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Research Article

POPULATION BASED SURVEY ON KNOWLEDGE AND QUALITY OF LIFE PERCEPTION ON ERECTILE DYSFUNCTION AMONG DIABETIC AND NON-DIABETIC ATTRIBUTES, PENANG, MALAYSIA

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ABSTRACT

Introduction: Sex is a natural & basic drive of human beings. In Malaysia erectile dysfunction (ED) is a common problem, affecting 16 to 47% of men above 40 years old. Erectile dysfunction (ED) is a common complication of diabetes, with prevalence ranging between 27 and 75%. Knowledge and perception are essential precursors of ED related quality of life. A cross-sectional study was conducted in Pulau Pinang, Malaysia, to produce the preliminary information to compare the knowledge and the perception of diabetic & non diabetic population towards sexual activity & the effect of ED on quality of life.

Methods: Population based survey includes the entire male respondent in the community with age above than 18 years. Investigator personally approached the respondents and asked to complete self administered and anonymous pre-validated questionnaire. Statistical Package for Social Sciences (version 15®) was used to analyze the data by adopting chi-square, univariate and multivariate analysis, ANOVA, T-test techniques respectively.

Results: Data was collected from 1700 males aged between 20 years and above with response rate of 88.35%. The mean total knowledge score obtained by diabetes was significantly (p<0.001) higher (63.7 % of the maximum possible total knowledge score) than non-diabetes score (53.8 %). Diabetes scored significantly (p=0.021) lower regarding perception towards sexual activity (65.1%) than non diabetes (70%), also, diabetes scored non significantly higher scores regarding perception towards effect of ED on quality of life (61.3%) comparing with non diabetes (59.7%). Mean score of total Knowledge of non-diabetes was 10.23±4.73 (i.e.53.8%) with maximum possible score of 19. While mean score of total perception of non diabetes was 34.08±5.51 (i.e. 63.1%) with maximum possible score of 54. There was significant association between diabetes & using medicine for ED (p<0.001) Viagra ® (Seldenafil) was the most commonly used medicine between diabetes & non diabetes .

Conclusion: It was concluded that although diabetes patients are more knowledgeable regarding ED but they have lower perception towards sexual activity & less satisfaction with their sexual life. Their perception regarding the effect of ED on their quality of life is more than that of non-diabetes.

Keyword: diabetes mellitus, perception and quality of life, erectile dysfunction, erectile and diabetes, diabetes and quality of life, erectile dysfunction treatment.

INTRODUCTION

Sex is a natural & basic drive of human beings. A person's total sexual experience however depends on the integration of genetic, physiological, biological, & psychosocial influences [1,2]. Patients with ED suffer from a multitude of problems, ranging from depression, loss of self-esteem, worthlessness, workplace inattention and concentration loss, once they experience a failure to erect [3]. Little is known about impact of erectile dysfunction and the effect of its subsequent treatment on the lives and wellbeing of patients [1,4]. The International Index of Erectile Function (IIEF) questionnaire is an important screening tool used by doctors in this regard. The questionnaire consists of five item with fifteen questions concerning erectile function, orgasmic function, sexual desire, intercourse satisfaction and overall satisfaction [5].

Medications for hypertension, cardiovascular disease, and depression also may cause or exacerbate ED, and there is strong evidence suggesting that cigarette smoking and heart disease contribute to the disorder [6]. The Massachusetts Male Aging Study, an ongoing epidemiologic study of health and aging in men begun in 1987, reveals a 99% age-adjusted probability of the incidence of ED in smokers treated for heart disease [7]. Other risk factors include excessive alcohol consumption, bicycling more than three hours a week, and a sedentary lifestyle [6].

In Malaysia erectile dysfunction is a common problem, affecting 16 to 47% of men above 40 years old. Many troubled men with erectile dysfunction do not complain or come forth and seek medical help although a large proportion of them will admit to having the problem on direct questioning. In a recent study, it is estimated that up to 1.68 million Malaysian men above the age of 40 years may be experiencing some degree of erectile dysfunction [4].

Erectile dysfunction (ED) is a common complication of diabetes, with prevalence ranging between 27 and 75% [1-3]. Despite the high prevalence of this condition in patients with diabetes, little is known regarding how diabetic subjects with ED differ from the general population of impotent men. Comparison of randomized clinical trials assessing the efficacy of sildenafil show that diabetic men with ED differ from the general population of impotent men in their response to oral therapy. However, it is not known whether diabetic men present with worse sexual dysfunction than impotent patients from the general population or whether ED has a different impact on quality of life in diabetic men when compared with non diabetic patients [6, 7, 8].

