

IJBHS 2014028/10401

## Incidence of Erectile Impotence and Determination of Sexual dysfunctions in Diabetic Neuropathic Saudi Men

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(Received April 19, 2014; Accepted November 28, 2014)

**ABSTRACT:** **Objectives:** The present study was aimed at evaluating the incidence of erectile impotence and sexual dysfunctions associated with diabetic neuropathies prevailing in male Saudi population. **Methods:** In this investigation 100 Type-1 and 150 Type-2 diabetes mellitus patients with and without an objective evidence of neuropathy having an age span in between 15 and 65 years and duration of diabetes distributed over 25 years were included. All the subjects were evaluated for the incidence of erectile impotence and sexual dysfunctions. **Results:** The largest correlation of the incidence of impotence associated with a consistent increase with the advancement in age (about 80%) was found in both Type-1 and Type-2 diabetic patients having symptomatic autonomic neuropathy. However no such correlation with respect to age was found in both types of diabetic men without neuropathy. A non significant association in the incidence of impotence among Type-1 and Type-2 diabetic patients with/without neuropathy was also observed. Patient-reported outcomes using responses to individual items of the International Index of Erectile Function (IIEF), erectile dysfunction, orgasmic dysfunction, sexual desire, intercourse satisfaction, and overall satisfaction were found to be significantly low in both types of diabetic neuropathic patients ( $p < 0.001$ ). Decreased sexual desire, as opposed to other erectile dysfunctions was the most common form of sexual dysfunction noted in these neuropathic patients, thus suggesting high prevalence of sexual dysfunctions with long standing diabetic neuropathic men. **Conclusion:** It would appear that erectile impotence and altered sexual dysfunctions are directly associated with an increased tendency to autonomic neuropathy in these patients irrespective of their type of diabetes.

**Key words:** Impotence, Sexual responses, Diabetes, neuropathy.

### Introduction

Sexual dysfunction is a common complication of diabetic autonomic neuropathy both in men and women.<sup>1-4</sup> Despite the general agreement of previous investigators that the prevalence of impotence in diabetic men approximates fifty percent there is a controversy surrounding the aetiology of this problem. Endocrine causes of the impotence associated with diabetes have been suggested.<sup>5-11</sup> Vascular complications of diabetes may produce impotence on the basis of large vessel disease.

The neurologic factor, long felt to be important in the pathogenesis of erectile difficulties in diabetic males, has been re-emphasized by the demonstration of a high association of neurogenic vesical abnormalities in a group of impotent diabetics.<sup>12-14</sup>

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Impotence is a frequent finding in diabetic males. It appears to be rare in diabetic men below the age of 35 although 25% of diabetic men 30 to 34 years of age suffered varying degrees of impotence.<sup>6</sup> The average age of the men involved is around 50 years.<sup>4, 15</sup> Among 175 subjects selected and interviewed at random for their sexual history, testosterone levels were normal in all men. However 52% admitted sexual dysfunction, mainly erectile impotence.<sup>16</sup> Moreover, the percentage of men on insulin or oral agents were about equal. Neuropathy seemed more prevalent than any measured complication of diabetes. Symptomatic autonomic neuropathy is much less well defined and may be more common in Type-1 patients. The annual incidence is unknown, although abnormal cardiovascular reflexes can be found after only two years of insulin dependent diabetes.<sup>17</sup> Diabetes causes damage to nerves throughout the body including the penis and erectile dysfunction is a common manifestation of diabetes complication.<sup>18</sup> Research indicates that although erectile dysfunction is widespread among men with diabetes; the condition is often remains undiagnosed and demands appropriate assessment and initiation of proper treatment.<sup>19</sup> A study by Zdravko<sup>20</sup> supported the hypothesis that in the complex pathogenesis of diabetic erectile dysfunction (ED), diabetic neuropathy is the major pathogenic factor. Other research findings are indicative that the aetiology of ED is a multifactor disorder and in the management of diabetic ED, a holistic approach should be applied.<sup>21</sup>

