

Recreational use of oral erectile dysfunction medications among male physicians - A cross-sectional study

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Abstract

Introduction: Erectile dysfunction (ED) is defined as the persistent inability to attain and maintain an erection sufficient to permit satisfactory sexual performance. Bypassing health-care providers and obtaining ED medications (EDM) without a prescription are an issue that is faced globally.

Aim: We attempt to assess erectile function (EF) among a local sample of physicians, the psychological effects of recreational EDM use, and compare EF among different user groups.

Methods: This is a cross-sectional study done solely on physicians in Saudi Arabia. A self-designed questionnaire including demographics, sexual characteristics, use of ED medication, sexual satisfaction, and the validated international index of EF (IIEF).

Outcome: Physicians misused EDM.

Results: A total of 503 physicians completed the questionnaire. Among participants reporting sexual problems, only 23% received counseling and 3.4% were professionally diagnosed with ED. Among users, 71.2% were using EDM recreationally, 14.4% prophylactically, and 14.4% were prescribed. Participants aged 20–29 IIEF-5 score was significantly lower than participants aged 30–39 years. Prescribed users had a lower IIEF-5 score compared to both recreational users and nonusers.

Clinical Implications: Many healthy sexually active men use EDMs recreationally to increase sexual performance.

Strengths and Limitations: One of the limitations of our study is that we did not use standardized tools to determine the diagnosis of some important disorders like premature ejaculation. Our study strengths include the very high response rate, with our results truly showing a nationwide self-assessment of sexual dysfunction.

Conclusion: Recreational use of oral EDMs may adversely impact the psychological aspects of sexual function. In our study, physicians misused EDM. We recommend labeling EDMs as restricted medication that requires a prescription to use by a licensed physician.

Keywords: Erectile dysfunction, erectile dysfunction medication, men, physician, phosphodiesterase type 5 inhibitors, recreational, Saudi Arabia

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INTRODUCTION

Erectile dysfunction (ED) is defined as the persistent inability to attain and maintain an erection sufficient to permit satisfactory sexual performance.^[1] Although not a lethal condition, the interest in ED dates back to the 15th century.^[2]

Treatment modalities for ED are extensive and continuously developing. Lifestyle modifications and risk factor control could go a long way in the treatment of ED. Nonsurgical treatment options include oral phosphodiesterase Type 5 inhibitors (PDE5is), vacuum erection devices, intraurethral suppository, and intracavernosal injections. Finally, surgical options include penile implants and penile revascularization.^[2]

ED medications (EDMs) were developed to treat medically diagnosed ED.^[3] A popular form of EDMs is oral PDE5is. PDE5is do not stimulate the cascade of erection but rather prevent a catabolic step without having an inherent ability to produce an erection. Therefore, sexual stimulation is required for the medications to be effective, leading some to characterize PDE5is as facilitators rather than primers of tumescence.^[4] The discovery of PDE5i for causing the erection of the penis was accidental, noticed as a side effect while being administered to investigate their use in hypertension and angina.^[5] With the discovery of Zafirlinast, the first selective PDE5 inhibitor in 1974, a revolution in male sexual function commenced.^[6]

When it comes to a drug abuse definitions, there are three categories:

- Recreational: The use of a drug without medical justification for its psychoactive effects
- Chronic: The seeking for and use of a drug that is compulsive or difficult to control and also called addiction
- Deviant: The continued and risky use of a drug despite serious health, social, and legal consequences.

On the other hand, EDMs users can be categorized into three main categories: prescribed users to treat diagnosed ED, prophylactic users to special cases like patients undergoing prostate interventions, and recreational users.

Bypassing health-care providers and obtaining EDMs without a prescription are an issue that is faced globally.^[7,8] PDE5i users vary in terms of demographics, sexual behaviors, attitudes toward their general/sexual health, and demands for ED treatments.^[9] Obtaining PDE5i without a prescription and proper evaluation by a professional has substantial risks of adverse events including potentially

life-threatening hypotension when used with nitrates, also risks by limiting physicians' ability to identify drug contraindications, patients' ability to learn about the risks and benefits of medications, and pharmacists' ability to identify drug interactions and chance to educate patients.^[10] Such individuals risk using counterfeit PDE5i, which may be manufactured in poorly controlled and unsterile facilities, thereby introducing other health concerns.^[11]

In recent years, PDE5 use became popular among men without ED to improve sexual performance as a recreational drug.^[12] Off-label use of oral EDMs is sometimes used to counter the effects of other illicit recreational drugs.^[13] Evidence shows that oral EDMs use was associated with decreased erectile confidence, which in turn showed negative relations with erectile function (EF).^[14,15] To the best of our knowledge, there are no studies focusing on the recreational use of oral EDMs among physicians.

