

Full Length Research Paper

Erectile dysfunction: The interest of the scientific community

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Erectile dysfunction (ED) (impotence) can be defined as a partial or total inability to achieve erection, an inconsistent ability to do so, or a tendency to sustain only brief erections. The interest of the scientific community in studies about ED is evident and is increasing. The aim of this work was to evaluate the number of publications (NP) in ED using the databank PubMed in the period between 1950 to January 2011 determining the NP, in each year, in ED (NP-ED) and in impotence (NP-IM) alone or together (NP-ED-IM). The total NP-ED or NP-IM was associated with Viagra (NP-ED-V or NP-IM-V), or Levitra ((NP-ED-L or NP-IM-L), or Cialis (NP-ED-C or NP-IM-C) or physiotherapy (NP-ED-Physio or NP-IM-Physio). The results showed a growing interest of the scientific community in ED. Viagra has been most cited drug and the physiotherapy is cited since 1991 to treat ED. The findings reported reveal the relevance of the PubMed to evaluate the scientific interest in specific subjects. Furthermore, the knowledge of these findings would be relevant to verify the scientific interest in ED that has undesirable impacts in our Society.

Keywords: Erectile dysfunction, impotence, Viagra, Cialis, Levitra, physiotherapy, scientific community, PubMed.

INTRODUCTION

Epidemiological studies have demonstrated that erectile dysfunction (ED) is very common and affects millions of men, but its incidence in the community has been difficult to quantify due to the limited number of epidemiological surveys that are available. Recent estimates suggest that in the United States of America and in Europe the

incidence is about 25-30 cases per 1000 person-years. In a Brazilian study, the incidence rate was 65.6 cases per 1000 person-years (Sivalingam et al., 2006; Johannes et al., 2000; Moreira et al., 2003; Schouten et al., 2005). All these studies had demonstrated an increase in the incidence rates of the ED with each decade of life of the population. Moreover, there is an increase in erectile dysfunction with the aging process in males (Kinsey et al., 1948).

Erectile dysfunction is usually due to a multifactorial etiology, comprising organic, psychological, or mixed

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aspects, and may often require a multidisciplinary approach for assessment and treatment. Organic causes encompass vascular, neurologic, hormonal, as a result of medications, pelvic surgery, radiation, diabetes or mixed factors. Ejaculatory dysfunction is a distinct entity often coexisting with erectile dysfunction (Johannes et al., 2000; HSTAT, 2003).

Droupy (2005) reported that the causes of ED in a senior man are intricately and complexly including vascular disorders, a physical cause like trauma, side effects of drugs and surgery. Any condition that can cause damage to the nerves or impair blood flow in the penis may lead to erectile dysfunction. Many common therapeutic drugs, as blood pressure drugs, antihistamines, antidepressants, tranquilizers, appetite suppressants, and cimetidine can produce erectile dysfunction. Surgery (especially radical prostatectomy and bladder surgery for cancer) might damage cavernous nerves and arteries near the penis, causing erectile dysfunction. Other possible causes include smoking, which impairs blood flow in veins and arteries, and defective testosterone secretion (HSTAT, 2003; Nussey and Whitehead, 2001).

Impaired erectile function, or the total inability to maintain or achieve sufficient penile rigidity for satisfactory sexual intercourse performance, it was used as a definition of impotence up to the National Institutes of Health Consensus Development Conference on 1992, when it was recommended that the term "erectile dysfunction" replace the term "impotence," but, sometimes, the two terms have been used interchangeably. The term erectile dysfunction is more precise and eliminates the confusion of multiple meanings and connotations associated with the word impotence (HSTAT, 2003). In 2004, the Second International Consultation on Sexual Dysfunction (ICSD2) defined ED as a "consistent or recurrent inability of a man to attain and/or maintain penile erection sufficient for sexual activity". The condition must be present for a minimum of 3 months to establish the diagnosis. The exception to this is when ED is preceded by trauma or pelvic surgery (Sivalingam et al., 2006).

