

## Epidemiology/Risk Factors of Sexual Dysfunction

Ronald W. Lewis, MD,<sup>a</sup> Kersten S. Fugl-Meyer, PhD,<sup>b</sup> R. Bosch, MD,<sup>c</sup> Axel R. Fugl-Meyer, PhD,<sup>b</sup> Edward O. Laumann, PhD,<sup>d</sup> E. Lizza, MD,<sup>e</sup> and Antonio Martin-Morales, MD<sup>f</sup>

<sup>a</sup>Department of Urology, Medical College of Georgia, Augusta, GA, USA; <sup>b</sup>Sexology Unit, University Hospital, Uppsala, Sweden; <sup>c</sup>Department of Urology, Academic Hospital Rotterdam-Dijkzigt, Rotterdam, the Netherlands; <sup>d</sup>University of Chicago, Chicago, IL, USA; <sup>e</sup>New York, NY, USA; <sup>f</sup>Department of Urology, Carlos Haya Hospital, Malaga, Spain

Summary of Committee. For the complete report please refer to *Sexual Medicine: Sexual Dysfunctions in Men and Women*, edited by T.F. Lue, R. Basson, R. Rosen, F. Giuliano, S. Khoury, and F. Montorsi, Health Publications, Paris 2004.

---

### ABSTRACT

**Introduction.** Accurate estimates of prevalence/incidence are important in understanding the true burden of male and female sexual dysfunction and in identifying risk factors for prevention efforts.

**Aim.** To provide recommendations/guidelines concerning state-of-the-art knowledge for the epidemiology/risk factors of sexual dysfunctions in men and women.

**Methods.** An International Consultation in collaboration with the major urology and sexual medicine associations assembled over 200 multidisciplinary experts from 60 countries into 17 committees. Committee members established specific objectives and scopes for various male and female sexual medicine topics. The recommendations concerning state-of-the-art knowledge in the respective sexual medicine topic represent the opinion of experts from five continents developed in a process over a 2-year period. Concerning the Epidemiology/Risk Factors Committee, there were seven experts from four countries.

**Main Outcome Measure.** Expert opinion was based on grading of evidence-based medical literature, widespread internal committee discussion, public presentation and debate.

**Results.** Standard definitions of male and female sexual dysfunctions are needed. The incidence rate for erectile dysfunction is 25–30 cases per thousand person years and increases with age. There are no parallel data for women's sexual dysfunctions. The prevalence of sexual dysfunction increases as men and women age; about 40–45% of adult women and 20–30% of adult men have at least one manifest sexual dysfunction. Common risk factor categories associated with sexual dysfunction exist for men and women including: individual general health status, diabetes mellitus, cardiovascular disease, other genitourinary disease, psychiatric/psychological disorders, other chronic diseases, and socio-demographic conditions. Endothelial dysfunction is a condition present in many cases of erectile dysfunction and there are common etiological pathways for other vascular disease states. Increasing physical activity lowers incidence of ED in males who initiate follow-up in their middle ages.

**Conclusions.** There is a need for more epidemiologic research in male and female sexual dysfunction.

**Key Words.** Prevalence/Incidence Sexual Dysfunction; Epidemiology Studies in Sexual Dysfunction; Desire Disorder; Arousal Disorder; Erectile Dysfunction; Orgasmic Disorder; Risk Factors; Co-morbidities

---

## Introduction

Usable definitions must be developed to provide consistency in the description of various sexual dysfunctions in men and women, as well as classifications of sexual disorders. Descriptive and analytical epidemiological studies of various sexual dysfunctions backed by evidence-based medicine were examined. The conclusions and recommendation of the committee on Definitions, Classifications and Epidemiology of Sexual Dysfunction are summarized.

## Definitions

Consistent uniform, universally acceptable definitions for sexual dysfunctions that affect men and women, which also include the degree of dysfunction, are necessary to compare epidemiological studies across the world. The following boldly highlighted definitions for the sexual dysfunctions for men and women (in principle consensus with Basson et al. [1]) are recommended.

