in several ways: inhibition of prostatic fibroblast proliferation in response to growth factors, antiinflammatory activity, inhibition of 5-α-reductase, and inhibition of prolactin levels and consequently blocked accumulation of cholesterol in the prostate (Capasso *et al*., 2003). Pygeum seems to have a positive effect not only on the prostate but also on the bladder by protecting it destructive effects of free radicals and degradative enzymes. Studies carried out on pygeum are limited by the short duration of trials (30–122 days) and the variability in study design, the use of different preparations, and the type of reported outcome. In a meta-analysis of 18 randomized controlled trials involving 1562 men, pygeum provided a moderately large improvement in urologic symptoms and flow measures (nocturia was reduced by 19%, whereas peak urine flow was increased by 23%) (Wilt *et al*., 2002).

Pygeum has no effect on the volume of the adenoma. The usual dosages are 100 to 200 mg a day. No major side effects, including herb-drug interactions, have been reported.

Nettle. The roots of *Urtica dioica* (Fam. *Urticaceae*), an herbaceous plant which grows wild around rural houses and in ditches, contain sterols and their glycosides, glycoproteins, acids (salicylic, malic, etc.), polysaccharides, fatty acids, and so on. This herb dates the medieval times when it was used as a diuretic and as therapy for joint problems. Today, it is also used to treat of BPH. Nettle extract contains compounds that inhibit the action of sex hormones (lignans), block the binding of the epidermal growth factor to its receptor with suppression of prostate-cell metabolism and growth (polysaccharides and lectins) and display antiinflammatory activity (acids). Nettle also inhibits proteolytic enzyme, which is involved in genitourinary tract infection/inflammation, but it is a very weak inhibitor of 5-α-reductase. Some studies have documented that nettle only relieves the symptoms of an enlarged prostate without eliminating the enlargement itself (Ghorbanibirgani *et al*., 2013). On the contrary, Safarinejad (2005) documented a modest decrease in prostate size measured by transrectal ultrasonography in BPH patients treated with nettle for 6 months. However, the evidence supporting the use of nettle for the treatment of BPH is not as convincing as other herbs, namely, saw palmetto and pygeum. Nettle may be taken in combination with saw palmetto and pygeum (Melo *et al*., 2002). The usual dosage is 120 mg of standardized extract twice a day. With the exception of rare allergic reactions and intestinal disturbances in some people, nettle has no known serious side effects. No drug interactions have been reported to date.

Rye grass pollen. The extract is prepared from the pollen of *Secale cereale* (Fam. *Graminaceae)*. The preparation is obtained by microbial digestion of the pollen followed by extraction with water and acetone.

The total extract (Cernilton® (Graminex, Saginaw, MI, USA)) consists of a water–soluble and acetone–soluble fraction. The last fraction contains sterols. Even if the identity of the active substances is not entirely known, several mechanisms of action have been proposed: (i) inhibition of 5-α-reductase; (ii) blockade of α-adrenergic receptors; and (iii) antiinflammatory activity.

Some clinical studies have documented that rye grass pollen (Cernilton®) improves self-rated urinary symptoms but does not improve urinary flow rates, residual volume on prostate size (MacDonald *et al*., 2000). Overall, the studies carried out suggest that rye grass pollen modestly improves urological symptoms including nocturia. Rye grass pollen is well tolerated and rarely causes gastrointestinal symptoms or allergic skin reactions. Rye grass pollen extract (Cernilton®) has been used in clinical trials at daily doses ranging from 200 to 380 mg (Wilt *et al*., 2000).

Pumpkin. The seeds of *Cucurbita pepo* L. (Fam. *Cucurbitaceae*), an annual forming prostrate shoot native to America, contain Δ^7-sterols (avenasterol and spinasterol) and Δ^5-sterol (sitosterol, stigmasterol, etc.), fatty oil (linoleic and oleic acid), tocopherols (vitamin E), zinc, and so on.

The Δ^7-sterols are considered to be active constituents in that they have been shown to significantly decrease elevated levels of DHT in patients with BPH. Pumpkin also produces a tonic effect on the bladder and relaxation of sphincter at the neck of the bladder. Some clinical studies have documented that pumpkin (seed oil or seed extract) improves only the symptoms associated to an enlarged prostate but does not reduce the enlargement itself. Some studies also found that pumpkin seeds are rich in zinc, and these elements may help shrink an enlarged prostate, but how it works is unknown. No side effects have been reported. The daily dose recommended by the German Commission E is 10 g of crud drug (Blumenthal, 1998).

