The Royal Society of Medicine

Journal of the Royal Society of Medicine Open;
0(0) 1–10
DOI: 10.1177/2054270415622602

The impact of poor glycaemic control on the prevalence of erectile dysfunction in men with type 2 diabetes mellitus: a systematic review

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Abstract

Objective: To determine the impact of poor glycaemic control on the prevalence of erectile dysfunction among men with type 2 Diabetics aged 27 to 85 years.

Design: The databases Embase classic+Embase, Global health, Ovid Medline and PsychINFO, were searched for relevant studies in June 2014 using the keywords: (Diabetes Mellitus OR diabetes mellitus type2 OR DM2 OR T2DM OR insulin resistance) AND (erectile dysfunction OR sexual dysfunction OR impotence) AND glycaemic control.

Setting: All study settings were considered (primary care, secondary care and tertiary care setting).

Participants: Type 2 Diabetic Patients with erectile dysfunction.

Main outcome measures: Included studies must include one of the following outcomes: (1) HBA1c for assess the level of glycaemic control; (2) Erectile dysfunction (any stage: IIEF-5 = 21 or less).

Results: Five cross-sectional studies involving 3299 patients were included. The findings pointed to a positive association between erectile dysfunction and glycaemic control. Three studies showed a significant positive association, while one study showed only a weak correlation and one study showed borderline significance. Patients' age, diabetes mellitus duration, peripheral neuropathy and body mass index had positive association with erectile dysfunction. However, smoking and hypertension were not associated with erectile dysfunction in most included studies. Physical activity had a protective effect against erectile dysfunction.

Conclusion: We may conclude that the risk of erectile dysfunction is higher in type 2 diabetic men with poor glycaemic control than those with good control.

Keywords

diabetes, endocrinology, clinical, sexual health

Introduction

Erectile dysfunction (ED) is defined as the inability to achieve and/or maintain penile erection sufficient for satisfactory sexual intercourse.[1] ED is a common problem in men with a history of diabetes mellitus (DM).[2] The prevalence of ED among patients with history of type 1 and/or type 2 DM in the literature varies from 35% to 90%.[3–12] Literature including patients with history of type 2 DM only shows the prevalence of ED severity, by international index of erectile function (IIEF), as 73.10%,[10] 86.10%[11] and 90%.[12]

Diabetic men have almost a threefold higher probability to develop ED compared with non-diabetics;[13] they are also prone for the onset of ED to occur 10 to 15 years earlier than in non-diabetic men.[13] ED in diabetic men has also been shown to be more severe and associated with a poorer quality of life.[14] It is less responsive to medical treatment compared with ED in non-diabetic men.[15] However, it is still unclear whether ED in diabetic men is a consequence only of hyperglycaemia and microvascular complications or a collection of risk factors, as the patients often present with other ED risk factors, such as cardiovascular diseases, hypertension, smoking and obesity at the same time.[16]

The importance of poor glycaemic control as an indicator of reduced erectile function in diabetic men is still unclear. Several studies have demonstrated a significant correlation between the two;[11,17–21] however, some studies have been mixed as to whether there is a statistically significant correlation between ED and poor glycaemic control, showing only a borderline correlation[8,22,23] or no correlation at all.[24–26] The inconsistency in the literature means that further studies are needed to clarify a causal link between prolonged hyperglycaemia and ED. This disparity between studies may be the result of the sample sizes used and multivariate strategies used to analyse the data.

In our review, we aim to clearly determine the impact of poor glycaemic control on the prevalence of ED in men with type 2 DM, as well as the impact of other possible risk factors, such as duration of DM, patients' age, hypertension and cigarette smoking on the prevalence of ED.

Methods

The databases Embase classic + Embase from 1947, Global health from 1973, Ovid Medline from 1946 and PsychINFO from 1967 were searched for relevant studies in June 2014 using the keywords: (Diabetes Mellitus **OR** diabetes mellitus type 2 **OR** DM2 **OR** T2DM **OR** insulin resistance) **AND** (erectile dysfunction **OR** sexual dysfunction **OR** impotence) **AND** glycaemic control.