Several drugs for treating erectile dysfunction are available and they can be taken orally, injected directly into the penis, or inserted into the urethra at the tip of the penis. In March 1998, the Food and Drug Administration (FDA) approved Viagra, the first drug to treat ED. In August 2003, the FDA gave approval to a second oral medicine, vardenafil hydrochloride (Levitra). Several undesirable effects have been associated with the administration of these drugs (Beraru, 2006; Kendirci et al., 2006; Ravipato et al., 2007). In consequence, additional oral medicines are being tested for safety and effectiveness (HSTAT, 2003). These undesirable clinical

conditions have shown that a highly relevant approach about another possible kind of treatment of the erectile dysfunction could be the physiotherapeutic procedures. The physiotherapy can play an important role in the treatment of the ED due no side effects are observed (Tsai et al., 2000). Dorey et al (2005) has studied the role of pelvic floor exercises as a way of restoring erectile function in men with erectile dysfunction. Men with erectile dysfunction were treated with either pelvic floor muscle exercises (taught by a physiotherapist) with biofeedback and lifestyle changes (intervention group) or they were advised on lifestyle changes only (control group). After 3 months, the erectile function of men in the intervention group was significantly better than in the control group. This study suggests that pelvic floor exercises should be considered as a first-line approach for men seeking long-term resolution of their erectile dysfunction. Van Kampen et al (2003) have evaluated a re-education program for men with ED of different etiologies that were treated with physiotherapy involving pelvic-floor exercises, biofeedback, and electrical stimulation. Comparison of the results of the physical therapy protocol reported here with those obtained for other interventions reported in the literature shows that a pelvic-floor muscle program may be a noninvasive alternative for the treatment of patients with erectile dysfunction caused by venous occlusion.

The economic burden of ED is not just limited to the cost of diagnosis and treatment. Subtle impacts on the society that are difficult to quantify are (i) lost time at work, (ii) decreased productivity of the patient due to distress, and (iii) impact on the partner, family and co-worker (Shabsig et al., 1999). The comprehensive knowledge and the understanding of these conditions and the analysis of the publications in database systems could help to develop specific strategies to improve quality of life of these persons.

The PubMed is a database service of the National Library of Medicine that includes over 20 million citations from MEDLINE and other life science journals for biomedical articles. PubMed includes links to full text articles and other related resources and it has been used as a tool in various publications related with Health Sciences, as in studies (i) to review the pharmacologic and clinical trial data of the Food and Drug Administration-approved phosphodiesterase 5 (PDE5) inhibitors for the treatment of erectile dysfunction (Setter et al., 2005), or (ii) to review the costs and consequences of pharmacy benefit reimbursement policies related to erectile dysfunction therapies, using sildenafil citrate as the case study (Miner, 2004), or (iii) to the epidemiologic evaluation of chronic fatigue syndrome (Ranjith, 2005), or (iv) to review of herbs are most commonly used as

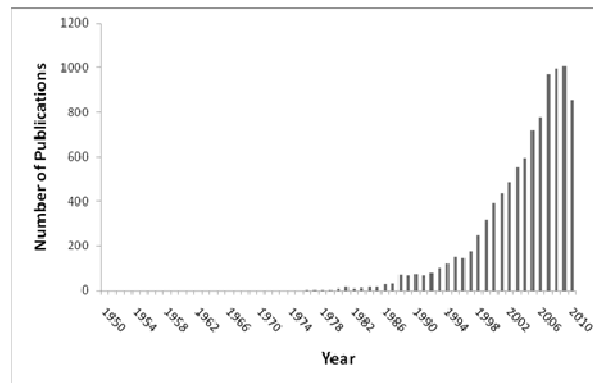


Figure 1: The number of publications of erectile dysfunction per year
The total number of publications, in each year and in the studied period (from 1950 up to 2010) was determined in erectile dysfunction (PED) in the PubMed on January 6th 2011.