Soy isoflavones. The beans of *Glycine max* (L.) Merr. (Fam. *Fabaceae*), a herb native to East Asia, contain isoflavones such as genistein and daidzein. The two form of isoflavones, aglycone and glucoside, are commonly used dietary supplements among patients will BPH (Wong *et al*., 2007). Several studies have shown that isoflavones have effects on glandular epithelium (involving 5-α-reductase inhibition and uridine 5-diphospho-glucuronsyltransferase activation) and on stromal cell in the prostate (including 17-phydroxysteroid dehydrogenase inhibition, aromatase inhibition, and estrogen receptor antagonism); therefore, it may mimic the action of estrogen and may help to detoxify DHT, which fosters prostate tissue proliferation. However, there are no official recommendation for soy products to promote prostate health, but some epidemiological studies link a low incidence of BPH with a diet rich in isoflavones (Morton *et al*., 1997), and one study shows that a high consumption of soy milk reduces the risk of BPH (Jacobsen *et al*., 1998).

Recently, a randomized controlled study has shown only slight superiority of soy isoflavones (40 mg/*die* for 12 months) over placebo in controlling the symptoms and signs of BPH (Wong *et al*., 2012).

However, several naturopaths recommend taking 25 to 50 g of powdered soy protein, a rich source of isoflavones, a day.

It can be mixed with milk or juice to make a nutritional drink. Soy has been shown to be well tolerated in a clinical trial investigating its effect in BPH (Wong *et al*., 2012).

NUTRACEUTICALS

Lycopene. Lycopene is a member of the carotenoid family of chemical substances. Lycopene, similar to other carotenoids, is a natural fat-soluble pigment found in many fruits and vegetables. Tomatoes (*Lycopersican esculentum*) are the major dietary source of lycopene; other sources include watermelon, papaya, pink grapefruit, and pink guava. Lycopene tends to concentrate in the prostate (Clinton *et al*., 1996), but the mechanisms by which it is sequestrate into prostatic tissue are still unclear. So also how lycopene slows the progression of BPH and reduces the risk of prostate cancer is unknown, but there are a few hypothesis. Cancer, as well as several other chronic diseases, is linked to oxidative stress, and lycopene has the highest antioxidant activity of all the carotenoids. Therefore, lycopene's antioxidant activity is a possibility. Lycopene has also been found to inhibit cell grown in normal prostatic epithelial cells (Obermüller-Jevic *et al*., 2003) and to promote apoptosis in hyperplastic prostate tissue (Bowen *et al*., 2002). The failure of cell signaling may be a cause of cell overgrowth and eventually cancer. Lycopene may stimulate gap junction communication between cells and stop cell division (benefiting BPH). Other mechanisms might be a reduced degradation of lycopene and consequently an enhanced efficacy in BPH (Goyal *et al*., 2006), an increased production of lycopenoids into prostatic tissue and potentially a reduced prostate cancer risk (Ford and Erdman, 2012), and an inhibition of 5-α-reductase and interleukin-6 signaling (Herzog *et al*., 2005).

Some studies have documented that lycopene and tomato products may be helpful in preventing BPH and possibly also managing prostate cancer. Research, though suggestive of these positive effects, is far from conclusive.

Selenium. Selenium is a mineral and an essential component of an antioxidant enzyme, glutathione peroxidase (Laudato *et al*., 2013). It generally occurs in food (Brazilian nuts, fish, whole grains, wheat germ, soybean, and sunflower seed) as selenomethionine, an organic selenium analog of methionine with antioxidant and anti inflammatory effects. Some preclinical studies suggest that selenium supplementation can slow prostate growth and help prevent prostate cancer by inhibiting cell proliferation and stimulating apoptosis (El-Bayoumy *et al*., 1991, 2006). However, a clinical trial found that a daily supplement of selenium 200 mcg was safe and enough to lower the risk of prostate cancer (Clark *et al*., 1996). It was been related that selenoproteins are likely implicated in the protective effects of selenium against prostate cancer (Rayman, 2005). Lastly, the beneficial effects of selenium in combination with isothiocyanates could be attributed to epigenetic and antioxidant effects (Barrera *et al*., 2012).

β-Sitosterol. β-Sitosterol is a phytoterapeutic extract mainly originating from South Africa star grass, which consist of phytosterols bonded with glucosides (Wilt *et al*., 2000). A systematic review assessed the benefits of this phytotherapeutic compound in patients with BPH. β-Sitosterol improved urological symptoms and some urodynamic values such as peak urinary flow and post-void residual urine. The adverse effect of β-Sitosterol were mild, such as placebo.