Several studies have examined ED by diabetes type and duration, but few have directly compared the prevalence of this condition in men with and without diabetes [9, 10]. Therefore, little literature is available about knowledge and the perception of general Malaysian population, particularly among patients with type II diabetes mellitus; only limited data has been derived from small sample studies. Main objectives of the study were to evaluate the knowledge and to compare the knowledge of diabetes with non-diabetes respondents on risk factors & prevention of ED, also to evaluate the perception & to compare the perception of diabetes with non-diabetes participants towards sexual activity & the effect of ED on quality of life.

Significance of study: Analyzing the findings of the study will give an indicator for the level of knowledge & perception of general

public, particularly diabetes for ED & its effect on the Quality of Life for those suffering for the problem and so developing appropriate future educational interventions in order to improve the knowledge & perception of population. And to enhance the quality of life in patients with ED particularly in diabetes could be an important strategy in community.

METHODS

A cross-sectional, descriptive study was conducted in Pulau Pinang during Nov 2009 to March 2010. Pulau Pinang is one of the fourteen states located in the northwest of Malaysia and comprises of the mainland and Penang Island. Its population is 1265.1 thousand [9]. Different ethnic groups inhabiting the state are Malays (42.5%), Chinese (46.5%), Indians (10.6%), and other minorities (0.4%) [11].

Cluster random sampling technique was employed for the selection participants in the community. Participants were approached in plazas, malls, shopping marts and invited to take part in this survey. To avoid bias all the three main ethnic groups were included according to the racial distribution in the country. Verbal consent was taken from the respondents and instructions were given to fill the questionnaires. All questionnaires were anonymous so to maintain the privacy participants were asked to fold the questionnaire after filling. Ethical approval was obtained from the Social and Behavioral Research Ethics Committee, University Sains Malaysia. The face and content validity was done by the professionals at the Disciplines of Social and Administrative Pharmacy at Science university Malaysia and by the Department of Biostatistics General Hospital Pulau Pinang.

A multilingual (English, Malay, Chinese, Tamil) was prepared with the collaboration of centre of languages and translations, USM. The questionnaire divided into six parts, namely: demographic data. (7 parameters), knowledge regarding causes & risk factors of ED (13 questions), knowledge regarding prevention of ED (6 questions), perception regarding sexual activity (7 questions), perception regarding the effect of ED on quality of life (7 questions), treatment of ED (4 questions), In knowledge sections, participants were awarded one point for each correct answer and zero for wrong or don't know response. In perception sections, likert Scale was used. Age above and equal than 18 years enrolled in this study design.

The reliability scale was applied to all the variables comprising the knowledge domain i.e

Knowledge regarding causes & risk factors of ED, prevention, perception regarding sexual activity, effect of ED on quality of life and treatment of ED. The reliability and internal consistency of the tool were estimated on the basis of Cronbach's Alpha (= 0.79). Using face and content validation technique did validation of the scale.

Results were analyzed statistically using statistical package for the social sciences (SPSS) for windows version (15®). Both descriptive and inferential statistics were used to analyze the data. The following mention statistical tests were used when appropriate: Chi-square test, Student-T test, Mann-Whitney U test, Kruskal – Wallis test and ANOVA. All above and also for univariate & multivariate analysis the statistical significance level used was kept at 0.05.

RESULTS

A population of 1924 from community was surveyed. The responses of 1700 (88.35%) participants were valid; the rest of 224 (11.64%) survey forms were rejected because they were not completely filled. The mean age of the study participants was recorded as 47.5 years. The socio-demographic characteristics of the participants are shown in "additional file 1". The erection function / dysfunction was classified on five likert scale, about 70.6% participants reported erectile functioning from moderate to very low. The responded values were high 500 (42.7%), moderate 726 (16.2%), low 275 (16.2%) and very low 199 (11.7%) respectively.