Although prior studies have attempted to identify a single proxy item for erectile function in men<sup>22, 23</sup> they have not assessed the influence of that single item on overall sexual bother. Furthermore, none of these studies captured ejaculatory or libido dysfunction, which may also affect sexual bother. Corona *et al.*<sup>24</sup> captured libido dysfunction, as well as erectile dysfunction, but this group failed to assess the relationship between these dysfunctions and bother. Furthermore, the study was limited by selection bias, as the entire cohort was assembled from patients who presented for sexual dysfunction treatment at an Andrology clinic. To adequately address the question at hand, subject must be drawn from a more general population, and both function and bother must be assessed. Gill and Feinstein<sup>25</sup> have documented the importance of incorporating both the degree of dysfunction and also the amount of bother, as this provides the most comprehensive understanding of the relationship between the medical condition under study and the patient's quality of life.

The present investigation was conducted to evaluate the factor(s) underlying the frequency of impotence in diabetic men in association with the prevalence of erectile, orgasmic/ejaculatory, libido/desire and satisfaction dysfunction in a cohort of men with diabetic neuropathy. An attempt was also made to determine the differential impact on each of these domains on global sexual bother. An underlying neuropathic factor in diabetes was suggested by the fact that potency depends on the integrity of the autonomic nervous system and that the latter is frequently involved in diabetic neuropathy.

## **Materials and Methods**

By the direct interrogation and specific questions the erectile function of 100 Type-1 and 150 Type- 2 diabetic men with/without evidence of neuropathy, 15 to 65 years of age were elicited. The erectile function was based on the ability to develop an erect angle of 90 degree and more. Evaluated parameters included persistence of libido, ability of intercourse/masturbation, the pattern of ejaculation either normal or retrograde and the pattern of erection loss, i.e. either gradual or abrupt (Table 1).

Impotence was evaluated according to the method described previously.<sup>26</sup> The criteria for the determination of impotence was as follows:

1. Individual patient was asked if he was able to obtain a normal penile erection. Impotence was regarded as present if there has been partial or complete failure to obtain an erection for at least six months.
2. The duration of impotence was recorded in months. If the patient was potent at the time of interview, enquiry was made if transient impotence had ever been present in the past, for example during anxiety or poor control. Such patients were entered in the study as being potent. Any decrease in libido was noted and enquiry was made for features suggestive of a psychological cause for the impotence. The information was recorded on a questionnaire form, coded and transferred to punch cards. In the tabulations which follow five age groups were chosen to give adequate numbers in each group 15-20 years, 21-30 years, 31-40 years, 41-50 years, and 51-65 years.

Self-reported ability to achieve and maintain an erection for sexual intercourse was determined to the International Index of Erectile Function (IIEF) a multidimensional scale for assessment of erectile dysfunction (15 questions) according to the method described by Rosen et al.<sup>27</sup>

Based on the scores of (IIEF)-5, efficacy was assessed for the five separate response domains of male sexual functions including erectile function (questions 1 through 5 and 15), orgasmic function (questions 9 and 10), sexual desire (questions 11 and 12), intercourse/masturbation satisfaction (questions 6, 7, and 8), and overall satisfaction (questions 13 and 14).

Comparisons between mean responses for both types of diabetic patients with and without neuropathy were analyzed using Student's *t*-test for significant differences. In all instances probability ( $p < 0.05$ ) was recorded as statistically significant.

## Results

The data for the incidence of erectile impotence in 100 Type-1, and 150 Type-2 diabetic patients (with and without neuropathy) is presented in Table 1. This indicated largest correlation of the incidence of erectile impotence i.e. about 80% and 78% was found in both Type-1 and Type-2 patients with symptomatic autonomic neuropathy respectively which includes differential diagnostic symptoms (libido, angle of erection i.e. more or less 90 degree, intercourse/masturbation ability, pattern of ejaculation and the pattern of erection lost), however, among both types of the diabetics without neuropathy incidence of impotence was about 20% and 23% respectively. A comparison of the frequency/distribution of impotence with respect to age in 100 Type-1 and 150 Type-2, diabetic patients (with neuropathy) presented in Table 2, indicates a consistent increase in the incidence of impotence with the advancement in age in both types of the diabetic neuropathic patients. A similar comparison of the frequency/distribution of impotence with respect to age in both types of diabetic patients (without neuropathy) is shown in Table 3. No such correlation in the incidence of impotence with respect to age was observed in both types of diabetics without neuropathy. It would appear that aging is an important factor involving vasculopathy as a cause of impotence. However, in both types of neuropathic diabetics, disease itself causes vascular changes in addition to the effect of aging. A comparison of the incidence of erectile impotence among different age groups of Type-1 and Type-2 diabetic subjects with and without neuropathy further showed a non significant association in the percentage of impotence. Thus diabetic impotence was directly associated with increase autonomic neuropathy in these patients irrespective of their type of diabetes.

