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Abstract

Background: Normal sexual function is one of the most improtant aspects of well being and quality of life. In male cancer survivors normal sexual function may be problematic and normal erectile function may be compromised due to issues associated with cancer disease and treatment. However, the prevalence of erectile dysfunction (ED) in male cancer survivors across cancer types has not been systematically analysed.

Aim: We conducted a systematic review and meta-analysis to estimate the prevalence of ED in all types of cancer and identify characteristics associated with ED in cancer survivors.

Design and Setting: Systematic review and meta-analysis of cross-sectional studies.

Method: We searched four electronic databases – Medline Cinhal, PsychInfo and Embase – targeting reports published until 1st of February 2020. All retrospective or prospective studies reporting the prevalence of ED in male patients with cancer and using a validated tool for the detection of ED (e.g. the International Index of Erectile Function, IIEF-5) were included in this review. Random-effects meta-analysis (MA) model was used to pool the prevalence of ED as absolute estimates at three different stages (i.e., healthy, at diagnosis, and after treatment stages). A univariate MA regression including the three-level group variable as the only independent variable was used to assess the difference of prevalence of ED across the three groups. Further MA were conducted for studies involving patients at diagnosis and after treatment and statistical inferences were made with setting for multiple testing controlling for false discovery rate less than 0.05. Graphical comparisons of the prevalence of ED across these two stages of cancer treatment were given by a classic forest plot.

Results: 1301 studies were assessed for inclusion. Of those, 141 were potentially eligible and subsequently scrutinizedscrutinised in full text. We included 43 studies with a total of 19,329 participants. Overall the pooled data of the included studies showed an ED prevalence of 40.72% (95%CI: 31.80-50.29) in cancer patients, with prevalence of 28.60% (95%CI: 12.10%-53.83%) at time of diagnosis and 42.70% (95%CI: 32.97%-53.03%) after treatment, with significant difference between these two stages and across cancer locations, controlling for false discovery rate less than 0.05.

Conclusion: ED is particularly high in male cancer survivors and was found to be associated with cancer treatment, cancer site, and age.

Keywords: Erectile Dysfunction; Male Cancer; Systematic Review; Meta-Analysis.

How this fits in

- In male cancer survivors, normal sexual function may be disturbed due to occurrence of erectile dysfunction.
- Our systematic literature review and meta-analysis reported a prevalence of 40.72% of erectile dysfunction in cancer survivors, with prevalence being somewhat higher in studies that focused on reporting prevalence after cancer treatment with 42.70%.
- The reasons of high occurrence of erectile dysfunction in male cancer survivors is multimodal and it includes a variety of factors including psychological and physical ones.
- Clinicians should be aware that erectile dysfunction has a large effect on the quality of life and mental health of male cancer survivors.

Introduction

Cancers located in the pelvic region represent more than a quarter of all newly diagnosed cancers worldwide in men.[1] This localisation of cancer has also been associated with long term severe sexual dysfunction in at least half of all patients.[2] Erectile dysfunction (ED), the inability to obtain or maintain an erection that allows for sexual intercourse, is one of the most distressing consequences of cancer diagnosis and treatment in men.[3]

Erectile dysfunction has a complex aetiology influenced by cancer in both direct and indirect ways. Men diagnosed with prostate cancer, the second most common type of cancer (except for non-melanoma skin cancer) in men,[1] are expected to have the same risk factors (cardiovascular disease and metabolic disorders) for ED when compared with cancer-free age matched men. However, in men with prostate cancer, risks for ED are increased given higher incidence of lower urinary tract symptoms and psychological distress.[4,5] Indirect pathways, mostly associated with cancer treatment modalities (surgery, radio- and chemotherapy and hormone treatment) seem to be the most common cause.[6,7]

Moreover, few men are able to achieve normal erection following pelvic surgery, with studies noting that even in men with excellent baseline erections, less than one quarter retained or recovered the erection quality prior to treatment. Pelvic surgeries most associated with ED are radical prostatectomy, radical cystectomy and low anterior or abdominoperineal resections.[8] Furthermore, the results from a 12 year follow up study showed that 84% and 80% of men with prostate cancer who had radical prostatectomy or were under active surveillance reported ED, respectively, compared to 43% in the matched control group.[9] Similar results have been reported for men who had treatment for other types of pelvic cancer such as anal, rectal or bladder cancer.[10-15] However, it is noteworthy that ED is not only prevalent in men with pelvic cancers but may also be the result of intensive chemotherapy or radiotherapy, causing hypogonadism or pelvic nerve damage. Studies have shown ED also after lung cancer, haematological malignancies and head and neck tumours.[16-18]