The mean score of knowledge of causes & risk factors is 7.09±3.45 (i.e. 54.5%) with maximum possible score of 13. The mean score of knowledge of prevention of ED is 3.63 ±1.60 (i.e. 60.5%) with maximum possible score of 6. Mean scores of perception towards sexual activity is 15.11±2.61 (i.e.68.7%) with maximum possible score of 22. Mean scores of perception towards effect of ED on quality of life is 19.22 ± 3.22 (i.e. 60.1%) with maximum possible score of 32. The mean score of total knowledge is 10.72±4.46 (i.e. 56.42%) with maximum possible score of 19. The mean score of total perception is 34.04±5.15 (i.e. 63%) with maximum possible score of 54. Mean (SD) score for perception towards sexual activity is significantly (p<0.001) increase with the increase in the reproductive organ sizes in table 1.

Mean score of total Knowledge of non-diabetes was 10.23±4.73 (i.e.53.8%) with (p=0.002) maximum possible score of 19. Mean score of total perception of non-diabetes was 34.08±5.51 (i.e. 63.1%) with maximum possible score of 54. Mean score of total Knowledge of diabetes was 12.11±3.20 (i.e. 63.7%) with maximum score of 19. Mean score of total perception of diabetes was 33.92±4.02 (i.e. 62.8%) with maximum possible score of 54 in table 2. Sexual activity perception score is significantly (p=0.021) lower with a mean score difference among DM and NDM. A total of 70.51% participants respond to 'yes' on the use of medicine for ED. With 68.97% state the use of Viagra® (Sildenafil) followed by Cialis® (Tadalafil) with 12.07% etc presented in figure 1.

Tables 3 provides complete information regarding the mode, median and mean score comparison against diabetic and non-diabetic patients on each section of knowledge and perceived activity. When we look at the descriptive data on the percentage of correctness regarding the knowledge question, a cumulative difference is observed between both groups, a univariate and multivariate analysis has been performed to identify the specific relationship of characteristics among diabetes and non-diabetes population (table 4). For correctness in perception domain please refer to supplementary data file. Erection level is categories by 5-likert scale presented in questionnaire attached. ANOVA analysis technique was used to identify the mean score differences with outcome domains of knowledge and perception score in between diabetes and non-diabetes population (table 5, 6). We come to know that diabetes patients are porn towards low (13%) erection as compared to non-diabetes (3%), also 33% of non-diabetic claimed high erection level as compared to diabetes only (17%). On other hand the comparison between groups regarding the treatment preferences was analyzed (p<0.001) reporting information is presented in figure2. Upon further analysis on diabetes group, it is identified that erection level have a significant (p<0.001) association with years of diabetic history in figure 3. Finally when we ask about the perception about the recent sexual life, 36% of NDM with significance of p<0.024 stated 'Pleased' as compared to only 13% of DM. (figure 4).

DISCUSSION

Diabetic patients are significantly more knowledgeable regarding risk factors & preventive measures than non diabetic people. The higher mean total score of knowledge performed by diabetes 12.11(3.20) compared with non diabetic people 10.23(4.73) (p=0.002) can be attributed to the regular lessons provided in diabetic clinic in USM main campus, & their interest to know more about the complications for their disease. It is rationale that people suffered from any disease will know more about their problems than do the others. It is not strange that people with more than 10 years with diabetes performed the highest knowledge scores comparing to other diabetes with less diabetes disease duration.

It is not unusual for diabetes to have significantly lower perception towards sexual activity (P=0.012) & higher perception regarding the effect of ED on quality of life (p=0.332) These results are consistent with many other studies which showed that Impotent men with diabetes presented with worse ED than no diabetes men with ED and this resulted in worse disease-specific health related QoL in the diabetic men. (Diabetes Care 2005) [12]. Also erectile dysfunction is extremely common among type 2 diabetic patients and associated with poorer quality of life (Diabetes Care 2002) [13]. Also there is significant difference between diabetes themselves & perception of sexual activity (p= 0.019) , as those with longer duration with

diabetes scored the lower sores of perception of sexual activity & the higher scores of effect of ED on their quality of life.

There was significant association between diabetes & source of sexual information (p<0.001) as most of diabetic patient (75%) ask for information or queries directly to the health care professionals .This indicates the important rule of health professionals & they must be involved in health education to the public , particularly for diabetic education. Reading educational material & techniques should be designed in suitable way for less educated, non English speaking & low income populations. For example, health professionals might supply the materials with other aids such as personal instructional sessions or audio- visual aids.