Table 1: Incidence of erectile impotence in Type-1 and Type-2 diabetic men with and without neuropathy (N = number of patients)

Subjects	Differential Diagnosis						Number of Impotent
	Libido	Erection Frequency	Intercourse Satisfaction	Ejaculation Pattern	Erection Loss		
Type-1 With Neuropathy N = 100	Absent	Failure of Erection (less than 45°)	Impaired	Retrograde	Abrupt		80/100
Type-1 Without Neuropathy N = 100	Diminished	Failure of Erection (less than 65°)	Impaired	Normal	Gradual		20/100
Type-2 With Neuropathy N = 150	Absent	Failure of Erection (less than 45°)	Impaired	Retrograde	Abrupt		117/150
Type-2 Without Neuropathy N = 150	Diminished	Failure of Erection (less than 65°)	Impaired	Normal	Gradual		33/150

Table 2: Incidence of erectile impotence in Type-1 and Type-2 diabetic men (with neuropathy) of different age groups. (N = number of patients; figures in parenthesis = number of impotent men)

Age (years)	Diabetics with Neuropathy (% Impotence)	
	Type-1	Type-2
15-20	50.0 (5) N = 10	45.0 (9) N = 20
21-30	60.0 (6) N = 10	72.7 (16) N = 22
31-40	75.0 (12) N = 16	76.0 (19) N = 25
41-50	84.6 (22) N = 26	86.6 (26) N = 30
51-65	92.1 (35) N = 38	88.6 (47) N = 53
Total	80.0 (80) N = 100	78.0 (117) N = 150

Table 3: Incidence of erectile impotence in Type-1 and Type-2 diabetic men (without neuropathy) of different age groups. (N = number of patients; figures in parenthesis = number of impotent men)

Age (years)	Diabetics without Neuropathy (% Impotence)	
	Type-1	Type-2
15-20	10.0 (1) N = 10	5.0 (1) N = 20
21-30	10.0 (1) N = 10	9.0 (2) N = 22
31-40	18.75 (3) N = 16	16.0 (4) N = 25
41-50	19.2 (5) N = 26	16.6 (5) N = 30
51-65	26.3 (10) N = 38	20.75 (11) N = 53
Total	20.0 (20) N = 100	15.3 (23) N = 150

The mean ( $\pm$ SE) scores for erectile function (five questions; possible total score, 1 to 30) for both Type-1 and Type-2 diabetic men with and without neuropathy is presented in Figure 1. These results indicated significant

difference ( $p < 0.001$ ) in the above mentioned domain of sexual dysfunctions in both types of diabetic neuropathic patients. Both Type-1 and Type-2 diabetic neuropathic patients showed about 56% and 55.1% decrease in erectile function response respectively than their respective non neuropathic patients. Mean orgasmic function domain score (two questions, possible total score, 0-12) presented in Figure 2 showed a similar relationship between both types of diabetic patients with and without neuropathy ( $p < 0.001$ ). Both Type-1 and Type-2 diabetic neuropathic patients showed about 40% and 42.3% decrease in orgasmic function response respectively than their respective non neuropathic patients.

