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Research Article

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PREVALENCE OF SEXUAL DYSFUNCTIONS IN MEN AGED 18-65 AND RELATED FACTORS: A META-ANALYSIS AND META-REGRESSION STUDY FROM TURKEY

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Abstract

Objectives: Studies on male sexual dysfunctions around the world point to high prevalence rates. Although there are studies on the prevalence of sexual dysfunctions in men in Turkey, these studies report different results due to regional and methodological differences. Therefore, more robust and consolidated data are needed on the prevalence of sexual dysfunctions in men.

Materials and Methods: For this meta-analysis study, "Google Scholar" and "ULAKBIM" databases were searched. Studies have been conducted in Turkey between January 2000 and April 2019 were included in the study.

Results: The prevalence of male sexual dysfunction, erectile dysfunction and premature ejaculation were found to be 28%, 18% and 24%, respectively.

Conclusion: This study is the first meta-analysis on the prevalence of male sexual dysfunction in Turkey. Our results reveal the importance of preventive and therapeutic health services in male sexual dysfunctions.

Keywords: Erectile dysfunction, men, meta-analysis, premature ejaculation, sexual dysfunction.

Introduction

Loss of function in one or more stages of sexual psychophysiology, such as interest/desire, arousal, orgasm, and resolution, is defined as sexual dysfunction.[1,2] According to the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM 5), although sexual dysfunctions are handled in different categories, they are intertwined to different degrees.[3,4] Erectile dysfunction (ED) and premature ejaculation (PE) are the most common male sexual dysfunctions. ED is the inability to achieve and maintain an adequate erection to allow satisfactory sexual performance.[5] PE is characterized by ejaculation that always or nearly always occurs before or within about one minute of vaginal penetration, the inability to delay ejaculation on all or nearly all vaginal penetrations and negative personal consequences such as distress, bother, frustration and the avoidance of sexual intimacy.[6] Although the prevalence of ED and PE varies in studies, it is estimated that 5-20 and about 30%, respectively. This variability is probably due to study methodologies, sample age, and sociocultural factors.[7-9]

Sexual health can be sustained by the interaction of many biopsychosocial components. Although sexual life is primarily handled from a physiological point of view, it is also under the control of cognitive and emotional factors and is affected not only by the presence of medical conditions but also by psychosocial conditions. While sexual health is affected by these factors, it is also in a position to affect these factors. In other words, healthy sexual life is also necessary for maintaining physiological and psychosocial health. The role of sexual health in terms of general health and quality of life cannot be ignored, and the protection of sexual health should be at the forefront of public health services.[10]

Although more has been studied in women, there are relatively few studies on the epidemiology of male sexual dysfunctions (MSD).[6] The studies on MSD are mostly regional and there is a risk of bias for MSD, which can be affected by a large number of demographic, geographical, and cultural factors. Therefore, a meta-analysis study on the prevalence of male sexual dysfunction can provide the consolidation of the findings of these regional studies. The secondary objectives of this study are to create data for public health policies for male sexual dysfunctions. In addition, the high prevalence rates of male sexual dysfunctions may, in some ways, indicate the inadequacy of both the provision of appropriate treatments and access to these treatments. It, therefore, emphasizes the need to improve and expand existing MSD treatment offerings.

Materials and Methods

Search Strategy

The methods for this meta-analysis were developed according to recommendations from the Meta-analysis of Observational Studies in Epidemiology (MOOSE) statements.[11] Scans for the meta-analysis study were carried out using "Google Scholar" and "ULAKBIM TR Directory" databases. The search words were as in English it was as follows; "sexual function", OR "sexual problem", OR "sexual dysfunction", OR "erectile dysfunction", OR “erectile”, OR "premature ejaculation", AND Year: 2000 - 2019, OR Database: Science, OR Database: Social. The reasons for choosing these databases; Google scholar has an extensive database for a large number of research papers carried out in Turkey. ULAKBIM includes national articles.

The literature search and review were carried out by the researchers. All abstract and title sections have been revised according to their relevance to the meta-analysis. Suspicious articles were included until the full text was examined. The final inclusion of the studies was achieved through the review of two separate researchers. In case of conflict, a third researcher examined the article and made the decision. If different articles originate from a single study, the most recent of them were included. A second screening was made by examining the reference part of the final articles (Figure 1).