There is a significant difference between diabetes & non diabetes people regarding the degree of erection & number of intercourse / month (*p*= 0.000,*p*=0.005 respectively) , as diabetes showed lower degree of erection & less number of intercourse / month & these results agree with another study conducted by David et al .(2003) showed that Impotent men with diabetes present with worse ED than non diabetes men with ED [14]. Also there is significant difference between diabetes with different periods with diabetes & their confidence to keep erection (*p*=0.018) with reduction in erection level with longer periods with diabetes. These results compatible with the results of another study done by Constance G et al .(2002) showed increasing duration with diabetes was positively associated with increased risk of ED [13] . It was non unexpected to find significant difference towards satisfaction with recent sexual life between diabetes & non-diabetes with less satisfaction with diabetic people (*p*<0.001).

It is interesting to find the majority of diabetes & non-diabetes correctly answered the question related to the role of wife in dissolving ED & keeping successful relations with husband. This indicated the importance of educate wives regarding the ways they should follow in dealing with their husbands particularly for those wives if their husbands suffered from any degree of ED. There is one qualitative study conducted by WY Low et al .(2002) showed that Malay and Chinese men tended to blame their wives for their problem and thought that the problem might lead to extra-marital affairs, unlike the Indian men who attributed their condition to fate [15].

The majority of respondents from diabetes or non diabetes have awareness regarding the danger of smoking & alcohol as risk factors for ED, also they aware regarding using traditional herbs for treating ED as these herbs are quite common in this country, in the same qualitative study mentioned above by WY Low et al .(2002) Malays would preferred traditional medicine for the problem [15]. Also, the respondents from diabetes & non diabetes are informed regarding the effect of ED & the possibility of causing other medical problems , the majority of respondents correctly answered the role of exercise & weight reduction in preventing ED , however it is strange that the majority of both diabetes & non diabetes believe that ED is contagious & analgesics & wide spectrum antibiotics may prevent ED.

There is no significant difference (*p*=0.96) between diabetes & non diabetes in asking doctor regarding ED but diabetes appeared to be more embarrassed with asking their doctors regarding their problem , this indicate the important role of doctors to ask their patients particularly diabetes regarding their sexual activity .

The increased understanding of the pathogenesis, proper evaluation and accurate diagnosis, and the available treatment options of erectile dysfunction, should stimulate health care planners to find ways of improving public awareness and physicians' up-to-date knowledge about this major medical problem.

Comparison between diabetes & non diabetes according to treatment of ED

We are not amazed to find significant association between diabetes or non diabetes & using medicine for treatment of ED (p<0.001) , as 56% of diabetes in our sample using medicine for ED , while only 20% of non diabetes used medicine .Also there is significant association between diabetes & the method of treatment preferred (*p*=0.009), but there is no significant association between diabetes or non diabetes regarding using any particular medicine for ED or appearance of drug adverse effect.

The majority of both diabetes 56% & non diabetes 42% preferred medicine as the first choice for treatment of ED, followed by massage (37% for diabetes & 28 % for non diabetes) then by traditional herbs (8% for diabetes & 24% for non diabetes).

Our results finds that Viagra ® (Sildenafil) is the most widely used among diabetes & non-diabetes as 93% of ED, diabetic patients using Viagra & 83% of ED non-diabetes people. This may be attributed to safety of PDE5 inhibitor & the minimal invasive side effect for the drug. The most common side effects among both groups were GIT irritation headache & flushing.

Limitations of the study

1. The distinguish between different types of diabetes is not performed, as a limitation in many other studies; most of the results dealing with type 2 diabetes.
2. The comorbidities (other than diabetes mellitus) that may cause ED & worsening the quality of life are not undermining in this study.

Table 1: Mean score (SD) for perception towards sexual activity for different reproductive organ sizes

Characteristics	N	Mean	Std. deviation	Sig
Small	94	12.83	2.05	
Average	1266	14.91	2.24	0.000
Large	340	16.86	3.13	

Table 2: Comparison between diabetes & non diabetes according to mean scores of knowledge & perception

	Maximum possible score	Diabetes Mean ± SD	Non diabetes MEAN ± SD	P value
		Knowledge scores		
A) Causes & risk factors	13	7.60(2.66)	6.91(3.68)	0.274 NS
B) Prevention	6	4.52(1.11)	3.32(1.63)	< 0.001
C) Total knowledge	19	12.11(3.20)	10.23(4.73)	0.002
		Perception scores		
A) Sexual activity	22	14.33(2.46)	15.38(2.61)	0.021 S
B) Effect of ED on life	32	19.60(2.80)	19.09(3.36)	0.342 NS
C) Total perception	54	33.92(4.02)	34.08(5.51)	0.971 NS