**Sexual interest/desire dysfunctions** are diminished or absent feelings of sexual interest or desire, absent sexual thoughts or fantasies and a lack of responsive desire. There is some lessening of lack of interest with life cycle and relationship durations but these sexual interest/desire dysfunctions go beyond this normally expected decrease. This first area of dysfunction has been more commonly discussed in women and somewhat neglected in epidemiological research in men. **Sexual arousal disorders in women** can be divided into three types: genital sexual arousal dysfunction, which is absent or impaired genital sexual arousal (characterized by minimal vulval swelling or vaginal lubrication); subjective sexual arousal dysfunction is the absence of or markedly diminished feelings of sexual arousal, sexual excitement and sexual pleasure, from any type of sexual stimulation; and combined genital and subjective arousal dysfunction, which is an absence of or markedly diminished feelings of sexual arousal (sexual excitement and sexual pleasure) from any type of sexual stimulation as well as complains of absent or impaired genital arousal. In men, **erectile dysfunction (ED)** is an arousal disorder defined as a consistent or recurrent inability of a man to attain and/or maintain penile erection sufficient for sexual activity. It was suggested that a 3-month minimum duration be present for establishment of this diagnosis, except in some instances of trauma or surgically induced erectile dysfunction. **Persistent sexual arousal dysfunction** is spontaneous,

intrusive and unwanted genital arousal in the absence of sexual interest and desire. **Early ejaculation** in men is ejaculation that occurs sooner than desired, either before or shortly after penetration over which the sufferer has minimal or no control. To this definition, actual intravaginal ejaculatory latency time (IELT), stop watch specified, may be added [2]. **Delayed ejaculation** is undue delay in reaching a climax during sexual activity. **Orgasmic dysfunction** in either men or women is lack of orgasm, markedly diminished intensity of orgasmic sensations or marked delay of orgasm from any kind of stimulation. **Anejaculation** in men is the absence of ejaculation during orgasm. **Dyspareunia** is persistent or recurrent pain with attempted or complete vaginal entry and/or penile vaginal intercourse. **Vaginismus** is the persistent or recurrent difficulties of the woman to allow vaginal entry of a penis, a finger, and/or any object, despite the woman's expressed wish to do so. **Sexual aversion** disorder is extreme anxiety and/or disgust at the anticipation of/or attempt to have any sexual activity.

For clinical applicability of the definitions, a degree of distress or bother from the sufferer, would aid greatly the interpretation of the data collected and possible later communication of that data. It is suggested that a definition should not follow a sequential concept in terms of phases. Definitions should be further characterized as to whether they are lifelong or acquired and whether they are global or situational.

Definitions gain applicability for comparative studies by including the degree of dysfunction. Such a classification should be internationally accepted. One way of classification of severity of sexual desires has been the use of well validated indices, an example for men, the IIEF [3] and for women, the FSFI [4]. There have also been scales suggested which can be as simple as yes/no answers or four-graded and six-graded itemized scales. Useful trichotomized scales including no dysfunction (never), mild dysfunction (hardly ever, rather rarely) and manifest dysfunction (rather often, often, always/nearly always) have been suggested as a useful scale to classify severity.

## Incidence

There is clearly a need for more longitudinal studies for all of the dysfunctions in order to obtain more accurate incidence data. Incidence rate for erectile dysfunction comes from three studies. Two, from the United States and Europe, suggest an incidence rate of 25–30 cases per thou-

sand person years. The rate was higher in the third study from Brazil. In all of the studies, rates increase markedly with each decade of age [5,6,7]. Incidence of sexual dysfunction in women is supported even less by evidence-based literature.

### Prevalence

Prevalence rates for sexual dysfunction are strongly supported by evidence-based reports. Literature supporting these prevalence rates was reviewed in WHO chapter [8]. Evidence-based literature for prevalence rates was graded using a modification of the system suggested by Prins and others in their 2002 article in the *International Journal of Impotence Research* [9]. A summary of this is provided in Table 1. There is a variance in the prevalence rates reported because of different age groups reported on, difference in definitions used to describe the