Sexuality and intimacy are important aspects of quality of life and may also reduce some of the psychosocial distress associated with the cancer diagnosis. In this light it has been reported that maintaining a normal sexual function in men with cancer can be important to help relieve suffering.[19,20] Given the growing incidence of cancer globally and the new therapeutic modalities that are prolonging life expectancy in cancer

survivors, questions of quality of life post-diagnosis and treatment are more and more relevant. However, studies focusing on ED in cancer survivors are rare, and mostly focused on cancer localisations in the pelvic region, making prevalence estimates of ED in cancer survivors rare. Providing pooled estimates of the prevalence of ED as well as its associations should provide important information not only on the scale of the issue but also help clinicians working with cancer survivors to easily identify patients who are at risk of ED but also to provide comprehensive cancer care that is associated long-term quality of life of cancer survivors.

Therefore, the aim of this systematic review and meta-analysis (MA) was to examine the available studies and provide pool estimates for ED prevalence in relation to all cancer sites and identify characteristics associated with ED in cancer survivors. To our knowledge this is the first study of its kind.

Material and methods

Search strategy

We searched four electronic databases – Medline Cinhal, PsychInfo and Embase – targeting reports published until 1st of February 2020. The search strategy included terms reported in **Supplementary Table 1.**

The references of retrieved articles together with the proceedings of relevant conferences were hand-searched in order to identify other potentially eligible studies for inclusion in the analysis missed by the initial search or any unpublished data.

The literature search, assessment of inclusion and exclusion criteria, quality of studies and extraction of data were independently undertaken and verified by two investigators (DP, TX). The results were then compared and, in case of discrepancies, a consensus was reached with the involvement of a third investigator (LS). There was no language restriction.

Type of studies, inclusion and exclusion criteria

All retrospective or prospective studies reporting the prevalence of ED in male patients with cancer and using a validated tool for the detection of ED (e.g. the International Index of Erectile Function, IIEF-5) were included in this review. We excluded studies that didn't meet the inclusion criteria.

Types of outcome measures

All outcomes were defined prior to the literature search. The primary outcome was the prevalence of ED across cancer treatment relevant stages (i.e., healthy, at diagnosis, and after treatment stages).

Data extraction and statistical analyses

For all included studies, we generated descriptive tables for population and study characteristics. We recorded the first author, publication year, country of the investigators, sample size, age, method of assessment of ED and cancer type and site. Furthermore, number of ED patients among case and control groups, BMI, hormonal levels, smoking, hypertension, diabetes, dyslipidemia and cardiovascular diseases were recorded. All statistical analyses based on these data were performed using R (version 3.6.1).[21]

For the included studies at the three different stages (i.e., healthy, at diagnosis, and after treatment stages), random-effects meta-analysis model with the between-study heterogeneity parameter estimated by DerSimonian-Laird (DL) method [22] was used to pool the prevalence of ED as absolute estimates (in %) with their 95% confidence intervals (CIs) for each of three stages of patients. A univariate MA regression including the three-level group variable for healthy/diagnosis/treatment stages as the only independent variable was used to assess the difference of prevalence of ED across the three stages. A scatter plot with point and confidence interval estimates of prevalence of ED across three different groups of patients are illustrated. Publication bias was assessed by a visual inspection of funnel plots and calculating the Egger bias test.[23] In case of publication bias ($p<0.10$), we planned to apply the trim and fill-analysis [24] for overcoming this bias.

Further MA were conducted for the 40 studies only involving patients at diagnosis and after treatment (i.e., excluding healthy control). Graphical comparisons of the prevalence of ED across these two stages of cancer treatment were given by a classic forest plot. Heterogeneity across these 40 studies involving the two cancer treatment stages was assessed by the I^2 metric and taking as measure of high heterogeneity an