In this study, we attempt to add to the medical literature the adverse psychological effects of recreational oral EDMs use through assessing EF among a national sample of physicians. Moreover, we assessed and compared EF between different EDMs users (prophylactic, recreational, and prescribed) and nonusers. We believe that this is the first study to be solely focused on physicians.

METHODS

Study design

This was a cross-sectional quantitative study conducted between April and June 2020. An electronic survey in English was sent to male physicians working in Saudi Arabia through E-mail, WhatsApp, and other social media platforms.

Survey content

The survey contained five parts. The first section included demographic data, which were age, marital status, area of residence, professional level, specialty, presence of associated comorbidities, medication use, and body mass index (BMI). The second section included sexual characteristics, which were current sexual activity, previous counseling for any sexual problem, diagnosis of ED, ejaculation abnormalities, number of sexual partners, duration of current sexual relationship, and sexual intercourse frequency. The third section focused on oral EDM use, whether the respondent was a nonuser, prophylactic user, recreational user, or prescribed user. Moreover, the third section focused on the acquisition source of oral EDM, who advised the person to use them, the type of oral EDM used, reasons behind using oral EDMs, and impression on cost. The fourth section assesses

the satisfaction of sexual performance before and after using oral EDMs products. The fifth part used the English language validated international index of EF (IIEF-5).^[6] The permission to use the questionnaires has been obtained from Pfizer Inc. (“PFIZER”).

Statistics

Statistical analysis was performed using the SPSS software version 23 (IBM Corp. Released 2015. Version 23.0. Armonk, NY, USA: IBM Corp). The responses' frequencies of the first three sections were calculated. A one-way analysis of variance (ANOVA) was performed to compare the total IIEF-5 score between users and nonusers. Pairwise comparisons with Bonferroni corrections were done to compare prophylactic users, prescribed users, recreational users, and nonusers. IIEF-5 scores were compared between age groups and between professional levels using the Kruskal–Wallis test, due to violation of normality and homogeneity of variance. A Mann–Whitney *U*-test was used to compare IIEF-5 scores between married and single participants. In addition, a paired sample *t*-test was done to compare satisfaction before and after using EDMs. Moreover, Chi-square was used to compare the use of oral EDMs recreationally against not using them based on age and substance use. $P < 0.05$ was considered to be statistically significant.

Ethical considerations

The study was approved by the Institutional Review Board, College of Medicine at King Saud University (Research Project No. E-20-5255). All participants were required to read an online consent form and accept it before gaining access to the anonymous survey.

RESULTS

Demographics

A total of 503 physicians completed the questionnaire. The details of demographics of participants are listed in Table 1.

Most of respondents 75.7% reported that they are sexually active. Out of the participants reporting sexual problems, only 23% received counseling. 3.4% were professionally diagnosed with ED, 17.3% reported premature ejaculation, 4.8% reported delayed ejaculation, and 1.4% reported anejaculation. 60.4% reported a single sexual partner and 11.3% reported 2 or more. Thirty-one percentage reported intercourse frequency to be 2–3/week and 22.7% reported frequency of intercourse to be once or less per week. 20.3% had over 10 years in their current sexual relationship and 22.3% had between 1 and 5 years.

Table 1: Demographic and sexual characteristics of physician users and nonusers of oral erectile dysfunction medications