In consultation with the research team, we considered any observational study at any clinical settings that explored the impact of glycaemic control level on the prevalence of ED in men with type 2 DM. The inclusion criteria for the participants were any patient with type 2 DM, aged between 27 and 85 years. The primary outcome must include: glycaemic control which was measured by glycosylated haemoglobin (HBA1c) and diagnosis of ED was done by using the international index of erectile function (IIEF-5). We defined poor glycaemic control as HBA1c more than 7% (53 mmol/mol) and ED, if IIEF-5 is equal to or less than 21.[27] Our secondary outcomes were the impact of other possible risk factors on the prevalence of ED for men with T2DM, e.g. duration of DM, patients' age, hypertension and smoking. Searching was restricted to articles in the English language.

Two reviewers (TB and SH) performed the search and reviewed the results. The duplicate studies were removed using EndNote. During the initial review for titles and abstracts, studies that did not meet our criteria were excluded. If the reviewers were uncertain about certain studies during the initial review, then the full text article was assessed. Independently, two reviewers (TB and SH) assessed all relevant studies. Disagreement had been resolved by discussion and external opinion had been requested if needed.

Two reviewers (TB and SS) independently assessed the included studies for quality. Full critical appraisal was done for each study, by using Newcastle Ottawa quality assessment tool for cohort studies; checklists were adapted to be applied for cross-sectional studies.[28] Items reviewed included representativeness of the sample; sample size; response rate; validity of measurement tool, if validated and if non-validated; study controls for the most important factor and additional factors; assessment of the outcome; and statistical test used.

After the data extraction form was developed, two reviewers (TB and SS) independently extracted the data from included studies on the prevalence of ED among type 2 DM and the correlation between glycaemic control and other risk factors with ED. p values were used for the magnitude of the effect.

Results

Our electronic search identified 379 studies (Figure 1, PRISMA flow chart), of which 68 duplicated studies were excluded. An additional 289 studies were excluded after title and abstract review as they did not meet our inclusion criteria, leaving 22 studies; of these 22 studies, 17 studies were further excluded on reviewing their full text. The main reasons for exclusion were that type 1 diabetic patients were included and some studies did not measure the association between the ED prevalence and glycaemic control.

We found one additional study[11] through bibliography hand searches; also one study[29] was excluded because the author did not respond to our query about the assessment of DM control. Five studies were finally included in this systematic review;[8,11,17,20,23] they were all of cross-sectional design. Table 1 summarises the characteristics and the main findings of the five included studies.