I^2 >50% or p<0.05 for testing the Chi2-distributed Q statistic for between-studies heterogeneity (a high value of Q would result in a high value of I^2 since I^2 = (Q-K+1)/Q where K is the number of studies).[25] In case of high heterogeneity of the prevalence of ED and having at least 10 studies for the outcome, we used, as possible predictors for MA regression analyses: stage, continent, mean age, range of age, method of ED assessment, cancer site, standard deviation of age, proportion of patients underwent radiotherapy, proportion of patients with diabetes, proportion of patients underwent chemotherapy. The plots of study count distribution for each of the above moderators across their observed values are given. Univariate MA regression model for each moderator was fit. The stage predictor as well as the significant moderators screened out by these univariate MA regression analyses were used as potential predictors to fit a multiple MA regression with manual variable selection procedure applied. The conclusions by the final multiple MA regression model were drawn with multiple testing concern by controlling for false discovery rate (FDR).[26] Back-transformed estimated prevalence values of ED with 95% C.I. for studies with different levels of predictor variables in the final multiple MA regression model were given.

For all MA regression, we applied the logit transformation to the observed prevalence across primary studies to make the transformed prevalence follow a normal distribution, and the MA regression analysis is based on the transformed scale.

Assessment of study quality

Study quality was assessed by two investigators (DP, LS) using the Newcastle-Ottawa Scale (NOS).[27,28] This scale has been adapted from the Newcastle-Ottawa Quality Assessment Scale for cohort studies to perform a quality assessment of cross-sectional studies for the systematic review.[27,28] A third reviewer was available for mediation (NV). The NOS assigns a maximum of 9 points based on three quality parameters: selection, comparability, and outcome.

Results

The electronic search yielded, after de-duplication, 1301 studies that were assessed for inclusion in the review. Of those, 141 were potentially eligible and subsequently scrutinised in full text (Supplementary Figure 1).

Excluded studies

Amongst the relevant studies, 98 failed to meet the inclusion criteria and were excluded from this overview. Of these, 37 used no validated tools for ED assessment, 36 had no useful data on ED prevalence, 18 were longitudinal studies, 4 had no data on the association between ED and cancer and 3 were double publications.

Included studies

The 43 studies, 36 prospective and 7 retrospective, included a total of 19,329 participants. The majority of the studies (n=25) were conducted in Europe, 6 in North America, 6 in Asia, 5 in Middle East and 1 in Oceania. The most affected sites were: prostate and rectum (12 studies each), testis (6), haematological (5), multiple sites (3), colorectal (2), and penis, colon and anus (1 each).

The median quality of the studies was 4.97 (range: 3-7), indicating an overall good quality of the studies, according to the NOS (**Supplementary Table 2**). In particular, the majority of the studies (18) scored 5, followed by 11 studies with 4. Only 3 studies scored 3 while 6 and 5 studies scored 6 and 7 respectively.

Meta-analysis on Prevalence of ED across three stages (i.e., healthy, at diagnosis, and after treatment stages)

Distribution of study counts and the corresponding pooled prevalence of ED at the three different stages are given in Table 1. The pooled prevalence of ED at the stage of after treatment was significantly different from that of healthy control by the univariate MA regression analysis with dummy variables for *stage* ($p = 0.0322$).

To compare prevalence of ED among patients in the two cancer treatment stages with that of healthy control people, we also illustrate the pooled prevalence of these three groups of people in Figure 1, with the pooled prevalence of ED given in red square and the corresponding CI given in red extending line (blue circles are centered at the prevalence of ED reported in each of the included primary studies with circle size proportional to sample size of each primary study).

Small study effect (including publication bias) was not found among the included studies and the trim and fill analysis did not modify our results. Figure 2 shows the funnel plot, with non-significant Egger's test result for funnel plot asymmetry (p = 0.4418).

Meta-analysis on Prevalence of ED across the two cancer treatment stages (i.e., at diagnosis, and after treatment stages)

Pooling the data of the 40 studies of cancer patients only (i.e., excluding 3 studies of healthy controls), we found an overall prevalence of 40.72% (95%CI: 31.80-50.29) with a high degree of overall heterogeneity (I2=98%; p<0.0001). Figure 3 shows the prevalence of ED among cancer patients.

To locate the potential predictors that account for the very high heterogeneity of prevalence of ED among all the primary studies involving cancer patients in the two treatment stages, MA regression analyses were conducted with ten predictors used. Distribution plots of Study Count for each of the 10 possible predictors are given in Supplementary Figure 2. Study counts of these 10 possible predictors for the ED prevalence among cancer patients and p-value for continuous predictor (or smallest p-value for the dummy variables of categorical predictor) in the univariate MA regression analysis are given in Table 2. The results by the univariate MA regression showed that the following mean age and cancer site are variables that are significantly associated with the ED prevalence.