Variable	n (%)
Age	
20-29	251 (49.9)
30-39	171 (34.0)
40-49	59 (11.7)
50-59	17 (3.4)
60-69	4 (0.8)
>70	1 (0.2)
Marital status	
Single	181 (36.0)
Married	311 (61.8)
Divorced	10 (2.0)
Widowed	1 (0.2)
Professional level	
Consultant	104 (20.7)
Fellow/specialist	102 (20.3)
Resident	214 (42.5)
Intern	83 (16.5)
Specialty	
Surgical specialties	197 (39.2)
Medical specialties	174 (34.6)
Obstetrics and gynecology	12 (2.4)
General physician	2 (0.4)
Intern	78 (15.5)
Others	40 (8.0)
Substance use	
Tobacco	157 (31.2)
Alcohol	2 (0.4)
Alcohol and tobacco	35 (7.0)
Neither	309 (61.4)
Associated comorbidities	
Yes	92 (18.3)
No	411 (81.7)
Active medication affecting potency	
Yes	98 (19.7)
No	399 (80.3)
BMI	
Underweight	9 (1.8)
Normal weight	162 (32.2)
Preobesity	195 (38.8)
Obesity class I	95 (18.9)
Obesity class II	27 (5.4)
Obesity class III	15 (3.0)
Sexual activity	
Yes	381 (75.7)
No	122 (24.3)
Previous counseling for any sexual problems	
Yes	23 (4.6)
No, but having some problems	74 (14.7)
No	406 (80.7)
Erectile dysfunction diagnosis	
Yes	17 (3.4)
No	486 (96.6)
Ejaculation problems	
Anejaculation	7 (1.4)
Delayed ejaculation	24 (4.8)
Premature ejaculation	87 (17.3)
No problems	385 (76.5)
Number of sex partners	
≥2	57 (11.3)
1	304 (60.4)
Not applicable	142 (28.2)
Duration of current sexual relationship	
>10 years	102 (20.3)
5-10 years	59 (11.7)
1-5 years	112 (22.3)

Contd...

Table 1: Contd...

Variable	n (%)
1 year	46 (9.1)
One-night stands	24 (4.8)
Not applicable	160 (31.8)
Sexual intercourse frequency	
>3 per week	81 (16.1)
2-3 per week	156 (31.0)
≤1 per week	114 (22.7)
Not applicable	152 (30.2)

Erectile dysfunction medication use

The characteristics of EDMs users are highlighted in Table 2. Out of 503 respondents, 104 (20.7%) reported using oral EDMs. Among oral EDMs users, 71.2% (74 out of 104) were using oral EDMs recreationally, 14.4% prophylactically, and 15% were prescribed. Among users, 80% decided by themselves to use oral EDMs, 5% were advised by their partners, and 15% were advised by a physician. 85% of users acquired oral EDMs over the counter through different ways and 15% were prescribed. The reason to use EDMs was to improve the strength and rigidity of erections 61.3%, to increase their sex drive 28%, and to prevent performance anxiety 30%. Among oral EDMs users, Tadalafil was used the most at 51%, followed by Sildenafil at 42% and Vardenafil (7%) [Figure 1]. Around 70% experienced an enhancement of penile rigidity after using oral EDMs, 47% reported an increase in erection duration, and 51% reported an increase in their self-confidence. Around half of the EDM users found them to be reasonable in price and 40% found them to be expensive. Among adverse effects experienced, headache was the most common at 46%, followed by nasal congestion at 27%, and flushing at 23%. Most of the users (44%) have been using oral EDMs for less than a year.

In addition, a comparison of satisfaction of sexual performance before and after using oral EDMs revealed a significant difference between the two scores, $t(95) = -6.38$, $P < 0.001$. Participants were significantly less satisfied before using oral EDMs ($M = 3.20$, standard deviation [SD] = 1.23) than after using them ($M = 4.08$, $SD = 1.22$).

Next, a Fisher's exact test was performed to analyze the relationship between age group (excluding participants aged 60–69 and >70) and usage of oral EDMs (including only recreational users and nonusers). The association between age groups and oral EDMs use was found to be significant and moderate, $P < 0.001$, Cramer's $V = 0.30$ [Table 3]. In most of the age groups (20–29, 30–39, and 40–49), majority of the participants were nonusers, while among respondents aged 50–59, there were more recreational users.

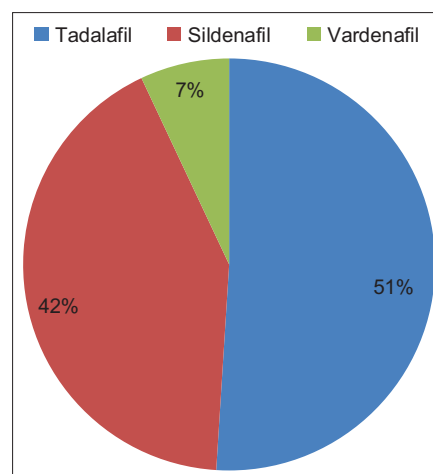


Figure 1: Brand names of oral erectile dysfunction medications used among users

A Chi-square test of independence was used to assess the link between substance use (alcohol consumers vs. nonalcohol consumers) and usage of oral EDMs (recreational users and nonusers). A significant, weak relationship was found, Chi-square (1) = 9.12, $P = 0.003$, $\phi = 0.14$. The percentage of EDM nonusers was equal to 85.7% among respondents who do not consume alcohol, while it was 65.6% for participants who consume alcohol [Table 4].