Eligibility Criteria

The study included a meta-analysis that reported the rates of any MSD in healthy male volunteers between January 2000 and April 2019, or at least one sexual dysfunction (such as erectile dysfunction or premature ejaculation). Observational studies such as cross-sectional and cohort studies were suitable for this meta-analysis. Reviews, intervention research, theses, and poster notifications were not included in the study. Studies with clinical populations (including infertility), studies with spouses of the clinical population, studies focusing on special populations of average or median age 65 and above, and studies conducted outside the field of health and social sciences were not included in the meta-analysis.

Data Extraction

The data to be collected from the studies were: authors and publication year of the study, the city and region in which the study was conducted, the average age of the sample, the method used for the diagnosis of MSD, ED or PE, total sample size, frequency or percentage of MSD, ED, and PE. After all the data were obtained, the collected information was rechecked by cross-exchange between the two researchers. If an error is detected, it is fixed.

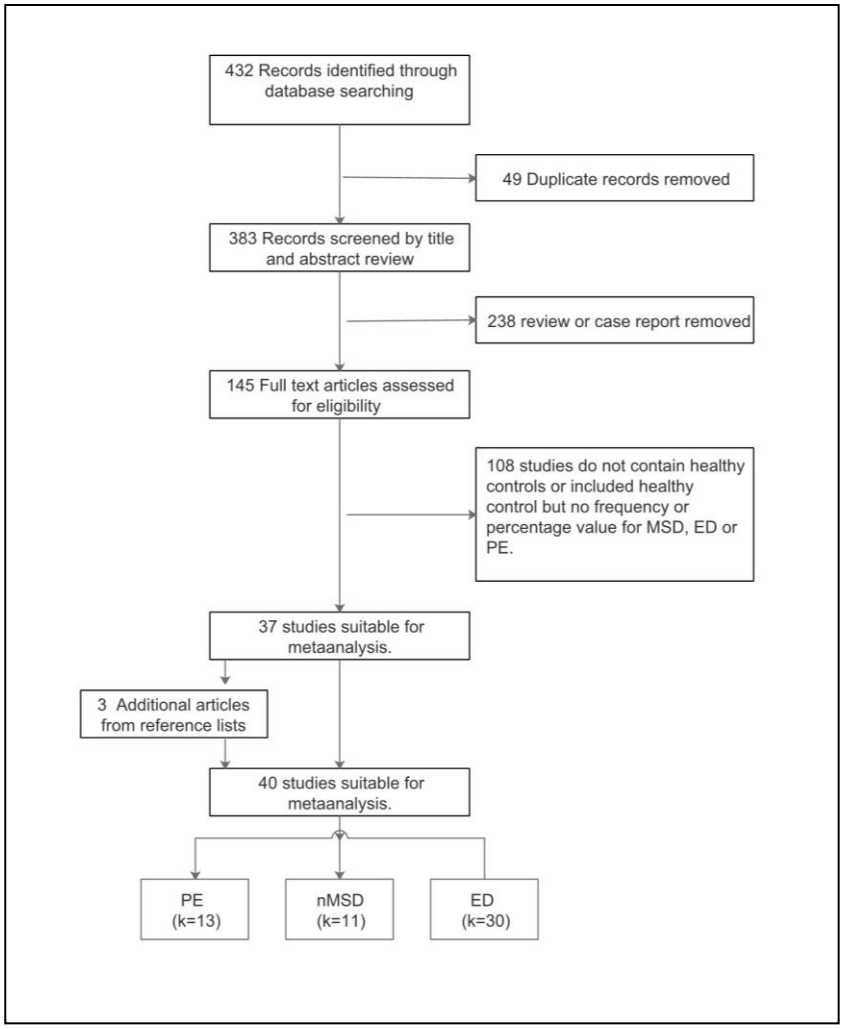

Figure 1. Flow diagram for study selection

Some of the data published publicly from the Turkish Statistical Institute's official website were used for meta-regression.[12] These variables were; Male first marriage age, crude marriage rate, crude divorce rate, literacy rate, and average gross national product per capita (GDP per capita -$-). These variables were added as moderator variables according to the publication year and region.

In the study, a meta-analysis of a single proportion method was used to calculate the effect size. For this, the number of cases with MSD, ED or PE and total sample sizes were recorded from each study. Weighted average ages were obtained for each MSD group using the average ages specified in each study. As explained below, the quality assessment was made for each study and the "quality" continuous variable was created.