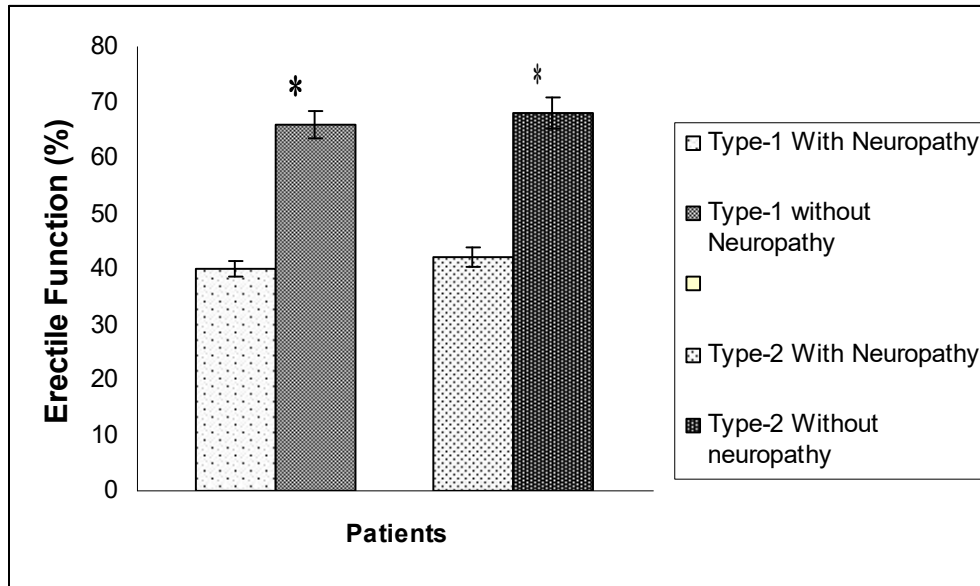


Figure 1: Mean ( $\pm$  SE) scores for the Erectile Function Domains of the International Index of Erectile Function (IIEF) for the Type-1 and Type-2 diabetic men with and without neuropathy. (Asterisk denotes  $p < 0.001$ )

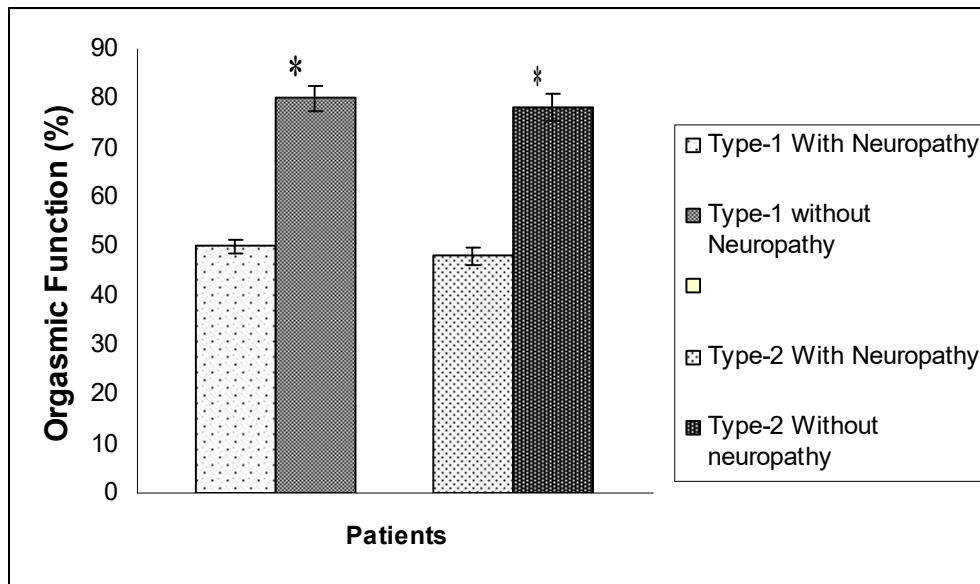


Figure 2: Mean ( $\pm$  SE) scores for the Orgasmic Function Domains of the International Index of Erectile Function (IIEF) for the Type-1 and Type-2 diabetic men with and without neuropathy. (Asterisk denotes  $p < 0.001$ )

A comparison regarding the sexual desire domain (two questions; possible total score, 0-12), between both types of diabetic men with and without neuropathy presented in Figure 3, further showed a significant difference ( $p < 0.001$ ), being 60.9 % and 58.9 % less in respectively in both Type-1 and Type-2 diabetic neuropathic men respectively than their respective non neuropathic patients. The mean domain scores for intercourse satisfaction (three questions; possible total score, 0-12) and overall satisfaction (two questions; possible total score, 0-12) for both types of diabetics with and without neuropathy is presented in Figures 4 and 5. These results indicated significantly low values ( $p < 0.001$ ) in the above mentioned domains of sexual dysfunctions in both types of diabetic neuropathic patients. The decrease in the intercourse satisfaction and overall satisfaction responses in both Type-1 and Type-2 neuropathic diabetics in comparison with both types of non neuropathic diabetic subjects was found to be 40 and 41.1 %, and 44.2 and 41.5% respectively.