Some combinations

Saw palmetto/selenium/lycopene. It has been recently shown that saw palmetto in combination with selenium and lycopene is more effective than saw palmetto alone in reducing prostate inflammation, growth factor expression, oxidative stress, and histological features in a bladder obstruction model. All these effects have been confirmed in a prostate enlargement model induced by testosterone in rats. These studies also support the conviction that testosterone administration induces prostate hyperplasia (Altavilla *et al*., 2011).

Some studies have shown that the association saw palmetto/selenium/lycopene has a greated antiinflammatory activity than saw palmetto alone (Bonvissuto *et al*., 2011). This association is also more effective than saw palmetto in reducing prostate hyperplasia, in enhancing the pro-apoptotic B ascx and caspase-9 and suppressing the epidermal growth factor and vascular endothelial growth factor expressions in BPH (for ref. see Minutoli *et al*., 2013). All these results suggest that selenium and lycopene increase saw palmetto efficacy in BPH. Moreover, the association saw palmetto/selenium/lycopene improves symptoms in prostate suffering from a chronic prostatitis/chronic pelvic pain syndrome, and it is safe and well tolerated (Morgia *et al*., 2010).

Saw palmetto/nettle/quercetin/curcumin. A combination therapy with antibiotics and saw palmetto is already used in everyday urological practice in the attempt to eradicate infecting organisms in chronic bacterial prostatitis (CBP) (Magri *et al*., 2007). However, it has been hypothesized that nettle, quercetin, and curcumin could have a further adjuvant role in the management of CBP as nettle is above all an antiproliferative drug; quercetin is a bioflavonoid that inhibits some pro-inflammatory cytokines involved in the pathogenesis of chronic prostatitis, and curcumin a substance that may interfere with certain signal transduction pathways is cleared that are critical for cell growth and proliferation.

In the light of these considerations, it has been recently carried out a prospective randomized study to evaluate if a combination saw palmetto/nettle/quercetin/curcumin was able to improve the therapeutic effect of prulifloxacin, an antibiotic, in patients affected by CBP (Cai *et al*., 2009). Some patients (group B: $n = 37$) received oral administration of prulifloxacin 600 mg once daily, whereas others (group A: $n = 106$) received orally prulifloxacin and the association saw palmetto [160 mg of standardized dry liposterolic *S. repens* extract (30% fatty acids and sterols)]/nettle [120 mg of standardized dry lipophilic *U. dioica* extract (0.4% sitosterol)]/quercetin (100 mg)/curcumin (200 mg of dry extract of *Curcuma longa*). One month after treatment, 89.6% of patients in group B did not report any symptoms related to CBP, whereas only 27% of patients in group A were recurrence-free. Six months after treatment, no patients in group A reported symptoms of disease, whereas two patients in group B did. Therefore, the association between antibiotic drug and phytotherapeutic agents is able to improve the clinical efficacy of prulifloxacin in bacterial prostatitis patients.

CONCLUSION

There are many clinical trials in favor of the use of phytotherapy and nutraceuticals in BPH, but conclusions are inconsistent as due to the methodological quality of trials, a small number of patients, the lack of control with placebo or short follow-up, and the use of unvalidated symptom scores (Dedhia and McVary, 2008). Another problem is the treatment of LUTS, complicated by the multi-factorial and multi-organelle origin, the slow evolution of the disease process as well as the high placebo response in this patient population, which collectively limit the perceived efficacy of therapy in clinical studies.

Therefore, further clinical trials should be conducted to confirm these results before concluding that some medicinal plants (*S. repens*, *P. africanum*, *U. dioica*, *C. pepo*, etc.) and some nutraceuticals (isoflavones, lycopene, selenium, β-Sitosterol, etc.) are effective (Morán *et al*., 2013). On the other hand, we do not know if the present conclusion concern the proprietary products of plants used to reduce BPH symptoms. Lack of standardization is an old problem of phytotherapeutic products.

Lastly, currently available data suggest that phytotherapeutics are well tolerated by most users and are not associated, contrarily to conventional medicine, with serious adverse events, including herb-drug interactions. However, higher quality reporting of adverse events is essential to improve the safety assessment of herbal products used by BPH patients.

Conflict of Interest

The authors have declared that there is no conflict of interest.

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