A Fisher's exact test was computed to test for a relationship between ejaculation problems and usage of oral EDMs. A significant, moderate association was found, $P < 0.001$, Cramer's $V = 0.20$. Most users of EDM did not have ejaculatory problems.

International index for erectile function-5 comparisons

Based on age

Three most frequent age categories were compared: 20–29, 30–39, and 40–49. Using Kruskal–Wallis test $H(2) = 9.20$, $P = 0.01$, it was found that participants aged 20–29 ($M = 19.24$, $SD = 5.21$, $Me = 21.00$). IIEF-5 score was significantly lower than participants aged 30–39 ($M = 20.66$, $SD = 4.37$, $Me = 22.00$), $P = 0.023$.

Based on the professional level

A Kruskal–Wallis test was also performed to compare IIEF scores between participants with different professional levels and the result was significant, $H(3) = 21.37$, $P < 0.001$. Interns ($M = 17.36$, $SD = 5.65$, $Me = 17.00$) had a significantly lower score than all other groups: consultants ($M = 20.74$, $SD = 4.19$, $Me = 22.00$, $P < 0.001$), fellows/specialists ($M = 20.32$, $SD = 4.42$, $Me = 22.00$, $P = 0.003$), and residents ($M = 20.29$, $SD = 4.75$, $Me = 21.00$, $P < 0.001$).

Table 2: Characteristics of oral erectile dysfunction medications use

Variables	n (%)
Oral EDM acquisition	
Prescribed user	15 (3.0)
Prophylactic user	15 (3.0)
Recreational user	76 (15)
Nonuser	399 (79)
Who decided/advised using oral EDMs?	
Oneself	83 (16.9)
Partner	5 (1.0)
Physician	16 (3.2)
Nonuser	399 (79)
Primary acquisition source	
Drug representatives	2 (0.4)
Friends	5 (1.0)
Online pharmacy abroad	4 (0.8)
Online pharmacy in one's country	2 (0.4)
Over-the-counter drug stores	78 (16.1)
Prescription	13 (2.6)
Nonuser	399 (79)
Reasons for using oral EDMs	
Because I was diagnosed with erectile dysfunction	7 (1.4)
Counteract drugs that decrease erectile capacity	5 (1.0)
Curiosity	15 (3.0)
I used oral EDMs to prevent future erectile dysfunction	6 (1.2)
Prophylactic use (due to medical reason)	6 (1.2)
To be more sure of myself (enhance self-esteem)	44 (8.7)
To feel more relaxed with my performance	31 (6.2)
To gratify and impress my partner	31 (6.2)
To improve strength, rigidity, and hardness of erection	63 (12.9)
To increase sex drive	30 (6.0)
To prevent performance anxiety	32 (6.4)
Non-user	399 (79)
Type of oral EDMs used	
Cialis (Tadalafil) 20 mg	29 (5.8)
Cialis (Tadalafil) 5mg	47 (9.3)
Herox (Tadalafil) 20 mg	7 (1.4)
Herox (Tadalafil) 5mg	10 (2.0)
Levitra (Vardenafil) 10mg	10 (2.0)
Levitra (Vardenafil) 20 mg	2 (0.4)
Snafi (Tadalafil) 20 mg	17 (3.4)
Snafi (Tadalafil) 5mg	8 (1.6)
Viagra (Sildenafil) 100mg	18 (3.6)
Viagra (Sildenafil) 50mg	33 (6.6)
Nonuser	399 (79)
Frequency of using oral EDMs before intercourse	
Always or almost always	8 (1.6)
Most times (over 50%)	19 (3.8)
Sometimes (approximately 50%)	15 (3.0)
Few times (less than 50%)	51 (10.1)
Never or almost never	410 (81.5)
Impression of usage cost	
Expensive	49 (9.7)
Reasonable	60 (11.9)
Cheap	12 (2.4)
Nonuser	399 (79)
Usage benefits	
Enhancement of penile rigidity	73 (14.5)
Improve ejaculation	11 (2.2)
Increasing erection duration	50 (9.9)
Increasing self-confidence	53 (10.7)
Increasing sense of warmth	15 (3.0)
Increasing sexual desire	20 (4.0)
No benefits at all	6 (1.2)
Nonuser	399 (79)
Adverse effects	
Abdominal pain	3 (0.6)

Contd...