After a manual variable selection accounting for the multicollinearities of the predictors, a parsimonious MA regression model was built to predict the highly heterogeneous ED prevalence. Regression coefficient estimates of this prediction model are given in Table 3. This model only included two predictors, *Stage* and *Cancer Site*. Since both of them are categorical variables, dummy variables are created to represent them. The reference level for *Stage* is selected as "at diagnosis", and the reference level for Cancer Site is selected as "prostate" since prostate cancer has the highest count (12) in the collected primary study data (this count is same as the rectum cancer) and prostate cancer is a common cancer in urology. Both predictors are significant controlling for false discovery rate less than 5% in this MA regression model indicating that the ED prevalence estimates reported by primary studies are

significantly associated with factors of stage and cancer site. The interpretations of those significant regression coefficients are given as follows: study-reported odds of ED at after-treatment stage is estimated to be 2.4823 (i.e., exponential of 0.9092) times of that at diagnosis stage controlling for other covariates (95% C.I.: 1.3054 to 4.7204; adjusted p-value controlling for FDR: 0.0204); study-reported odds of ED for patients with colon cancer is estimated to be 0.23 (i.e., exponential of -1.4697) times of that for patients with prostate cancer controlling for other covariates (95% C.I.: 0.0697 to 0.7587; adjusted p-value controlling for FDR: 0.0434); study-reported odds of ED for patients with lymphoma cancer is estimated to be 0.2530 (i.e., exponential of -1.3744) times of that for patients with prostate cancer controlling for other covariates (95% C.I.: 0.0756 to 0.8470; adjusted p-value controlling for FDR: 0.0473); study-reported odds of ED for patients with multiple cancers is estimated to be 0.1041 (i.e., exponential of -2.2625) times of that for patients with prostate cancer controlling for other covariates (95% C.I.: 0.0419 to 0.2586; adjusted p-value controlling for FDR: < .0001); study-reported odds of ED for patients with penis cancer is estimated to be 0.1725 (i.e., exponential of -1.7574) times of that for patients with prostate cancer controlling for other covariates (95% C.I.: 0.0394 to 0.7553; adjusted p-value adjusted p-value controlling for FDR: 0.0433); study-reported odds of ED for patients with testis cancer is estimated to be 0.1353 (i.e., exponential of 2.0001) times of that for patients with prostate cancer controlling for other covariates (95% C.I.: 0.0730 to 0.2508; adjusted p-value controlling for FDR: < .0001).

The R^2 value of this MA regression is as high as 75.70%, indicating that this MA regression model already accounts for 75.70% heterogeneity of the ED prevalence reported by the 40 studies involving studies of cancer patients. The back-transformed estimated prevalence values of ED for studies with patients of different cancers at the two stages by this MA regression are given in Table 4.

Discussion

Summary

In our systematic review our search yielded 1301 individual studies, out of which 43 studies with overall 19,329 participants were included in the analysis. Our study provides pooled estimates for ED in cancer survivors across all cancer sites providing synthesized data of this kind for the first time. Overall the pooled data of the included studies showed an ED prevalence of 40.72% (95%CI: 31.80-50.29) in cancer patients,

with prevalence of 28.60% (95%CI: 12.10%-53.83%) at time of diagnosis and 42.70% (95%CI: 32.97%-53.03%) after treatment, across cancer locations.

Strengths and limitations

This systematic review and meta-analysis provides a comprehensive overview of evidence on the prevalence of ED in cancer survivors in general with studies using validated self-reported methods.

Limitations of our analysis include the inherent limitations from the included studies. Study populations were on average over 60 years old, which may have contributed to the prevalence as ED risks increase with age. Similar is the overrepresentation of cancer sites in the pelvic area. Again, due to the small number of primary studies that provide complete clinical and biological (e.g. serum testosterone or estradiol levels) features of the participants, we were not able to run some meta-regression analyses using well-known independent risk factors for ED (such as dyslipidemia, hypertension, diabetes mellitus and depression) as moderators of our findings. Lastly, the results pertaining to cancer survivors with multiple cancer sites need to be taken with caution given that there were only 3 primary studies that were included in the analysis.