dysfunctions, how the data were selected, how the data were collected, how long the dysfunction was present, and the degree of the dysfunction. Prevalence of sexual dysfunction, for the most part, increases as men and women age. There is, by and large, reasonably valid descriptive epidemiological data indicating that about 40–45% of adult women and 20–30% of adult men have at least one manifest sexual dysfunction. For women the prevalence of manifest low levels of sexual interest varies between 17–55%. Manifest low levels of sexual desire increase with age, with approximately 10% women up to the age of 49 years having a low level of desire, the prevalence then doubling to 22% in those aged 50–65 years and again doubling to 47% in the 66–74-year-olds. Generally, for arousal and lubrication disorder in women, manifest lubrication disability is prevalent in 8–15%, although three studies have reported this at a higher level of 21–28% in sexually active women. Some studies have evidence that with increasing age, in particular age greater than 50 years, lubrication insufficiency becomes more prevalent. For manifest orgasmic dysfunction there is a great variability in reported prevalence rates. In the United States, Australia, England and Sweden, the prevalence of manifest orgasmic dysfunction is about 25% in 18–74 year-old women. Most of the studies have not reported an age dependency. There have significant higher prevalence rates of orgasmic dysfunction in some cultures. In two Nordic countries, where identical methodology was used, more than 80% of all sexually active women age 18–74, age independently, report some degree of orgasmic dysfunction. The prevalence of vaginismus has been reported to be 6% in two widely divergent cultures, Morocco and Sweden. The prevalence of manifest dyspareunia has been reported as low as 2% in elderly British women, yet as high as 18–20% in British and Australian studies. For men, generally, dysfunction of sexual desire drive is much less prevalent than dysfunction of interest (the populations' level of sexual interest appears quite stable for the late teens up to about 60 years of age, where after it decreases markedly).

Prevalence data for erectile dysfunction appear to be the most clearly supported by evidence-based literature using the stringent criteria outlined in Table 1. Twenty-four studies from around the world regarding prevalence of ED (male sexual arousal dysfunction) from 1993 to 2003 were summarized. Methods of collecting the data varied from study to study. Definition of ED used in each of the studies differed. Time periods covered by

**Table 1** Criteria for the methodological quality assessment of prevalence studies—one point for yes to lower case query

<b>External validity</b>	
Source population	(a) Does the method to select and invite participants result in a study population that covers the complete population or a random sample?
Description of the eligibility criteria	(b) Is the age range specified? (c) Are inclusion and exclusion criteria specified?
Participants and nonresponders	(d) Is the response rate >70%, or is the information on nonresponders sufficient to make inference on the representativeness of the study population?
Description of the study period	(e) Is the study period specified?
Description of the study population	(f) Are important population characteristics <sup>a</sup> specified?
<b>Internal validity</b>	
Data collection	(g) Are the data prospectively collected?
Measurement instrument (questionnaire, interview, additional)	(h) Is the measurement instrument validated? (i) Is the period covered by the measurement instrument specified?
Definition of diseases <sup>b</sup>	(j) Is a definition of the disease stated?
Reported prevalences	(k) Are age-specific and gender-specific prevalences reported? (l) Are possible correlates of disease <sup>b</sup> reported?
Informativity	(m) Is the method of data collection properly described (interview, questionnaire, additional measurement)? (n) Are the questions and answer possibilities stated? (o) Are the reported prevalence rates reproducible?

<sup>a</sup> Two or more of: (i) age distribution; (ii) relevant co-morbidity; (iii) lifestyle factors (e.g., smoking and alcohol consumption); and (iv) socio-economic data (e.g., income, education level, marital status).

<sup>b</sup> Disease equals erectile dysfunction in this interview.

the questions about ED varied from a few months to 1 year and, in fact, eight of the studies did not specify a time period question about ED. By region of the world there were 15 studies from Europe (three from the United Kingdom, two each from the Netherlands, Sweden, Finland, and France and one each from Denmark, Germany, Italy, and Spain), five from the United States, one each from Thailand and Japan, and two from Australia. Most were random population studies, some stratified by age or region. Five of the studies were from general practice settings. The percentage responses from populations studied were determined from data presented in the paper or chapter regarding the eligible number who were scheduled to be screened and ranged from 39% to 82%. The number of respondents was not below 200 in any of the studies and only five of the 24 studies were under 500 in number. All of the studies that were stratified by age showed rising prevalence of ED as a population aged. In the full chapter extensive tabulations are made to present these data [8]. Below the age of 40 years the prevalence of ED is 1–9%, in the decade from 40–59 the prevalence range is from 2–9% to as high as 20–30% with some population showing marked differences between the 40–49 age groups compared to the 50–59 year age group. The 50–59 year age group showed the greatest range of reported prevalence rates. Most of the world showed a rather high rate from 20% to 40% for the ages of 60–69 years, some increasing after age 65 except for the Scandinavian reports where the age of 70 years and older is the decade of major prevalence rates change. Almost all of the reports showed high prevalence rates for those men in their 70s and 80s, ranging from 50% to 75% prevalence of ED in these decades.