Table 2: Contd...

Variables	n (%)
Abnormal vision	7 (1.4)
Back pain	10 (2.0)
Dizziness	8 (1.4)
Dyspepsia	11 (2.2)
Flushing	24 (4.8)
Headache	48 (9.5)
Myalgia	10 (2.0)
Nasal congestion	28 (5.6)
Palpitation	17 (3.4)
Stomach acidity and GI upset	1 (0.2)
No adverse events	33 (6.6)
Nonuser	399 (79)
Satisfaction before using oral EDMs	
Very dissatisfied	9 (1.8)
Moderately dissatisfied	23 (4.6)
Equally satisfied and dissatisfied	26 (5.2)
Moderately satisfied	27 (5.4)
Very satisfied	17 (3.4)
No intercourse	9 (1.8)
Nonuser	399 (79)
Satisfaction after using oral EDMs	
Very dissatisfied	10 (2.0)
Moderately dissatisfied	6 (1.2)
Equally satisfied and dissatisfied	14 (2.8)
Moderately satisfied	26 (5.2)
Very satisfied	46 (9.9)
No intercourse	3 (0.6)
Nonuser	399 (79)
Duration of oral EDM use	
<1 year	45 (9.4)
1-2 years	27 (5.6)
2-3 years	13 (2.6)
>3 years	18 (3.6)
Nonuser	399 (79)

EDMs: Erectile dysfunction medications

Based on marital status

A comparison using Mann–Whitney *U*-test was also performed to examine the IIEF-5 score difference between single and married respondents. The result was significant, $U = 21288.50, P < 0.001$. IIEF-5 score was higher for married participants ($M = 20.89, SD = 3.92, Me = 22.00$) than for single respondent ($M = 18.33, SD = 5.75, Me = 20.00$).

Based on types of users

To compare the mean score in IIEF-5 among users and nonusers of oral EDMs, a one-way ANOVA was performed. The result was significant, $F(3, 499) = 10.73, P < 0.001$. Pairwise comparisons with Bonferroni corrections showed that prescribed users ($M = 14.53, SD = 4.78$) had a significantly lower score in IIEF-5 compared to both recreational users ($M = 19.93, SD = 4.00; P < 0.001$) and nonusers ($M = 20.26, SD = 4.83; P < 0.001$). Similarly, prophylactic users ($M = 15.93, SD = 5.08$) scored significantly lower compared to recreational users ($P = 0.018$) and nonusers ($P = 0.003$). Figure 2 demonstrates the mean IIEF-5 score among the types of oral EDMs user.

A comparison between users and nonusers based on the first question of the IIEF-5 “confidence of getting and keeping an erection” a one-way ANOVA revealed a significant difference in the mean score between users and nonusers of oral EDMs, $F(3, 499) = 19.25$, $P < 0.001$. In particular, pairwise comparisons with Bonferroni correction showed that nonusers ($M = 3.95$, $SD = 0.96$) scored significantly higher than all other groups: prescribed ($M = 2.40$, $SD = 1.12$, $P < 0.001$), prophylactic ($M = 3.00$, $SD = 1.25$, $P = 0.001$), and recreational users ($M = 3.54$, $SD = 0.89$, $P = 0.004$). In addition, prescribed users had a significantly lower score than recreational users ($P < 0.001$) [Figure 2].

Based on risk factors

No significant difference was found in IIEF-5 scores between smokers and participants who do not use alcohol or tobacco, respondents with or without comorbidities,

or participants taking medications affecting potency, and participants who do not. Moreover, participants’ BMI classes (three most frequent ones: normal weight, preobesity, and obesity class 1) had no significant impact on IIEF-5 scores.

DISCUSSION

Recreational use of oral erectile dysfunction medications among physicians

Many healthy sexually active men use EDMs recreationally to increase sexual performance.^[17,18] The use of EDMs recreationally has been more evident in the younger population.^[12,14,15,18,19] When comparing earlier and recent literature, an increase from 2.6% to 61.9% in recreational use has been evident [Table 5]. A variation in recreational use rate could vary from a country to another, but such an increase should raise some attention. The occurrence of serious adverse events secondary to using EDMs without a prescription and proper clinical evaluation has been well supported by previous studies [Table 5]. Physicians are

Table 3: Age groups and oral erectile dysfunction medications recreational users versus nonusers