complementary and alternative medicine for treatment of asthma, allergy, and immunologic conditions (Bielory, 2004), or (v) on the evaluation the strength of the evidence supporting the use of currently available treatments for critically ill infants with bronchiolitis (Davison et al., 2004), or (vi) to evaluate the publications about Chinese traditional medicine and more specifically of the moxibustion technique (Santos-Filho et al., 2004), (vii) to evaluate the scientific interest in the study of the aging and prevention in biomedical sciences (Santos-Filho et al., 2006) or (viii) to verify the use of the whole body vibration in postmenopausal women (Pinto et al., 2010).

The evaluation of the literature permits to verify that the interest of the scientific community in studies about ED is evident and is increasing in the world. We aimed to quantify the number of publications involving erectile definition, causes, diagnosis and possible treatments of ED (medications and physiotherapy) using the databank PubMed.

METHODS

The PubMed publications related to ED were reviewed on January 6th, 2011 starting from 1950 up to January 2011. It was evaluated (January 6th, 2011) in the period from 1950 up to 2010 in the PubMed (<http://www.ncbi.nlm.nih.gov/entrez/query.fcgi>), the number of publications (NP) in erectile dysfunction (ED). As the term "erectile dysfunction" has replaced the term "impotence," but the two terms are used interchangeably, the search was carried out with "impotence" or "erectile

dysfunction" isolated or "erectile dysfunction or impotence" together. The searches determined the number of publications (NP), in each year, in ED (NP-ED) and in impotence (NP-IM) alone or together (NP-ED-IM).

A study in this database about drugs, as well as about physiotherapy associated with "impotence" or "erectile dysfunction" isolated was also performed. The total NP-ED or NP-IM was associated with Viagra (NP-ED-V or NP-IM-V), or Levitra ((NP-ED-L or NP-IM-L), or Cialis (NP-ED-C or NP-IM-C) or physiotherapy (NP-ED-Physio or NP-IM-Physio).

RESULTS

A total of 17872 publications about "impotence", a total of 16184 publications about "erectile dysfunction", and a total of 17872 publications about "erectile dysfunction or impotence" were identified. The first publication about impotence was identified in 1950, however the first publications about erectile dysfunction was identified only in 1976.

The figure 1 above shows the NP-ED per year. The NP-ED increased from 1 (1976) up to 854 (2010).

Figure 2 shows the NP-IM per year. The NP-IM has increased from 5 (1950) up to 940 (2010).

The NP-ED-IM increased from 5 (1950) up to 940 (2010) (Figure 3).

In table 1 is presented the number of the publications in the NP involving Viagra, Levitra, Cialis and Physiotherapy related with erectile dysfunction was summarized in table 1. The NP-ED-V is higher than to NP-ED-L, NP-ED-C and NP-ED-Physio. Moreover, the first publica-

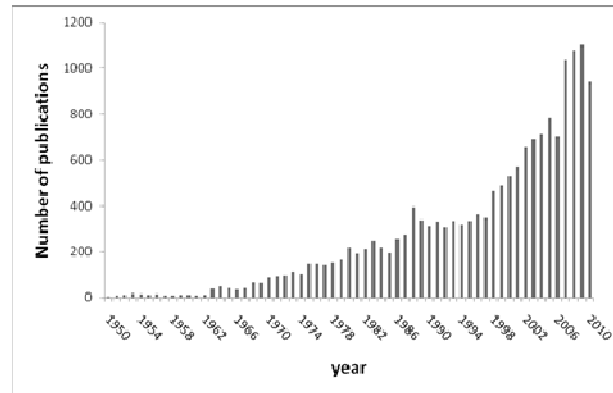


Figure 2: The number of publications of impotence per year
The total number of publications, in each year and in the studied period (from 1950 up to 2010) was determined in impotence (PIP) in the PubMed on January 6th 2011.