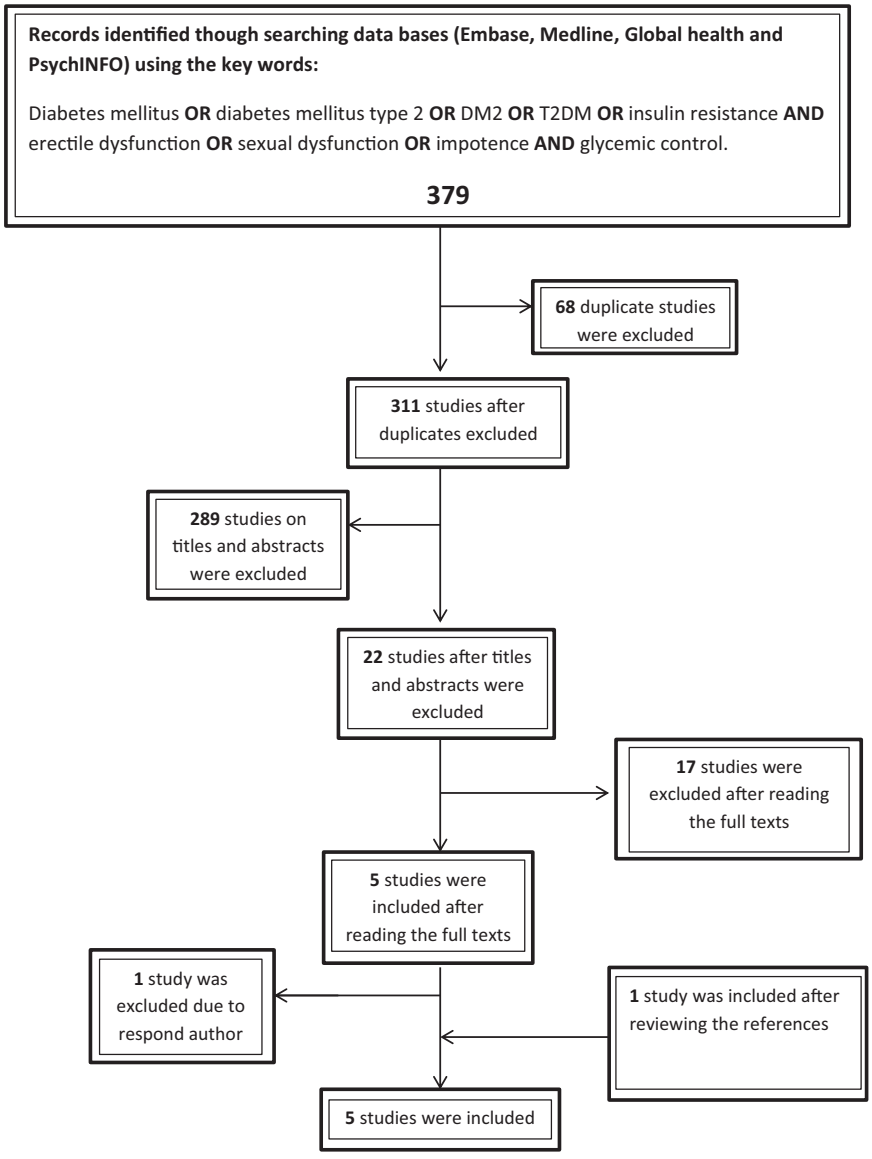
Studies included were published between 2000 and 2010. Total sample size was 3299 patients; they were conducted in the USA (78 participants), Italy (555 participants), Korea (1312 participants), Taiwan (792 participants) and Saudi Arabia (562 participants). Mean age ± SD were 62 ± 12.3 years,[17] 57.9 ± 6.9 years,[20] 53.8 ± 6.65 years,[8] 65.6 ± 13.2 years[23] and 53.7 ± 10.8 years.[11] Mean HBA1c ± SD were $8.1 \pm 1.9\%$,[17] $8.4 \pm 1.3\%$,[20] $7.9 \pm 1.83\%$,[8] $8.2 \pm 2.0\%$[23] and there were no data from El-Sakka and Tayeb.[11] Mean DM duration were 4.9 ± 1.5 years,[20] 9.0 ± 7.5 years,[23] 10.8 ± 7.5 years,[11] median DM duration was six years[8] and there were no data from Romeo et al.[17] Regarding all degrees of ED, the prevalence were 60%,[20] 65.4%,[8] 83.6%,[23] 86.1%[11] and data were not shown in one study.[17]

The highest score of quality assessment is 9 points and the lowest score is 7 points, which demonstrate a good quality of included studies.

The findings generally pointed to a positive association between ED and glycaemic control. Three studies showed a significant positive association,[11,17,20] while one study showed only a weak correlation[8] and one study showed a borderline significant association.[23]

In El-Sakka and Tayeb,[11] there was a higher likelihood of 12.2 times of patients with poor glycaemic control to suffer ED as compared with their counterparts with good glycaemic control. In the study by Romeo et al.,[17] the researchers showed that HBA1c was an independent predictor of EF score ($p < 0.001$). In Giugliano et al.,[20] there was a higher average level of HBA1c in diabetic men with ED than in those who

Figure 1. Flow chart showing search findings.



do not have ED ($8.7 \pm 1.0\%$ vs. $7.9 \pm 0.9\%$, $p = 0.01$). Meanwhile, in the largest study,[8] the data from 1312 Korean men with type 2 DM, after using multivariate logistic regression to recognise independent risk factors for all types of ED, only a weak independent connection with the occurrence of diabetic-related ED was shown by HBA1c (p 0.092). In Lu et al.,[23] men suffering from ED had significantly higher average HBA1c level compared with those not suffering from ED in the youthful age group (8.8 ± 2.2 vs. $7.9 \pm 2.0\%$, $p < 0.0009$); however, no significant difference in mean HBA1c level between men with ED and those not suffering among the older age group ($8.0 \pm 1.8\%$ vs. $8.1 \pm 2.0\%$, $p = 0.63$). There was also a significant higher mean HBA1c level in those with severe ED than in those with no severe ED among the youth (9.6 ± 2.3 vs. $8.3 \pm 2.1\%$, $p = 0.0002$), while mean HBA1c level did not show significant difference between those with severe ED and those who did not have it among the older generation (8.0 ± 1.9 vs. $8.0 \pm 1.7\%$, $p = 0.99$).