A significant decrease in all the above mentioned domain responses of sexual dysfunctions in both types of neuropathic diabetics seems to be associated probably due to some kind of vascular lesion in the pathway of erotic reflex in these patients.

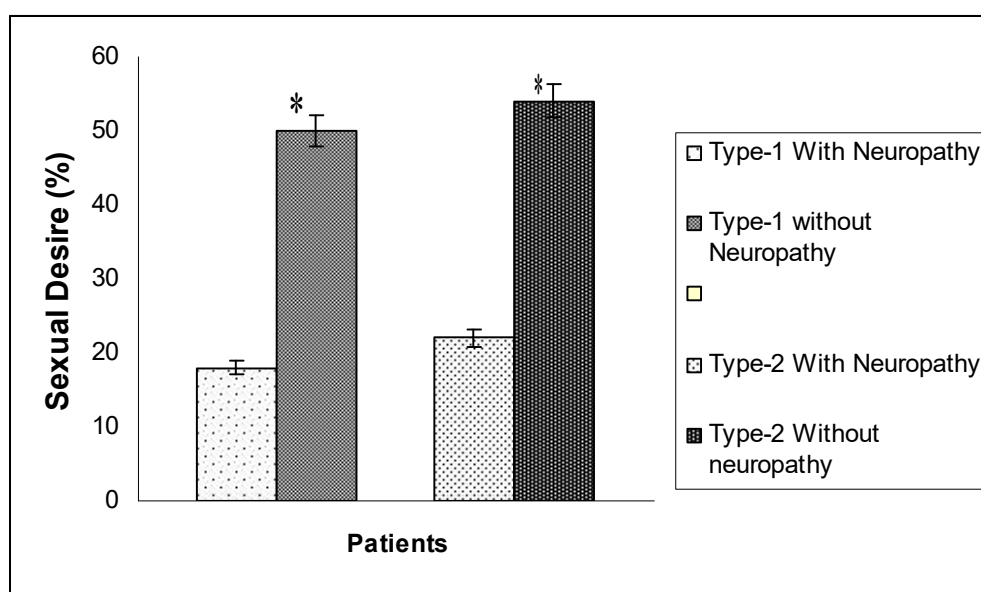


Figure 3: Mean ( $\pm$  SE) scores for the Sexual Desire Domains of the International Index of Erectile Function (IIEF) for the Type-1 and Type-2 diabetic men with and without neuropathy. (Asterisk denotes  $p < 0.001$ )