Comparison with existing literature

Meta-analyses of studies reporting prevalence levels of ED in healthy men are rare and mostly focusing on samples of Asian men. These studies report that ED prevalence in individual studies has been reported from 2 to 82%, differing among age groups and how ED has been assessed. Generally, lowest reports have been found among younger men between 20 and 29 years old with 15.1% (12.2–18.1), while the highest have been found in the groups of 60 and over with 70.0% (62.3–77.7).[29] Studies have noted that self-report leads to lower estimates than measuring by a standardized questionnaire. Overall pooled estimate for ED prevalence has been reported at 49.69% (95% CI = 39.29–60.10) for Chinese samples.[30]

Most studies included in our meta-analysis focused on cancers located in the pelvic region (prostate and rectum) and testis, where the effects would be expected to be strongest given the possible neurovascular damage associated with treatment.

Androgen-deprivation therapy (ADT) which is used in prostate cancer management leads to ED in most men who had not dysfunction prior to therapy.[31-33] Various chemotherapeutic agents may induce microangiopathy and vascular insufficiency in the *corpus cavernosum* of the penis as well as neurotoxicity that may result in ED.[34] In a study of more than 260 men on platinum-based chemotherapy, 40% were reported to have ED on standardized questionnaires, which corresponds to the pooled data from our analysis.[35] ED is also a common finding after radiation therapy for prostate cancer with varying incidence reported in studies depending on the dose, technique, associated treatments and time post-treatment, with brachytherapy showing lower rates of ED compared to external-beam radiation therapy in some studies.[36-37]

Surgical cancer treatment in the pelvic area may also lead to postoperative sexual dysfunction, depending both on the surgical techniques and methods used in assessing ED postoperatively. In one study more than 90% of patients who had radical prostatectomy reported lower scores on the IIEF-5 than before surgery,[38] with an Italian based study reporting that reaching perioperative levels does not equal patient satisfaction, with little over one quarter of patients who reported preoperative scores reported being satisfied. Only men who achieved scores higher than 22, as measured by the IIEF, and returned to the same levels postoperatively were also satisfied with their sexual function.[39] Similarly, 86% of men who had radical cystectomy were not able to achieve vaginal penetration and studies report between 10 and 50% of men having sexual dysfunction following colorectal surgery, where the proposed mechanism may lie in the injury to the hypogastric plexus. In testicular cancer survivors, a study measuring blood flow and erectile hemodynamics using duplex ultrasonography reported that 12 months after treatment there were no differences between men with or without hypogonadism, suggesting an hyperadrenergic mediated causes of ED.[40]

Sexual function may be influenced by systemic chemo- or radiation therapy, as well as by psychological factors such as depression, anxiety, low self-esteem or issues with body image, which are known conditions in all cancer patients and survivors, regardless of the primary cancer site.[41-47] However, very few studies examine the effects of cancer sites outside of the pelvic area on the overall sexual function or ED, specifically, in men. A meta-analysis on sexual functioning in male lymphoma survivors reported prevalence of sexual dysfunction between 20 and 40%.[48] Anecdotal evidence also suggests similar prevalence in patients with lung cancer. In fact, although

this is the most prevalent cancer in men globally, there is still no research on sexual function in men lung cancer patients or survivors, as most of the focus is on short-term survival rather than post-treatment quality of life.[49]

Implications for research and/or practice

Our analysis showed high prevalence of ED in cancer survivors at various points and across cancer types. As the aetiology of ED in cancer survivors is multimodal and it includes a variety of factors including psychological and physical ones. The results should improve the visibility of this issue and allow health care professionals to more easily identify cancer survivors under higher risk of ED. Moreover, it is important that clinicians be aware of the impact of ED on quality of life and mental health of cancer survivors, especially as sexuality and intimacy may reduce some of the psychosocial issues associated with receiving a cancer diagnosis.[19,50] Various therapeutic modalities exist and health care providers should facilitate an open exchange with patients before cancer treatment and manage expectations. Here the primary care physicians are of great importance given their role in follow through during cancer care and beyond. As men are generally less prone to discuss sexual health problems in a clinical setting, clinicians should routinely and proactively ask about sexual health and recognize and acknowledge any concerns, which may increase the patient's satisfaction and improve the doctor-patient relationship.[51]

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Table 1: Study Count and Pooled Prevalence of ED across Three Stages

	Healthy Control	At Diagnosis	After Treatment	Total
Study Count	3	5	35	43
Pooled number of patients with ED	250	782	2794	3826
Pooled sample size	1240	2403	9505	13148
Pooled Prevalence (95% CI)	0.1370 (0.0394; 0.3808)	0.2861 (0.1229; 0.5340)	0.4269* (0.3311; 0.5286)	