Patients' age, DM duration, peripheral neuropathy and body mass index had positive association with ED. However, smoking and hypertension were not associated with ED in most included studies. Physical activity had a protective effect against ED.

Table 1. Data extracted from articles.

Study	Objective of study	Sample characteristics	Outcomes	Confounders included
Sexual function in men with diabetes type 2: association with glycaemic control Romeo et al.[17] Cross-sectional study, Ohio	To evaluate the association of glycaemic control with ED in men with type 2 DM	– Total study population: 78 – Mean age: 62.0 ± 12.3 years (38–82) – Mean HBA1c: 8.1% ± 1.9% (5.2–15.6) – Mean EF score: 16.6 ± 5.9 (5–23)	– After EF scores were stratified by the level of glycaemic control: – Mean EF score decreased as HBA1c increased (analysis of variance $p = 0.002$) – After bivariate analysis, to examine the correlation of ED with subject characteristics: There was a significant correlation of HBA1c with neuropathy but not with participant age, duration of DM or some medication use (data not shown) – Multivariate analysis showed that HBA1c was an independent predictor of EF score ($p < 0.001$) even after adjusting for peripheral neuropathy, which was also an independent predictor ($p = 0.023$) – When subject age and DM duration were included in multivariate models, only HBA1c and neuropathy were significant independent predictors of EF score	– HBA1c – Age – DM duration – Peripheral neuropathy – Some medications
Determinants of erectile dysfunction in type 2 diabetes F Giugliano et al.[20] Cross-sectional study, Naples (Italy)	To evaluate the prevalence and correlates of ED in a population of diabetic men	– Total study population: 555 – All ED: 333 (60%) – Mild: 9% – Mild to moderate: 11.2% – Moderate: 16.9% – Severe: 22.9% – Mean age: 57.9 ± 6.9 years (35–70) – Mean HBA1c 8.4% ± 1.3% – Mean DM duration: 4.9 ± 1.5 years	Contribution of different risk factors to risk of ED in the diabetic population (based on multivariate logistic regression): 1-Age (OR 1.10) 95% CI 1.05–1.15 (p 0.001) 2-DM duration (OR 1.05) 95% CI 1.01–1.10 (p 0.01) 3-HBA1c (OR 1.18) 95% CI 1.02–1.37 (p 0.03) 4-MS (OR 2.08) 95% CI 1.17–3.26 (p 0.01) 5-BMI (OR 1.03) 95% CI 1.00–1.07 (p 0.04) 6-WHR^ (OR 1.04) 95% CI 1.01–1.08 (p 0.03) 7-HTN (OR 1.34) 95% CI 1.08-2.03 (p 0.02) 8-DLD (OR 1.23) 95% CI 1.04–1.49 (p 0.01) 9-Cigarette smoking: a-past (OR 1.15) 95% CI 0.86–1.98 (p 0.56) not significant b-current (OR 1.36) 95% CI 0.81–2.09 (p 0.35) not significant 10-Physical activity (OR 0.90) 95% CI 0.77–0.98 (p 0.04) protective of ED 11-Depression (OR 1.09) 95% CI 1.02–1.19 (p 0.03) The mean HBA1c level was significantly higher in diabetic patients with ED than those without ED (8.7 ± 1.0% vs 7.9 ± 0.9%, $p = 0.01$).	– HBA1c – Age – DM duration – Metabolic syndrome – BMI – WHR – HTN – DLD – Cigarette smoking – Physical activity – Depression

(continued)

Table 1. Continued.