Five descriptive epidemiological investigations of ejaculatory disturbances fulfilling our validity criteria were chosen [8]. Prevalence rates for ejaculatory disturbances were from a low of 9% up to 31%. These were rates for early ejaculation. Still fewer investigators have reported on the prevalence of delayed ejaculation. One of the problems of surveys regarding early ejaculation is the inconsistency of how the condition is defined. In men it was quite difficult to assess the prevalence of orgasmic dysfunction. In contrast to many men with complete spinal cord injury, some men may be unable to distinguish between ejaculation and orgasm. In the United States and France a prevalence rate for orgasmic dysfunction was from 7% to 8%, although a much lower rate was reported

in older Icelandic men (less than 1%). The prevalence of genital pain in men during sexual intercourse has only been fragmentarily studied.

As far as concurrence of sexual dysfunctions, both in the descriptive and analytical epidemiological literature, there is very little on simultaneous occurrence of sexual dysfunctions within and across genders. The association between manifest erectile dysfunction and early ejaculation has been described in men. Recently it was described in Sweden that within both genders (age 18–74) nearly all personal sexual dysfunctions were closely associated [10]. In addition, all women's dysfunctions were closely coherent with all male partner's functions/dysfunctions as perceived by the women. Men's dysfunction had precisely the same close associations with men's perceptions of their female partner's functions/dysfunctions. These findings firmly suggest that it is important to think in terms of sexual partner relationship. It is important to know to which extent sexual dysfunctions are accompanied by distress. Among women and men with manifest dysfunctions per se, generally less than half experience that it is accompanied by manifest personal distress. However, among the manifestly personally distressed, the vast majorities were not satisfied with their sexual life.

### *Risk Factors*

There are common risk factor categories associated with sexual dysfunction for men and women which include the following: general health status of the individual, the presence of diabetes mellitus, the presence of cardiovascular disease, concurrence of other genitourinary disease, psychiatric/psychological disorders, other chronic diseases, and socio-demographic conditions. For erectile dysfunction, smoking and hormonal factors also serve as well-defined risk factor associated conditions. There is also evidence-based literature for medication-related association for erectile dysfunction. Evidence-based criteria should be established for evaluating risk factors for women's and men's sexual dysfunctions. A good source of this type of critical analysis is that provided in reference [11]. This particular paper describes weaknesses in review of articles published on the association between diabetes mellitus and erectile dysfunction. The association between smoking and other tobacco use and erectile dysfunction was examined with the following conclusion. At the present time, after careful scrutiny against specific selection criteria, it appears that the preponderance of evidence available would iden-

tify cigarette smoking as an independence risk factor for ED. It is possible that this view may change in the future as more evidence becomes available. However, for the present, cigarette smoking should be considered a risk factor for erectile dysfunction. On the other hand, we have not identified descriptive or analytical literature which links smoking to other male sexual dysfunctions or to any female sexual dysfunction. It has been suggested in women that decreased lubrication is significantly (univariately) associated with being diabetic. Similarly, hypertension in women has been reported to be associated with decreased lubricative function and orgasmic dysfunction. Stress urinary incontinence has been found by some authors to negatively influence all aspects of women's sexual function (sexual interest, desire, arousal, lubrication, orgasm) and to be significantly correlated with dyspareunia and vaginismus. In women, a psychiatric disorder is closely associated with orgasmic dysfunction and dyspareunia. In men, diabetes has been associated with a greater prevalence of decreased desire and orgasmic dysfunction as well as erectile dysfunction. For men with insulin-dependent diabetes mellitus, diabetes present for over 10 years, with fair or poor control based on glycosylated hemoglobin, and those managed with agents other than diet control, history of diabetes mellitus related arterial, renal, or retinal disease and neuropathy, and those who are smokers all show a higher odds ratio for erectile dysfunction. Endothelial dysfunction is a condition present in many cases of erectile dysfunction and thus there are common etiological pathways for other vascular disease states.