* indicates that the ED prevalence among cancer patients after treatment is significantly different from that of healthy control at level 0.05 ($p = 0.0322$; this can also be seen by the fact that the point estimate of ED prevalence for healthy control, 0.1370, is not included in the 95% C.I. of ED prevalence for cancer patients after treatment)

Table 2: Study Count of the 10 Possible Predictors for the ED Prevalence and P-value for the Uni-predictor (or Smallest P-value for the Uni-predictor Dummy Variables) in the Univariate MA Regression Analysis

Predictor	**Study Count**	**Coef. Est.**	**95% C.I.**	**P-value**
Stage	40	0.6210	(-0.5253, 1.7673)	0.2883
Continent	40	1.2655	(-0.3051, 2.8362)	0.1143
Mean age	40	0.0503	(0.0243, 0.0762)	0.0002*
Range of age	40	0.0057	(-0.0210, 0.0325)	0.6739
Assessment method of ED	40	1.5236	(-0.1845, 3.2316)	0.0804
Cancer site	40	-1.8135	(-2.5841, -1.0429)	<.0001 ***
Standard deviation of age	17	-0.0078	(-0.0733, 0.0576)	0.8144
Proportion of patients underwent radiotherapy	15	1.0584	(-1.0225, 3.1393)	0.3188

Proportion of patients with diabetes	12	-3.6361	(-19.1360, 11.8639)	0.6457
Proportion of patients underwent chemotherapy	12	0.1348	(-1.9925, 2.2621)	0.9012

Note: significance code controlling for type I error rate less than 0.05 and greater than 0.01: '*'; significance code controlling for type I error rate less than 0.0001: '***'.

Table 3: A prediction model for the highly heterogeneous ED prevalence

Regression Coefficients	Estimate	Standard error	z	P-value	Adjusted P-value
Intercept	-0.5380	0.2720	-1.9778	0.0479	0.0659
Stage: After Treatment	0.9092	0.3279	2.7726	0.0056	0.0204 *
Cancer site: Colon	-1.4697	0.6089	-2.4136	0.0158	0.0434 *
Cancer site: Colorectal	0.9628	0.4856	1.9830	0.0474	0.0744
Cancer site: Haematologic	-0.0742	0.4759	-0.1560	0.8761	0.9637
Cancer site: Lymphoma	-1.3744	0.6165	-2.2293	0.0258	0.0473 *
Cancer site: Multiple	-2.2625	0.4643	-4.8726	<.0001	<.0001 ***
Cancer site: Penis	-1.7574	0.7535	-2.3324	0.0197	0.0433 *
Cancer site: Anus	0.1397	0.9449	0.1478	0.8825	0.8825
Cancer site: Rectum	-0.3761	0.2919	-1.2888	0.1975	0.2414
Cancer site: Testis	-2.0001	0.3148	-6.3533	<.0001	<.0001 ***

Note: significance code controlling for false discovery rate (FDR) less than 0.05 and greater than 0.01: '*'; significance code controlling for false discovery rate (FDR) less than 0.0001: '***'.

Table 4: Back-transformed estimated prevalence values of ED with 95% C.I. for studies with patients of different cancers at the two stages by the predictive MA regression model

Cancer site	At diagnosis	After treatment
Prostate cancer	59.2% (48.7%, 68.9%)	78.3% (58.2%, 90.3%)
Colon cancer	25.0% (9.8%, 50.4%)	45.3% (18.6%, 75.0%)
Colorectal cancer	79.1% (61.8%, 89.9%)	90.4% (76.4%, 96.5%)
Haematologic cancer	57.4% (37.0%, 75.5%)	77.0% (53.9%, 90.5%)
Lymphoma cancer	26.8% (10.6%, 53.2%)	47.6% (19.9%, 77.0%)
Multiple cancer	13.1% (6.3%, 25.2%)	27.2% (11.8%, 51.2%)
Penis cancer	20.0% (5.7%, 50.7%)	38.3% (11.6%, 74.6%)
Anus cancer	62.5% (21.6%, 91.0%)	80.5% (37.9%, 96.6%)
Rectum cancer	49.9% (40.4%, 59.4%)	71.2% (53.9%, 83.9%)
Testis cancer	16.4% (10.7%, 24.3%)	32.7% (16.8%, 53.9%)