Study	Objective of study	Sample characteristics	Outcomes	Confounders included
Prevalence of erectile dysfunction in Korean men with type 2 DM Cho et al.[8] Cross-sectional study, May 2002 to March 2003, Korea	To investigate the prevalence and risk factors for developing ED in 1312 Korean men with diabetes	– Total study population: 1312 – All ED: 858 (65.4%) – Mild: 20.1% – Moderate: 19.5 – Complete: 25.8% – Mean age: 53.8 ± 6.65 years (40–64) – Mean HBA1c 7.9% ± 1.83% – Median DM duration 6 years (range 1–43)	When the subjects were stratified according to ED status (Normal, mild, moderate and complete), there were significant trends relating the severity of ED to: 1-Age ($p < 0.001$) 2-DM duration ($p < 0.001$) 3-Fasting glucose ($p < 0.05$) 4-HBA1c ($p < 0.001$) 5-Duration of alcohol consumption ($p < 0.001$) – No significant differences were observed in blood pressure or duration of smoking Other risk factors for ED were examined: 1-Subjects who exercised regularly had rate of complete ED 0.62 times those of alcohol abstainers or sedentary subjects (95% CI 0.44–0.89, $p < 0.01$) 2-Subjects who consumed alcohol had rate of complete ED 0.49 times the same comparison above (95% CI 0.36–0.66, $p < 0.001$) 3-Subjects who were on insulin treatment are 6.1 times more likely to have complete ED than non-insulin users (95% CI 3.2–11.4, $p < 0.001$) 4-Subjects who were on diet therapy alone had rates of complete ED only 0.59 times of those receiving the other treatments (95% CI 0.36–0.95, $p < 0.001$) 5-Subjects with either neuropathy or macrovascular disease were, respectively, 1.8 times (95% CI 1.11–2.9, $p < 0.05$) and 3.5 times (95% CI 1.14–10.6, $p < 0.05$) as likely to have complete ED as those subjects without such complications 6-Complete ED was not significantly related to either HTN or smoking status When multiple logistic regression analysis was used to identify significant independent risk factors for all types of ED: 1-Age ($p < 0.001$) 2-DM duration ($p < 0.005$) 3-Neuropathy ($p < 0.05$) 4-Use of insulin ($p < 0.001$) 5-Macrovascular complications (p 0.038) Were independent positive risk factors for all types of ED. But, alcohol consumption ($p < 0.05$) and exercise ($p < 0.01$) were independent negative risk factors. Moreover, HBA1c showed only weak (or no) independent relationship with the development of diabetic-related ED (p 0.092). – When we analyzed the data further using complete ED as the dependent variable, those variables also showed independent relationship with all types of ED with exception of neuropathy.	– HBA1c – Age – DM duration – HTN – Smoking – Neuropathy – Use of insulin – Macrovascular disease – Alcohol consumption – Exercise

(continued)

Table 1. Continued.

Study	Objective of study	Sample characteristics	Outcomes	Confounders included
Association of glycaemic control with risk of erectile dysfunction in men with type 2 diabetes Lu et al.[20] Cross-sectional study, January 2004–May 2006, Taiwan	To evaluate the association of glycaemic control with risk of ED in type 2 diabetics	– Total study population: 792 – All ED: 662 (83.6%) – Mild: 123 (15.5%) – Mild to moderate: 133 (16.8%) – Moderate: 64 (8.1%) – Severe: 342 (43.2%) – Mean age: 65.6 ± 13.2 (27–85) – Mean duration of DM: 9.0 ± 7.5 (1–39) – Mean HBA1c: 8.2% ± 2.0% (4.3–17.5)	The prevalence of ED was positively correlated with subject's age and duration of diabetes (p 0.000) Higher HBA1c level was associated with a higher risk of ED with borderline significance ($p = 0.059$) – The ORs of ED for risk factors (HBA1c, HTN, DLD and cigarette smoking) after adjusting for age and DM duration: only HBA1c level was significantly associated with ED risk (p 0.034) – The prevalence of ED was 66.7% in younger group and 93.1% in the older group ($p = 0.000$) – Those with ED had a significantly higher mean HBA1c level than those without ED in younger group (8.8 ± 2.2 vs 7.9 ± 2.0%, $p < 0.0009$) – There was no significant difference in mean HBA1c level between those with or without ED in the older group (8.0 ± 1.8 vs 8.1 ± 2.0%, $p = 0.63$) – When multivariate logistic regression was used for the contribution of risk factors to risk of ED: (1) in young group (< 60): a-Age OR 1.06 (95% CI 1.02–1.10) p 0.002 b-DM duration OR 1.06(95% CI 1.001–1.12) p 0.045 c-HBA1c OR 1.21 (95% CI 1.06–1.39) p 0.004 were significant independent risk actors for ED (2) in old group (>60): a-Age OR 1.07 (95% CI 1.02–1.13) p 0.009 b-DM duration OR 1.07 (95% CI 1.01–1.14) p 0.019 were significant independent risk factors for ED – The mean HBA1c level was significantly higher in those with severe ED than those without severe ED among the younger group (9.6 ± 2.3 vs 8.3 ± 2.1%, $p = 0.0002$) – The mean HBA1c level did not show significant difference between those with severe ED and those without among the older group (8.0 ± 1.9 vs 8.0 ± 1.7%, $p = 0.99$) – Contribution of HBA1c and other risk factors to risk of SEVERE ED based on multivariate logistic regression: (1) in young group: a-DM duration OR 1.09 (95% CI 1.03–1.16) p 0.003 b-HBA1c OR 1.27 (95% CI 1.09–1.49) p 0.003 c-HTN OR 2.68 (95% CI 0.64–1.53) p 0.015 were significantly independent risk factors for severe ED compared with normal, mild or moderate ED (2) in old group: only age OR 1.08 (95% CI 1.05–1.11) p 0.000 was significant independent risk factor for severe ED compared with normal, mild or moderate ED.	– HBA1c – Age – DM duration – HTN – DLD – Cigarette Smoking