Age [§]	Recreational users, n (%)	Nonusers, n (%)	Total, n (%)	P*
20–29	21 (29.2)	222 (55.9)	243 (51.8)	<0.001
30–39	26 (36.1)	136 (34.3)	162 (34.5)	
40–49	18 (25.0)	35 (8.8)	53 (11.3)	
50–59	7 (9.7)	4 (1.0)	11 (2.3)	
Total	72 (100.0)	397 (100.0)	469 (100.0)	

[§]Participants aged between 60–69 and 70–79 were excluded, *Chi-square test

Table 4: Alcohol use and oral erectile dysfunction medications recreational users versus nonusers

	EDM recreational users	EDM non-users	Total	P*
Alcohol user	11 (14.9)	21 (5.3)	32 (6.8)	0.003
Alcohol nonusers	63 (85.1)	378 (94.7)	441 (93.2)	
Total	74 (100.0)	399 (100.0)	473 (100.0)	

*Chi-square test. EDMs: Erectile dysfunction medications

Table 5: Recreational use of oral erectile dysfunction medications in previous literatures among general population

Author	Year	Country	Sample size (n)	Mean age (SD)	Recreational use, n (%)
Aldridge et al. ^[38]	1999	UK	519	26 (NR)	15 (3%)
Santtila et al. ^[15]	2007	Finland	4,274	29.51 (=6.77)	115 (2.6%)
Korkes et al. ^[19]	2008	Brazil	167	21.2 (±2.3)	15 (9%)
Alahdal et al. ^[35]	2008	KSA	337	NR	188 (55.7%)
Bechara et al. ^[112]	2010	Argentina	321	25.1 (±3.3)	69 (21.5%)
Schnetzler et al. ^[7]	2010	UK, Germany, and Italy	11,889	38.7 (± 11.6)	403 (32.2%)
Harte and Meston et al. ^[34]	2011	USA	1,944	21.3 (= 4.12)	77 (4%)
Harte and Meston et al. ^[14]	2012	USA	1,207	21.9 (=4.48)	72 (6%)
Kimura et al. ^[9]	2012	Japan	7,710		519 (45.4%)
Shaeer et al. ^[27]	2013	USA	603	53.43 (± 13.9)	15.6%
Chan et al. ^[39]	2015	UK	282	32.7 ± 7.7	167 (59.2%)
Alshahrani et al. ^[36]	2016	KSA	1008	NR	234 (61.9%)
Hammoud et al. ^[40]	2017	Australia	2,250	33 (NR)	727 (32.3%)
Corona et al. ^[33]	2018	Belgium, France, Germany, Italy, Poland, Portugal, and Spain	940	46.2 (=13.4)	467 (60%)
Attia et al. ^[41]	2019	Egypt	3,000	41.76 ± 9.39	552 (58.35)

NA: Not reported, SD: Standard deviation

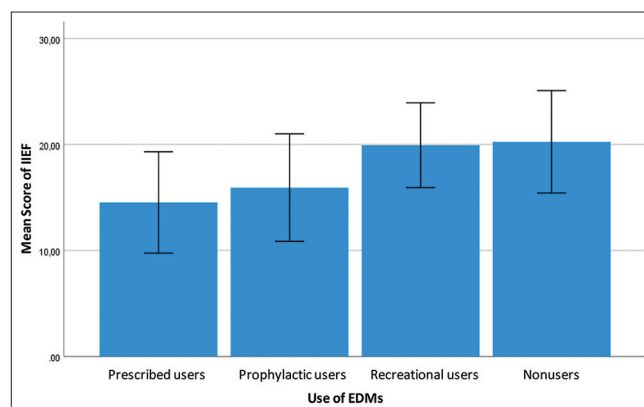


Figure 2: Mean score in international index of erectile function amongst prescribed, prophylactic, recreational, and nonusers of oral erectile dysfunction medications

expected to be more informed about using medications over-the-counter without proper clinical evaluation. However, in our study, we found that 74 (14.7%) of physicians used oral EDMs recreationally, representing 71.2% of all EDMs users. Compared to previous papers [Table 5], recreational use of oral EDMs among physicians is lower than what is reported in the general population, yet alarming.