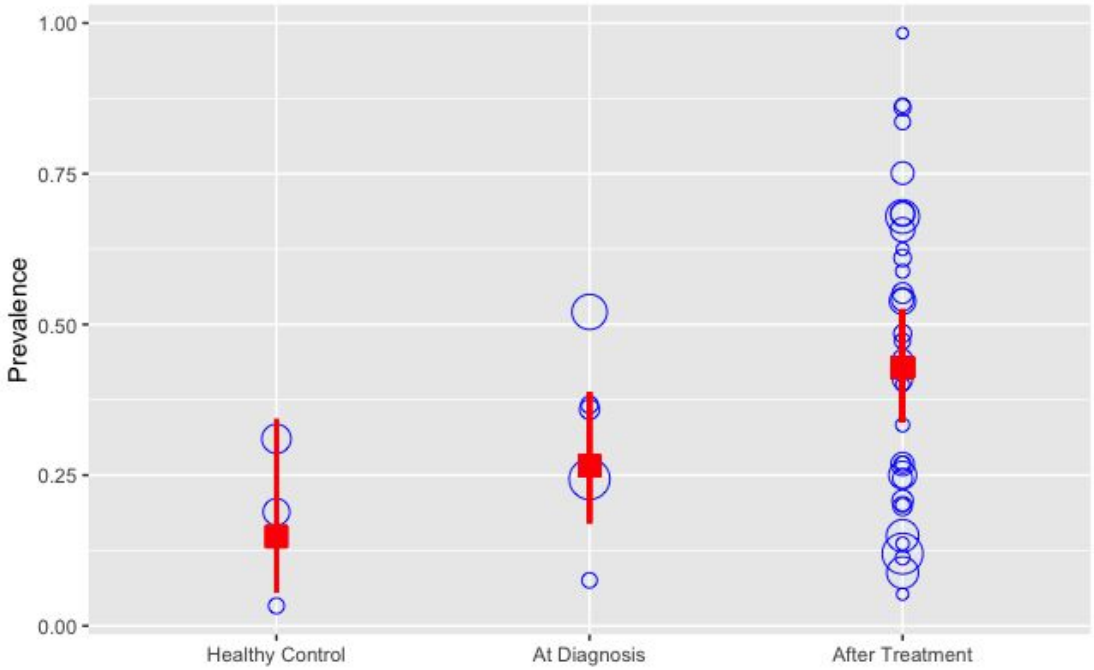

Figure 1: Comparisons of prevalence of ED among cancer patients and healthy control