Modification of risk factors has been reported essentially in only one longitudinal study and, other than increasing physical activity, other modifications of lifestyles do not seem to change incidence data, at least in the males who start to be followed well in to middle ages such as the middle 50s [10].

**Corresponding Author:** Ronald W. Lewis, Department of Urology, University of Augusta, Augusta, GA, USA. Tel: (706) 721-0985; Fax: (706) 721-2548; E-mail: rlewis@mail.mcg.edu

#### References

- 1 Basson R, Leiblum S, Brotto L, Derogatis L, Fourcroy J, Fugl-Meyer K, Graziottin A, Heiman J, Loan E, Meston C, Schover L, Van Lankveld J, Schultz WW. Definitions of women's sexual dysfunction reconsidered: Advocation expansion and revision. *J Psychosomatic Obstet Gyn* 2003;24:221-30.
- 2 Waldinger MD, Zwinderman AH, Schweitzer DH, Olivier B. Relevance of methodological design for the interpretation of efficacy of drug treatment of premature ejaculation: a systematic review and meta-analysis. *Int J Impotence Research* 2004, in press.
- 3 Rosen RC, Riley A, Wagner G, Osterloh IH, Kirkpatrick J, Mishra A. The international index of erectile function (IIEF): a multidimensional scale for assessment of erectile dysfunction. *Urology* 1997;49:822-30.
- 4 Rosen RC, Brown C, Heiman J, Leiblum SR, Meston C, Shabsigh R, Ferguson D, D'Agostino R. The female sexual function index (FSFI): a multidimensional self-report instrument for the assessment of female sexual function. *J Sex Marital Ther* 2000;26:191-208.
- 5 Johannes CB, Araujo AB, Feldman HA, Derby CA, Kleinman KP, McKinlay JB. Incidence of erectile dysfunction in men 40 to 69 years old: longitudinal results from the Massachusetts Male Aging Study. *J Urol* 2000;163:460-3.
- 6 Moreira ED, Lbo CF, Diament A, Nicolosi A, Glasser DB. Incidence of erectile dysfunction in men 40 to 69 years old: results from a population-based cohort study in Brazil. *Urology* 2003;61:431-6.
- 7 Schouten BWV, Bosch JLHR, Bernsen RMH, Blanker MH, Thomas S, Bohnen AM. Incidence of clinically relevant erectile dysfunction (ED) and ED by two other common definitions: strong effect of definition and bias by duration and follow-up. Submitted to *Int J Impotence Res*.
- 8 Fugl-Meyer KS, Lewis RW, Bosch R, Fugl-Meyer AR, Laumann EO, Lizza E, Martin-Morales A. Definitions, classification, and epidemiology of sexual dysfunction. In: Lue T, Giuliano F, Khoury S, Montorsi F, Rosen R, editors. *Sexual medicine volume 1: sexual dysfunction in men health publications*. United Kingdom; 2004:1-36.
- 9 Prins J, Blanker MH, Bohnen AM, Thomas S, Bosch JLHR. Prevalence of erectile dysfunction: a systematic review of population-based studies. *Int J Impotence Res* 2002;14:422-32.
- 10 Fugl-Meyer AR, Fugl-Meyer KS. Sexual disabilities are not singularities. *Int J Imp Res* 2002;14:487-93.
- 11 Weinhardt LS, Carey MP. Prevalence of erectile disorder among men with diabetes mellitus: comprehensive review, methodological critique, and suggestions for future research. *J Sex Res* 1996;33:205-13.
- 12 Derby CA, Mohr B, Goldstein I, Feldman HA, Johannes CB, McKinlay JB. Modifiable risk factors and erectile dysfunction: can lifestyle changes modify risk? *Urology* 2000;56:302-6.