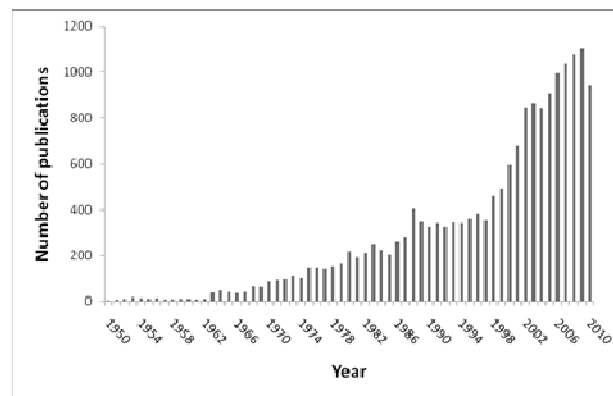


Figure 3: The number of publications of erectile dysfunction or impotence per year
The total number of publications, in each year and in the studied period (from 1950 up to 2010) was determined in erectile dysfunction or impotence (PEIP) in the PubMed on January 6th 2011.

Table 1: The number of the publications in drugs and physiotherapy related with erectile dysfunction

Drugs/physiotherapy	Publications
Viagra	2162
Levitra	510
Cialis	572
Physiotherapy	134

The total number of publications in the studied period (from 1950 up to 2010) was determined to erectile dysfunction and Viagra (EDV) or Levitra (EDL) or Cialis (EDC) or physiotherapy (Physio) in the PubMed on January 6th 2011.

Table 2: The number of the publications in drugs and physiotherapy related with impotence

Drugs/physiotherapy	Publications
Viagra	2186
Levitra	511
Cialis	572
Physiotherapy	154

The total number of publications in the studied period (from 1950 up to 2010) was determined to impotence and Viagra (EDV) or Levitra (EDL) or Cialis (EDC) or physiotherapy (Physio) in the PubMed on January 6th 2011.

tions about Viagra were found in 1996 and about Levitra or Cialis were found only in 2001. The first publications about physiotherapy associated with erectile dysfunction were found in 1991.

Table 2 presented the number of the publications in Viagra, Levitra, Cialis and Physiotherapy related to impotence. The NP-IM-V is also higher than to NP-IM-L, NP-IM-C and NP-IM-Physio. Moreover, the first publications about Viagra were also found in 1996 and about Levitra or Cialis were also found in 2001 when related with impotence. The first publications about physiotherapy associated with impotence were found in 1963.

DISCUSSION

Vascular abnormalities cause several clinical diseases mainly through two mechanisms: (i) narrowing or completely obstructing the lumens, either progressively or precipitously and (ii) weakening of the walls, leading to dilation or rupture (Kumar et al., 2005). In the history of the vascular disorders, diseases such as (a) diabetes mellitus, (b) renal disease, (c) thrombosis, and (d) atherosclerotic peripheral vascular disease may be immediately identified as potential causes of erectile dysfunction (impotence) (Droupy, 2005; Nussey and Whitehead, 2001; Walker et al., 1990; Le Pioufle et al., 2003; Desvaux, 2005; Bertolotto et al., 2005). Characterized by the degree of dysfunction, and estimates of prevalence (the number of men with the condition) vary depending on the definition of erectile dysfunction used (HSTAT, 2003). Because adequate arterial supply is critical for erection, any disorder that impairs blood flow may be implicated in the etiology of erectile failure. Most of the medical disorders associated with erectile dysfunction appear to affect the arterial

system. Some disorders may interfere with the corporal veno-occlusive mechanism and result in failure to trap blood within the penis, or produce leakage such that an erection cannot be maintained or is easily lost (HSTAT, 2003).