Physician's sexual health and erectile function

In our study, we reported a pattern of physicians using oral EDMs and their sexual characteristics. Around 23% received professional counseling for their sexual concerns, 3.4% were professionally diagnosed with ED, and 23.5% reported ejaculation problems. Furthermore, 19.7% of physicians regularly used medication that could potentially cause ED [Table 1]. The IIEF-5 score was significantly higher for married participants than for single respondents. Furthermore, we reported higher recreational EDMs use among older physicians, with the age range (50–59 years) representing a significantly higher percentage of recreational users compared to other age groups [Table 3]. Prescribed users demonstrated a significantly lower IIEF-5 score than prophylactic and recreational users. Moreover, between all groups, nonusers showed a higher IIEF-5 score as compared to other groups [Figure 2].

We found that interns had a significantly lower IIEF-5 score than all other groups (consultants, fellows/specialists, and residents). Sexual dysfunction among young physicians is a growing problem. This is most likely due to the nature of their work and burnout. Many papers investigated the impact of burnout among physicians in different specialties. Burnout impacts sexual function for both sexes. In a survey of 251 residents, personal burnout was observed to be associated with sexual dysfunction in men, whereas job stress correlated with female sexual problems.^[20] The authors found the rates of sexual dysfunction are higher than expected among medical students, with 30% of men suffering from ED.^[21] In a recent systemic review and meta-analysis, the prevalence of burnout syndrome was significantly higher among surgical residencies and specialties with an urgent nature than other clinical specialties.^[22] In another study, 339 medical residents from 11 specialties reported sexual dysfunction in 49% of the female residents and 11% of male residents. Both the frequency of sexual activity and quality of relationship with partner decreased during residency compared with the time immediately before residency.^[23] Residency training period is also associated with increased use of illicit substances.^[22,24,25] We did not assess the relation between burnout status, working hours, type of specialty of

physicians with the type of EDMs users. Further research is warranted to explore sexual dysfunction among physicians and to find prevented measures to decrease such problems in clinical training and practice.

In our study, 32.5% of physicians reported ejaculation disorders (according to ISSM definition of intravaginal latency period <1 min) [Table 1]. Moreover, we found a moderate association between ejaculation problems and the use of oral EDMs. Data from Shaer and Shaer showed that 48.8% of EDMs users had premature ejaculation. However, premature ejaculation and low libido are sometimes masked by ED or are the cause of subsequent ED.^[26] Premature ejaculation can motivate patients to use EDMs, recreationally.^[27] This is promoted by the fact that Sildenafil causes a significant reduction of the postejaculatory refractory time.^[28,29] However, the assumed role of PDE5Is as a treatment for premature ejaculation is theoretical and based solely on biology and pharmacology.^[30] Multiple systematic reviews of PDE5I as a treatment of premature ejaculation have failed to provide robust empirical evidence to support the role of PDE5Is in the treatment of premature ejaculation, except for men with concurrent ED.^[31,32] On the other hand, recent well-designed studies do support a potential role for these agents, suggesting a need for further evidence-based research.

In our study, 15 (3.0%) physicians used EDMs prophylactically representing 14.4% of all EDMs users. 5 (1.0%) participants reported using EDMs to counteract drugs that decrease erectile capacity, 15 (3.0%) used oral EDMs to prevent future ED, and 6 (1.2%) prophylactically use EDMs because of medical conditions [Table 2]. In our study, only 23% received counseling and 3.4% were professionally diagnosed with ED [Table 1]. Possible reasons for delayed consultations include embarrassment, social stigma, dissatisfaction with the relationship with physicians, and their ability to deal with sexual health.^[33]

Recreational use of erectile dysfunction medications and physician's age

We found a significant and moderate relationship between age group and recreational EDM use [Table 3]. The IIEF-5 score was significantly lower for participants aged 20–29 compared to participants aged 30–39. Among respondents, physicians aged 50–59 were found to have a higher percentage of recreational users. Such results are consistent with other studies reporting increasing EDM usage rates with increasing age.^[15,34] Corona *et al.* concluded that prescribed oral EDMs users were significantly older than recreational users, thus suggesting that younger men

are culturally less prone than older men to acknowledge ED or an erectile concern as a medical symptom.^[33]

Erectile confidence, ability, and satisfaction among physicians

In our study, the reasons for using oral EDMs were to improve the strength and rigidity of erection (61.3%), increase sex drive (28%), and prevent performance anxiety (30%). Corona *et al.* analyzed the reasons for the use of EDMs, subjects who used the standard recommended dosage felt more relaxed during sexual intercourse, whereas subjects who used the highest dosage more often wanted to gratify their partner. Furthermore, a larger percentage of men using the lowest PDE5i dosage reported recreational use of drugs, without statistical differences among groups.^[33] Several studies show an association between informal use of EDMs and low erectile confidence, which suggests that lack of sexual confidence is a common reason to use EDMs.^[12,14,15] The frequency of EDM use was significantly negatively correlated with erectile confidence.^[15] Moreover, this was similar to our study's findings.