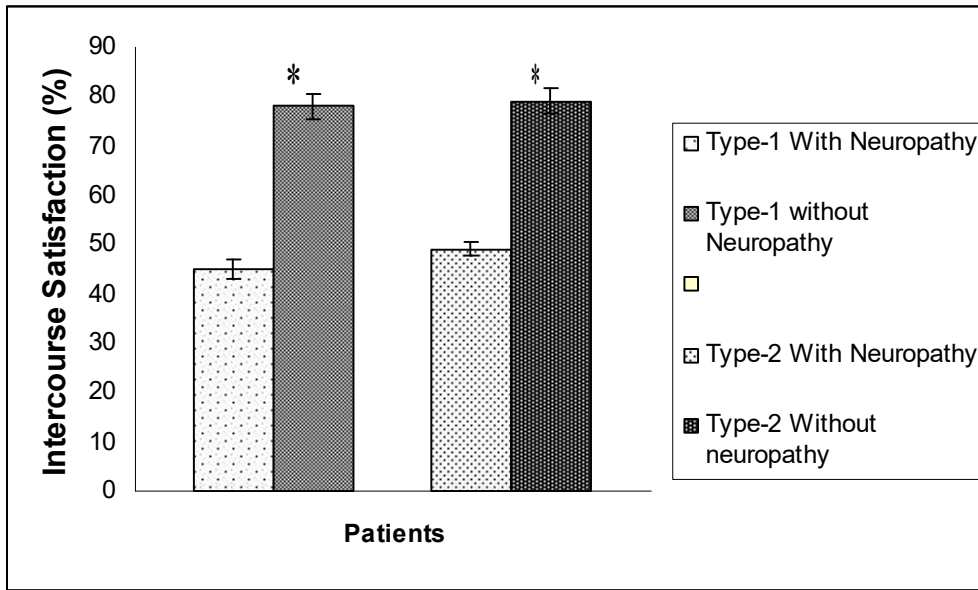


Figure 4: Mean ( $\pm$  SE) scores for the Intercourse Satisfaction Domains of the International Index of Erectile Function (IIEF) for the Type-1 and Type-2 diabetic men with and without neuropathy. (Asterisk denotes  $p<0.001$ )

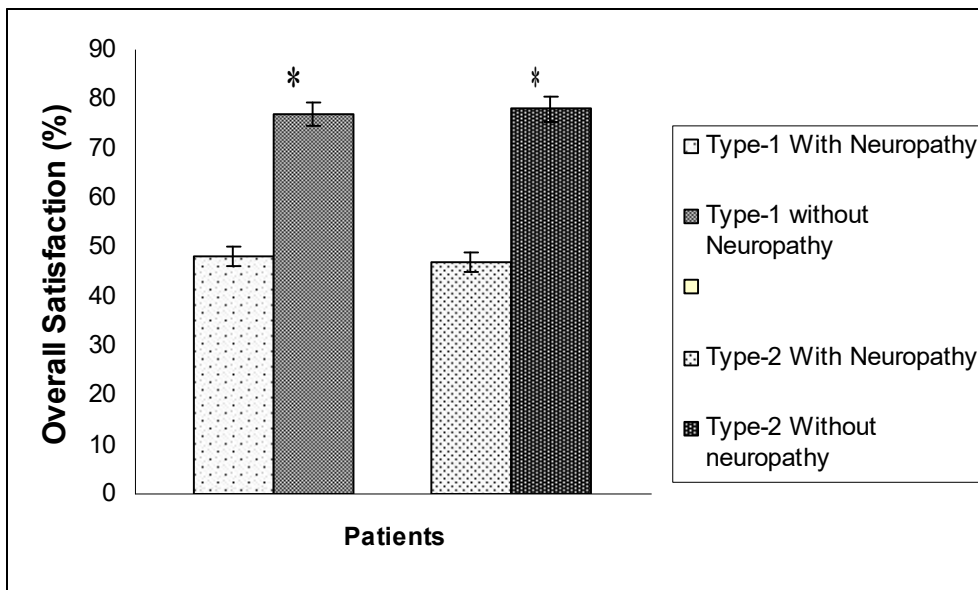


Figure 5: Mean ( $\pm$  SE) scores for the Overall Satisfaction Domains of the International Index of Erectile Function (IIEF) for the Type-1 and Type-2 diabetic men with and without neuropathy. (Asterisk denotes  $p<0.001$ )

## Discussion

It is well established that there is an association between increased prevalence of impotence and diabetes.<sup>6, 16</sup> Impaired potency is not only more frequent but may be early symptom of diabetes.<sup>9, 28- 31</sup> These findings are considerably greater than that for the general population.<sup>32</sup> We have studied the incidence of erectile impotence in a

large number of Type-1 and Type-2 diabetic patients 15- 65 years of age (both neuropathic/non neuropathic). Our results indicate that among 100 Type-1 males with neuropathy, 80 had erectile impotence, whereas this ratio was only 20% in the patients without neuropathy. In another survey of 150 Type-2 males with neuropathy, 117 had erectile impotence where as 33 patients (23%) were impotent in non neuropathic diabetics.