Erectile dysfunction is clearly a symptom of many conditions, and certain risk factors have been identified, some of which may be amenable to prevention strategies. Diabetes mellitus, hypogonadism in association with a number of endocrinologic conditions, hypertension, vascular disease, high levels of blood cholesterol, low levels of high density lipoprotein, drugs, neurogenic disorders, Peyronie's disease, priapism, depression, alcohol ingestion, lack of sexual knowledge, poor sexual techniques, inadequate interpersonal relationships or their deterioration, and many chronic diseases, especially renal failure and dialysis, have been demonstrated as risk factors (Kirby et al., 2005; Kendirci et al., 2005).

Age appears to be a strong indirect risk factor in that it is associated with an increased likelihood of direct risk factors (Nussey and Whitehead, 2001). Although ED increases progressively with age, it is not an inevitable consequence of aging as it is discussed in the HSTAT (2003). Smoking has an adverse effect on erectile function by accentuating the effects of other risk factors such as vascular disease or hypertension. Accurate risk factor identification and characterization are essential for concerted efforts at prevention of ED (Nussey and Whitehead, 2001).

As it is presented, there are several subjects to be discussed about ED. The use of the PubMed permits to verify the interest of the scientific community and relevant findings can be found as observed in different publications (Droupy, 2005; Nussey and Whitehead, 2001; Pinto et al., 2010; Bertolotto et al., 2005). The analysis of the results shows the interest of the scientific community in ED has a continuous growing, as it is

shown in the figure 1. This finding could not be associated with the fact that the erectile dysfunction is often assumed to be a natural concomitant of the aging process, to be tolerated along with other conditions associated with aging. Moreover, several studies have revealed that this assumption may not be entirely correct. For the elderly and for others, erectile dysfunction may occur as a consequence of specific illnesses or of medical treatment for certain illnesses, resulting in fear, loss of image and self-confidence, and depression (HSTAT, 2003; Droupy, 2005; Nussey and Whitehead, 2001). It is possible to suggest that new approaches about the erectile dysfunction have stimulated the growing of the research in erectile dysfunction (HSTAT, 2003; Droupy, 2005; Nussey and Whitehead, 2001), as well as the growth of related cases as published about the number of men in the US (HSTAT, 2003). Moreover, the economic burden, as well as subtle impacts on the society that is difficult to quantify (Shabsig et al., 1999) need to be considered. These facts put together would explain the increase of number of publications about erectile dysfunction shown in the figure 1. Similar findings are shown in the Figure 2 and Figure 3 when the term "impotence" was also considered in these evaluations. The analysis of these three figures permits to verify that, although the term ED has been suggested to substitute impotence, both have been utilized in the publications about this dysfunction.

When the analysis is carried out with erectile dysfunction or impotence and a defined therapeutic drug or physiotherapy (table 1 and table 2), it is found an important interest in Viagra (1108 publications) and the first publications about erectile dysfunction and Viagra were in 1996. In addition, the publications with Levitra and Cialis have started only after five years (2001). Moreover, the publications about erectile dysfunction and physiotherapy have just ongoing before five years (1991) and physiotherapy associated with impotence in 1963. This fact could be associated with the results of the protocol of the physiotherapy reported with those obtained for other interventions reported in the literature shows that a pelvic-floor muscle program may be a noninvasive alternative for the treatment of patients with erectile dysfunction (McLean and Madill, 2007; Nahon et al., 2006; Rosenbaum, 2007). Moreover, the male pelvic floor has many diverse functions. Importantly, it helps to support the abdominal contents, maintains urinary and fecal continence, and plays a major role in gaining and maintaining penile erection. Weakness of the male pelvic floor muscles may cause urinary and fecal incontinence and erectile dysfunction. Function may be restored in each of these areas by a comprehensive pelvic floor muscle training program (Dorey et al., 2005).

CONCLUSION

The findings reported reveal the relevance of the PubMed to evaluate the scientific interest in specific subjects. Furthermore, the knowledge of these findings would be relevant to verify the scientific interest in ED that has undesirable impacts in our Society.

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