T- Test , Significance level=0.05

Table 3: comparison of diabetes and non-diabetes against mode, median & mean (SD) for each section

Section	Maximum possible score	Mode score		Median score		Mean score (SD)	
Knowledge		DM	NDM	DM	NDM	DM	NDM
Causes & risk factors of Ed	13	9	7	8	7	7.60(2.66)	6.91(3.68)
Prevention of ED	6	4	4	4.5	4	4.52(1.11)	3.32(1.63)
Total knowledge	19	13	12	12	11	12.12 (3.21)	10.23(4.73)
Perception							
Sexual activity	22	14	16	14	15	14.33(2.46)	15.38(2.61)
Effect of ED on Quality of life	32	19	21	20	19	20(2.83)	19.09(3.36)
Total perception	54	32	36	33	35	33.92 (4.02)	34.08(5.51)
total Score	73	45	48	45	46	46.04(7.23)	44.31(10.24)

Table 4: Percentage comparison of correctness of Knowledge regarding Risk factors & causes of ED among diabetes and non diabetes population

Question	Univariate Correctness (%)		Wrong or don't know (%)			Multivariate[a] Correctness to ED	
	DM	NDM	DM	NDM	*P value*	OR	95% CI range
Erectile Dysfunction (ED) is only a disease of elderly	63.5	51.7	36.5	48.3	<0.001	1.8	1.0 - 2.3
Erectile Dysfunction (ED) is caused by physiological & psychological problems	48.1	53.4	51.9	46.6	< 0.0001	2.1	1.9 – 2.8
Diabetes Mellitus is an important cause for ED	59.6	57.4	40.4	42.6	0.16	1.0	0.6 – 1.6
Hypercholesterolemia leads to ED	55.8	39.2	44.2	60.8	<0.0001	4.5	3.4 – 7.4
Surgery in pelvic area ,specially for prostate will cause ED	36.5	32.4	63.5	67.6	0.25	0.8	0.4 1.5
Radiation therapy in pelvic area may cause ED	40.4	44.9	59.6	55.1	0.11	1.2	0.5 – 2.7
Depression or stress may lead to ED	53.8	57.8	46.2	42.2	0.14	1.1	0.7 – 1.8
Sleep deprivation reduce sexual interest	71.2	56.8	28.8	43.2	<0.001	2.1	1.1 – 3.0
The wife has a very important role in dissolving ED & maintains successful sex relations with husband	88.5	78.4	11.5	21.6	0.051	1.7	0.9 – 2.8
Family history is very important in ED	57.7	52.7	42.3	47.3	0.47	1.0	0.6 – 1.6
Smoking & Alcohol are main causes for ED	75	58.8	25	41.2	<0.001	2.2	1.0 – 3.1
Lower urinary tract infections lead to ED	57.7	52.7	42.3	47.3	0.16	1.0	0.7 – 1.8
ED may result as a side effect from using some drugs like Anti hypertensive, anti depressants, anti psychotics & anti ulcer drugs	51.9	56.1	48.1	43.9	0.16	1.0	0.6 – 1.6

a All the variables were mutually adjusted for each other.

Table 5: Mean scores of total knowledge (total knoweledge) & total perception (total perception) for non-diabetes patients

Parameter		Total know Mean (SD)	P value	Total perc Mean (SD)	P value
Age	20-29	10.2250+3.59	0.661	34.700+6.68	0.124
	30-39	10.2432+3.56		32.86+5.00	
	40-49	10.9744+4.85		35.48+3.77	
	50-59	9.2000+5.74		33.266+5.53	
	>=60	11.0000+1.41		29.00+12.72	
Race	Malay	10.07+4.76	0.584	34.20+5.23	0.638
	Chinese	12.33+3.57		32.88+6.27	
	Indian	10.10+5.62		32.900+8.34	
	Others	11.00+2.82		37.50+3.53	
smoking	smoker	8.19+5.58	0.002	34.69+5.11	0.547
	Non smoker	11.01+4.17		33.98+5.43	
	Ex-smoker	11.60+3.39		33.17+6.54	
Marital status	Single	9.82+3.42	0.264	33.51+7.35	0.351
	Married	10.38+4.98		34.27+4.96	
	Divorced	3.00		27.00	
Educational level	Primary education	9.16+5.99	0.069	30.91+4.64	0.020
	High school	9.45+5.20		33.64+6.01	
	College/ University	10.97+3.80		34.53+4.94	
	Postgraduate	12.37+2.87		37.12+3.61	
Income	Non	6.33+2.88	0.002	25.00+11.35	0.008
	<RM1000	9.02+5.33		33.08+6.37	
	RM1000-1999	9.60+4.83		34.23+4.68	
	RM2000-2999	12.37+3.22		35.31+4.32	
	>RM3000	12.84+1.99		36.30+3.66	