(continued)

Table 1. Continued.

Study	Objective of study	Sample characteristics	Outcomes	Confounders included
Erectile dysfunction risk factors in non-insulin dependent diabetic Saudi patients El-Sakka et al.[11] Cross-sectional study, Saudi Arabia	To assess the prevalence of and analyze risk factors for ED in patients with non-insulin dependent diabetes in Makkah, Saudi Arabia	– Total study population: 562 – All ED: 86.1% – Mild: 7.7% – Moderate: 29.4% – Severe: 49.1% – Mean age 53.7 ± 10.8 years (27–85) – Mean DM duration 10.8 ± 7.5 years (1–40)	– The prevalence of ED increased with age, in younger than 50 years the prevalence was 25% and in 50 years or older the prevalence was 75%. Men without ED 70% were younger and 30% were older than 50 years ($p = 0.0001$) – Patents with a greater than 10 years history of DM were 3 times as likely to report ED as those with a history of less than 5 years ($p = 0.0001$). – Patients with poor glycaemic control were 12.2 times as likely to report ED as those with good glycaemic control The prevalence of ED was significantly associated with: 1-poor glycaemic control ($p = 0.0001$). 2-increased body mass index ($p = 0.0001$). 3-a history of smoking ($p = 0.0001$). 4-the duration of smoking ($p = 0.003$). 5-the number of cigarettes daily ($p = 0.0001$). 6-Some DM treatment ($p = 0.0001$)	– HBA1c – Age – DM duration – BMI – Smoking – DM treatments

ED: erectile dysfunction; DM: diabetes mellitus; EF: erectile function.

Discussion

Penile erection is defined as the result of smooth muscle relaxation in the cavernous body and associated blood vessels.[30] Nitric oxide plays a major role in this process as it is one of the most important endogenous smooth muscle relaxants. For chronic hyperglycaemia and insulin resistance in diabetic patients, endothelial dysfunction is manifested as a decreased level of nitric oxide, leading to insufficient smooth muscle relaxation.

The correlation between glycaemic control and ED

In our systematic review, we identified five cross-sectional studies that examined the association between the glycaemic control (measured by HBA1c) and ED (measured by IIEF-5) among type 2 diabetic men. Sixty per cent of included studies[11,17,20] suggested that poor glycaemic control is positively associated with ED in type 2 diabetics as the mean HBA1c was found to be higher among those with ED than those without ED. In the literature, other studies had also shown positive correlation between poor glycaemic control and ED among diabetic patients.[18]

Lu et al.[23] showed a significant positive association between ED and glycaemic control in a younger age group (≤60 years), but not in an older age group (>60 years). Also in the same study, odds ratio of ED for different risk factors, after adjustment for duration of DM and age, showed that the HBA1c level was significantly associated with ED risk (p 0.034). However, Thomas et al.'s[22] study has shown that patients diagnosed with ED are mostly older and the commonness of the ED condition increased with age. Cho et al.[8] showed a weak relationship between HBA1c level and diabetes-related ED when using a multiple logistic regression analysis to identify risk factors for all types of ED. However, in the same study, classifying the patients based on the level of ED showed the connection between the severity of ED to HBA1c was significant ($p < 0.001$).

Several studies had demonstrated an insignificant correlation between glycaemic control and ED in diabetic men.[24–26] In terms of severe (complete) ED, Cho et al.[8] showed a significant positive correlation between complete ED with patients who were on insulin and patients with either macrovascular disease or neuropathy. However, complete ED was not significantly associated to either smoking status or hypertension. On the other hand, patients who were on diet only had rates of complete ED 0.59 times of those on other treatments, also patients who exercised regularly and those who consumed alcohol

had a lower rate of complete ED than sedentary patients and those of alcohol abstainers, respectively.