Mondaini *et al.* reported that PDE5is cannot improve erectile performance in subjects with normal erection.^[28] Lack of confidence in one's ability to initiate and hold erections has been identified as an important psychogenic risk factor for ED.^[16] Santtila *et al.* reported that recreational users had currently lower confidence in their erectile ability than nonusers even though they had a significantly better EF and significantly more unrestricted sexual behavior as well as had more confidence when initiating sexual activity.^[15] While Harte and Meston reported that recreational EDMs users had a 2.5-fold rate of erectile difficulties compared to nonusers.^[34] Recreational users of EDMs may be vulnerable to becoming psychologically dependent on these medications inducing erection.^[15] Certainly, these results suggest that there is a need for longitudinal follow-up studies of those men who start using EDMs for recreational purposes.

Misuse and risk factors associated with recreational use of erectile dysfunction medications among physicians

Several studies revealed that the use of PDE5i has been associated with misuse and high-risk sexual behaviors.^[12,18] Harte and Meston suggested the possibility that frequent substance use (which can independently cause erectile difficulties) may be etiologically responsible for the increased rate of self-reported ED.^[34] Data reported a high percentage (53.6%) of PDE5i association between alcohol (more than 75%), illicit drugs, and psychotropic medications. This may explain the high percentage of adverse events, mainly related to PDE5i vasodilatory

effects.^[12] In our study, few respondents consumed alcoholic beverages (7.4%). Alcohol consumption was weakly associated with the use of recreation EDMs [Table 4]. We did not measure exact alcohol consumption and drinking habits. Therefore, a dose-dependent association cannot be withdrawn to reflect accurately the association of using EDMs recreationally.

Among our study demographic, the rate of obtaining EDMs from uncontrolled sources is found to be higher than in the general population, and a total of 75% of EDM users acquired oral EDMs over the counter [Table 2]. Furthermore, we found that 80% of PDE5I users in our study obtained their EDMs without prior professional consultation (physician or pharmacist). Two previous studies in Saudi Arabia reported around 80% and 84.1% obtained EDMs without a prescription.^[35,36] This rate is considered high when compared to data from the United States, Europe, Japan, and Australia at 20.4%, 32.3%, 45.4%, and 55%, respectively.^[7,9,27,37] This should be considered a major health problem as those EDM users expose themselves to the risk of counterfeit and unapproved generics. PDE5i in most Middle Eastern countries are available "over the counter" and a medical prescription is not essential to purchase it from any drug store.^[36] Another potential factor that could facilitate the use of PDE5is recreationally is that the majority of the EDMs users in our study viewed them as reasonably priced medications [Table 2]. Sugita and Miyakawa explained that some patients may opt to choose counterfeit PDE5i because it may be more convenient, avoiding embarrassment or because of its lower price compared to genuine PDE5i from HCP.^[8] Another factor is the good economic status of the general population in Saudi Arabia who can afford such medications.^[36]

In our study, among users, 87% of them obtained EDMs without a prescription. On the other hand, data from the USA demonstrate high compliance to the law and regulations with 79.6% of EDMs users obtaining their medications with a prescription.^[27] Although these disparities may be related to variances in insurance legislation as well as ways of acquiring pharmaceuticals without involving a health care practitioner in Saudi Arabia and other countries. Another interpretation might be that being a physician will make the use of such medications felt to be more secure and confident to use.

Strengths and limitations

This study may be limited by the fact that most respondents were younger, and this may have introduced bias. We did not use standardized tools to determine a diagnosis of

premature ejaculation, medical/psychiatric disorders, and tobacco/alcohol consumption; no conclusions can be drawn from these points as neither can be easily quantified.

Our study strengths include the very high response rate, with our results truly showing a nationwide self-assessment of physician's EF and different types of EDMs. We used a standardized tool to establish a diagnosis of ED in our sample and to compare between different types of users. To the best of our knowledge, this is the first study to focus on physicians solely.

CONCLUSION

There is the potential for oral EDMs to be misused among physicians, those who are considered a highly educated individuals and more aware of the hazards of using such medications without a specialist prescription. Based on our local regulations, we recommend labeling EDMs as restricted medication requiring a prescription to use by a licensed physician.

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Conflicts of interest

There are no conflicts of interest.

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