ANOVA, α = 0.05

Table 6: Mean scores of total knowledge (total know) & total perception (total perc.) of diabetes

Parameter		total know Mean (SD)	P value	total perc Mean (SD)	P value
Age	20-29	Non	0.637	Non	0.250
	30-39	12.66+3.25		35.25+5.44	
	40-49	11.58+3.51		34.4+3.98	
	50-59	12.55+3.05		33.22+2.90	
	>=60	11.00+2.91		31.40+2.88	
Race	Malay	12.09+3.13	0.753	33.60+3.74	0.165
	Chinese	12.00+0.00		31.00+5.65	
	Indian	12.83+4.44		36.33+4.92	
	Others	9.00+---		39.00+-	
smoking	smoker	11.400+3.66	0.599	33.73+4.30	0.328
	Non smoker	12.37+3.21		34.51+3.97	
	Ex-smoker	12.50+2.32		32.12+3.48	
Marital status	Single	9.00+-	0.587	28.00+-	0.204
	Married	12.20+3.23		33.96+3.96	
	Divorced	11.00+-		38.00+-	
Educational level	Primary education	32.71+2.98	0.634	32.71+2.98	0.202
	High school	33.11+3.84		33.11+3.84	
	College/ University	35.28+3.96		35.28+3.96	
	Postgraduate	36.00+5.52		36.00+5.52	
Income	Non	12.36+3.66	0.415	34.90+4.6	0.128
	<RM1000	11.31+2.966		33.09+3.5	
	RM1000-1999	13.00+3.21		33.88+3.89	
	RM2000-2999	11.00+-		42.00+-	
	>RM3000				
Number of years with diabetes	<2 years	11.91+3.94	0.210	35.21+4.84	0.17
	3-5 years	11.33+2.44		33.33+3.46	
	6-10 years	13.42+1.13		31.85+1.34	
	>10 years	14.50+3.00		32.75+2.06	

ANOVA, $\alpha = 0.05$

Table 7: Comparison between Diabetes & non Diabetes according to perception towards ED

Question	Test	P value
The Best source of knowledge for sexual information.	Chi-square	0.000
How would you rate your confidence that you could get & keep an erection?	Mann-Whitney	0.000
Generally speaking, in a month how often do you usually have sexual intercourse or activity (on average?)	Mann-Whitney	0.005
If you were to spend the rest of your life with your sex life just the way it is now how would you feel about that?	Mann-Whitney	0.000
Unsatisfactory sex life may affect your job & mental performance	Mann-Whitney	0.071
How comfortable you feel asking your doctor about ED?	Mann-Whitney	0.405

CONCLUSION

Although diabetic patients are more knowledgeable regarding ED but they have lower perception towards sexual activity & less satisfaction with their sexual life. Their perception regarding the effect of ED on their quality of life is more than that of non-diabetes.

Qualification is critically important factor for perception toward ED in general public, while the level of income strongly affects the knowledge towards ED & the perception of sexual activity. Health care professionals should be more active in promoting health information about ED,& the information should be easily & cheaply accessed by all .Oral therapy by PDE 5 inhibitors particularly Sildenafil (Viagra ®) is the most widely used treatment for ED with minimal invasive side effects in both diabetes & non diabetic people.

Competing interests

None of the authors have any financial or non-financial competing interests in this study.

Authors' contributions

SWG concluded the field work and drafted the manuscript and SASS conceived and supervisor of the project. YH and MB helped in data collection and field work distribution. AA helped in statistical analysis and manuscript review. YOS helped in the scientific editing of the manuscript. All authors read and approved the final manuscript.

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