Lu et al.[23] showed a significant positive association between severe ED with HBA1c, DM duration and hypertension among a young age group (≤60 years), while only age was a significant independent risk factor for severe ED among an older age group (>60 years).

In summary, we may conclude that the risk of ED is higher in type 2 diabetic men with poor glycaemic control than those with good control, since three studies showed that there were positive associations between the two and the other two studies showed some correlations.

Risk factors for ED

Four of the included studies[8,11,20,23] highlighted that the prevalence of ED was mainly attributable to patients' age and the duration of diabetes. This positive association was confirmed by additional study.[31] Only one study[17] showed that both subjects' age and DM duration were not associated with ED prevalence.

Two studies[8,17] examined the peripheral neuropathy and the correlation with ED; both studies showed significant positive association. This was consistent with previous reports.[32,33]

Two studies[11,20] examined the correlation between body mass index and ED; both studies confirmed a significant association with ED. A similar finding was reported by Esposito et al.[34]

Giugliano et al.[20] is the only study that examined metabolic syndrome, waist hip ratio and depression and their correlation with ED; all of these factors were positively associated with ED prevalence.

Hypertension was examined in three studies;[8,20,23] only one study[20] showed a positive association, which was supported by previous evidence,[35] while the other two studies did not show any association with ED.

Cigarette smoking was examined in four studies;[8,11,20,23] only one of these studies showed a significant correlation between smoking and prevalence of ED.[11] A systematic review of observational studies came to a conclusion that ED risk is higher in current and former users of smoking than in those who never smoke, and smoking cessation may lead to lower risk of ED than current smoking.[36]

Dyslipidaemia was examined in Giugliano et al.[20] and Lu et al.;[23] one study[20] showed a positive association and the other study[23] did not show that.

In Cho et al.,[8] stratifying of the patients according to ED status (normal, mild, moderate and complete) showed a significant trend connecting the severity of ED to the duration of alcohol consumption ($p < 0.001$), but similarly using multivariate regression analysis independent predictors for all types of ED: alcohol consumption ($p < 0.05$) and exercise ($p < 0.01$) were negative independent risk factors of ED. Additional study by Giugliano et al. showed that physical activity protected against ED. An assessment of the association between ED and physical activity was performed in population-based studies with meta-analysis, and higher physical activity was seen to lower the risk of ED.[37] In Look AHEAD (action for health in diabetes),[31] cardiorespiratory fitness was found to protect ED among the 373 men with diabetes aged 45–75 years. Further study by De Berardis et al.[4] measured quality of life in diabetic men with ED and showed that exercise can help prevent ED.

A systematic review of the association between ED and cardiovascular disease[38] has shown that ED could be a possible sign of systematic endothelial dysfunction. ED usually occurs before cardiovascular disease and could therefore be an early sign of symptomatic cardiovascular disease.

Limitation of studies

Included studies had some limitations; for example, there were considerable differences in study settings, sample size and in adjustment of confounding factors. Romeo et al.'s[17] study had the lowest sample size (78 participants). The description of the sampling strategy was not mentioned in El-Sakka and Tayeb's study.[11] In both studies, there were no descriptions of the response rate. However, there were similarities of included studies in terms of study design since all included studies are cross-sectional studies and they all used IIEF-5 for the determination of ED and HBA1c to evaluate the glycaemic control level.

Conclusion

We may conclude that the risk of ED is higher in type 2 diabetic men with poor glycaemic control than those with good control. Also, an increase in patients' age, DM duration, BMI and peripheral neuropathy existence can increase the risk of ED among diabetic men.

This will raise the importance of early screening of ED among diabetic men and the importance of HBA1c control as there is supporting evidence for the reduction of DM complications. We therefore recommend the incorporation of early ED screening for all diabetic men alongside the screening of neuropathy, retinopathy and nephropathy which are already endorsed by all existing guidelines.

Declarations

Competing interests: None declared

Funding: None declared

Guarantor: SR

Ethical approval: Not applicable

Contributorship: TB and SH developed the concept for the research and the paper. TB collected data and analysis. TB and SS independently assessed the included studies for quality TB, SH, SR and AM finalised the text.

Acknowledgements: None

Provenance: Not commissioned; peer-reviewed by Aasem Saif

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