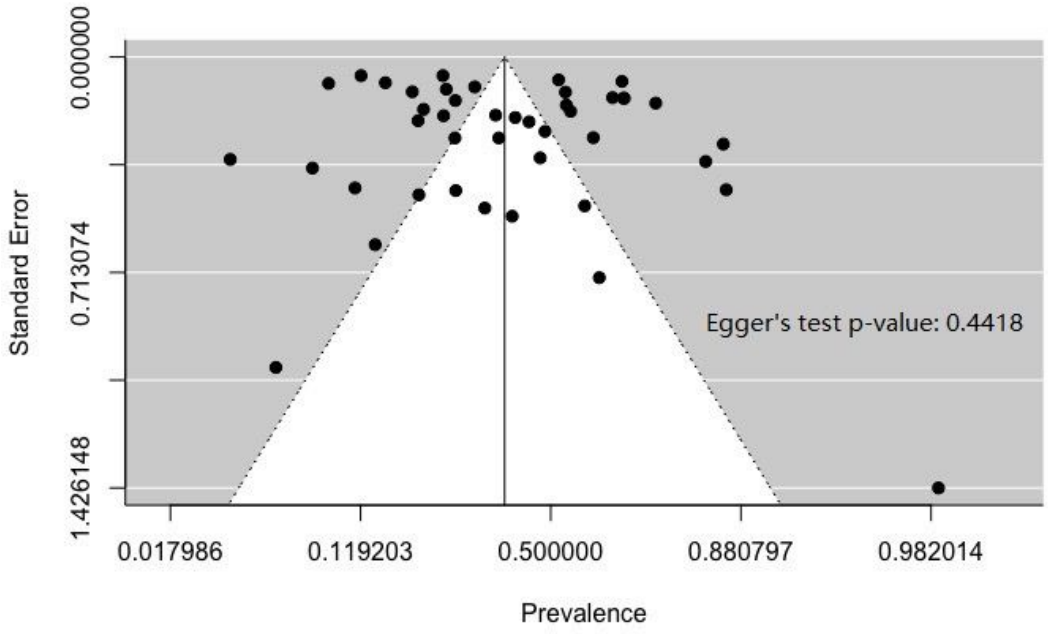

Figure 2: Funnel plot

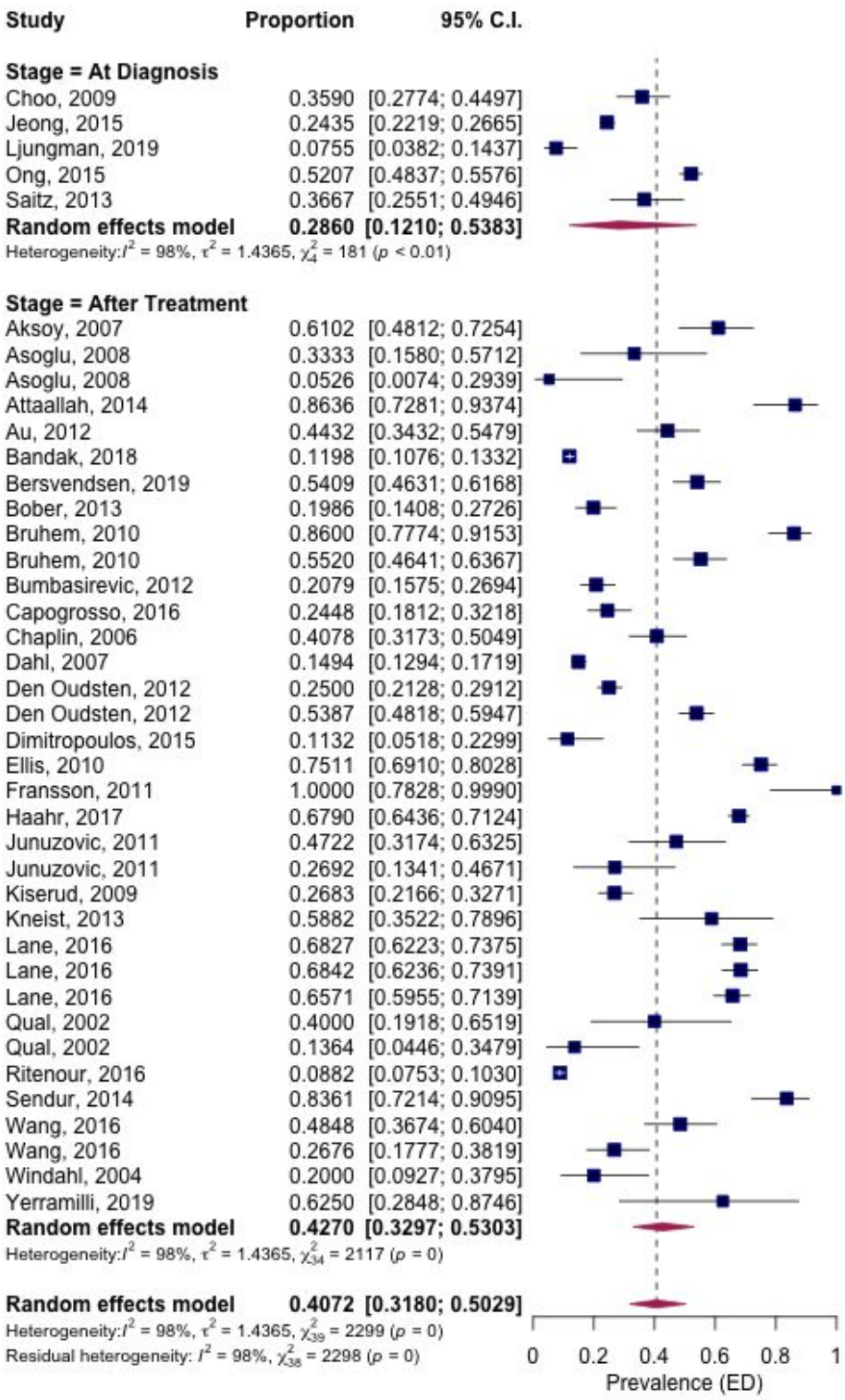

Figure 3: Prevalence of ED among cancer patients