Using linear logistic regression model for analysis the three most significant associations with impotence were the age, treatment with either insulin or oral hypoglycaemic agent, and symptomatic autonomic neuropathy. The largest correlation was found in the patients with symptomatic autonomic neuropathy which includes differential diagnostic symptoms (libido, erection frequency, angle or erection i.e. more or less than 90 degree, intercourse/masturbation ability, pattern of ejaculation, and the pattern of erection lost). In our studies impotence was defined as the inability to initiate or sustain a satisfactory penile erection.

Penile erection occurs as a reflex mediated by the parasympathetic nerve fibres from the spinal cord segments sacral 2 & 4 (nervierigentes). The diabetic impotence is due to autonomic neuropathy affecting these nerves.<sup>12</sup> There has been one unconfirmed study showing alterations in the autonomic nerve fibres in the corpora cavernosa in impotent diabetics,<sup>33</sup> which also suggest that a neurological lesion could cause the impotence. In our experiments a significantly high incidence of impotence in both types of neuropathies suggests that diabetic impotence is directly associated with increased autonomic neuropathy irrespective of the type of diabetes. In cases of autonomic neuropathy, impotence occurs frequently alone without any of the other symptoms of autonomic neuropathy and in patients with normal cardiovascular reflexes and the blood pressure response to sustained hand grip,<sup>32</sup> as well as there was preservation of normal testicular sensation.<sup>34</sup> In some cases there are several pathologies, such as neurological and vascular disorders which are involved in the aetiology of impotence.<sup>7</sup> Impotence in normal males,<sup>35</sup> and in diabetics,<sup>30</sup> increases with age. The significant association of impotence with age is in conformity with previous studies,<sup>12, 33</sup> where impotence was observed in all the patients irrespective of their types of diabetes. Impotence may be associated with an increased autonomic neuropathy in all types of diabetics. There is a high percentage of patients with peripheral neuropathies,<sup>36, 37, 1</sup> and with autonomic neuropathy.<sup>12, 33, 31</sup> However there are several variable in the aetiology of diabetic impotence.

Studies on men with diabetes also have indicated high occurrence of sexual dysfunction in the patients. Selvin *et al*,<sup>38</sup> reported that the prevalence of erectile dysfunction was over 50% in men with diabetes in the United States. A study from the Netherlands stated that the prevalence of erectile dysfunction in patients with Type-2 diabetes was about 41.3%.<sup>39</sup> Studies from Saudi diabetic patients reported moderate to severe erectile dysfunction among 80 to 90% of the patients.<sup>40, 41</sup> However, the prevalence of erectile dysfunction among diabetic men varies between 35-90%.<sup>21</sup>

The current study confirmed that sexual dysfunctions including decreased erectile and orgasmic function, sexual desire, intercourse satisfaction and overall satisfaction are all common in both types of diabetic men with neuropathy. Contrary to what one might expect, decreased sexual desire, as opposed to erectile dysfunctions was the most common form of sexual dysfunction noted in our neuropathic patients, although erectile dysfunction had a greater impact on global sexual bother than decreased sexual desire, or orgasmic dysfunction. These data also indicate that a single validated item that assesses the confidence that a man has in his ability to get and keep an erection can be used as a proxy item for global sexual function and bother in large observational studies. Of all of the items on the IIEF, the confidence item correlates most closely not just with erectile bother, but with global sexual bother. Administration of this single patient-completed item in epidemiologic studies may provide researchers with a composite estimate of both of erectile function and global sexual bother, while minimizing respondent burden and selection bias and avoiding the use of interviewer-administered surveys. Our data underscore the importance of asking men with diabetes mellitus about their sexual function and point to the need for further research to investigate disorders of orgasm and desire.

In general there is limited data regarding erectile dysfunction prevalence in diabetic neuropathic patients in Saudi Arabia. The high prevalence could be explained by the fact that we did not control for psychological factors affecting sexual dysfunctions in diabetes. Moreover this study investigated a small and heterogeneous sample. Further research should focus on all influential factors that might relate to prevalence of erectile dysfunction in diabetic patients in Saudi population. It is concluded that diabetic impotence with particular reference to neuropathy is still a common problem and may have a multi factorial aetiology.

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