Assessment methods of MSD

Since the studies covering the last 19 years are included, and there are changes in the diagnostic systems during this period, all methods previously used in the literature were included. Among them were the Arizona Sexual Experience Scale (ASEX), Golombok-Rust Inventory of Satisfaction (GRISS), International Index of Erectile Function (IEFF), Florida Sexual Health Questionnaire (FSHQ), Premature Ejaculation Diagnostic Tool (PEDT), Premature Ejaculation Profile (PEP) scales, Sexual Health Inventory for Men (SHIM) and face-to-face interviews that were used frequently and whose validity and reliability was determined. All of these scales have been used in international studies, and their Turkish validity and reliability have been tested.[13-16] Although face-to-face interviews have a more comprehensive assessment and high validity, and they are not frequently preferred in MSD studies. However, it is still one of the diagnostic methods frequently used in psychiatric practice.[17] Classifications for MSD in men coded as nonspecific MSD, ED, and PE.

Quality Assessment

The quality assessment of all included studies was carried out using the adapted 14-item quality criteria checklist recommended by Kmet et al.[18] There are questions in this checklist that evaluate studies in some ways (for example: “is the purpose clearly stated?” or “is the study design clear and appropriate?”). Each question was given "0 points" for the answer "no", "1 point" for the answer "partially" and "2 points" for the answer "yes". Questions that were not valid for the study were coded as “na (not applicable)”, and these questions were excluded from scoring and calculation. The quality score was obtained by dividing the total score by the highest possible score. The final score is between 0 and 1. The publication quality is considered high for studies close to 1. Each study was evaluated independently by two researchers. In case of disagreement, a consensus was reached with the senior researcher of this study. These final scores were evaluated by meta-regression.

Data Synthesis and Analysis

For the meta-analysis of prevalence statistics, prevalence data were transformed into logit event rate data and weighted by sample size. Results were then converted back to non-logit prevalence data for ease of comprehension. Egger’s test was used to evaluate publication bias between studies. It was also taken into account in the asymmetry on the funnel plots.[19,20]

I^2 statistics (i.e., the proportion of total variation explained by variation between studies) was used to determine heterogeneity between studies. It is assumed that if this value is 75% and above, there is heterogeneity.[21] Meta-analysis was performed according to both fixed and random-effects models. Considering the heterogeneity, the results were interpreted according to the random-effects model. Pooled prevalence rates were calculated with 95% CI. Meta-regression was applied to demonstrate the effects of possible variables on

the prevalence of MSD, ED and PE. For this, log-transformed prevalence rates of MSD, ED, and PE of studies and some demographic variables provided by TSI were analyzed by the mixed-effects meta-regression method. Relationships between the prevalence of MSD, ED, and PE and predictive variables were visualized with graphs. R program used for analysis.[22,23]

Results

Study Characteristics

As a result of the screening, 432 studies were reached. Forty-nine of these studies were duplicated studies. According to the article titles, 238 reviews and case studies were excluded. The abstracts were examined and 108 studies were excluded because they did not contain healthy controls and they did not report frequency or percentage rates, although they included healthy volunteers. As a result, 40 studies were included in the meta-analysis as they provided appropriate data. Meta-analysis was performed separately for MSD, ED, and PE. The number of studies for each meta-analysis was as follows: 11 studies for MSD, 30 studies for ED, and 13 studies for PE. The flow chart of the scanning method is shown in figure 1. The studies included meta-analysis conducted in 17 different provinces of Turkey. Eight studies are multi-center studies conducted in more than two provinces. The cities where most studies are conducted are Ankara and Istanbul, respectively. ASEX for MSD, face-to-face interviews for PE, and IIEF for ED was the most common assessment methods.

Prevalence of MSD, ED and PE in the general population

In the studies analyzed for the prevalence of ED, the total number of healthy volunteer men was 8874 (min=20, max=2288) and the weighted average age was 37.32 (min=20.44, max=61.11). Considering the random-effects model (Heterogeneity analysis results: Q value = 1606.42, df (Q)=29, p <0.001, I^2 = 98.22% (97.87%-98.48%), Tau square = 1.499) prevalence of MSD was found to be 17.83% (11.89%-25.72%). According to the fixed effects model, it was found as 31.77% (30.63%-33%) (Figure 2). Thirty studies were included in the analysis and the average study quality score was 0.68±0.14. Egger's test results for publication bias: t = - 1.338 and p = 0.010. According to these results, it can be said that there is publication bias (Figure 5).

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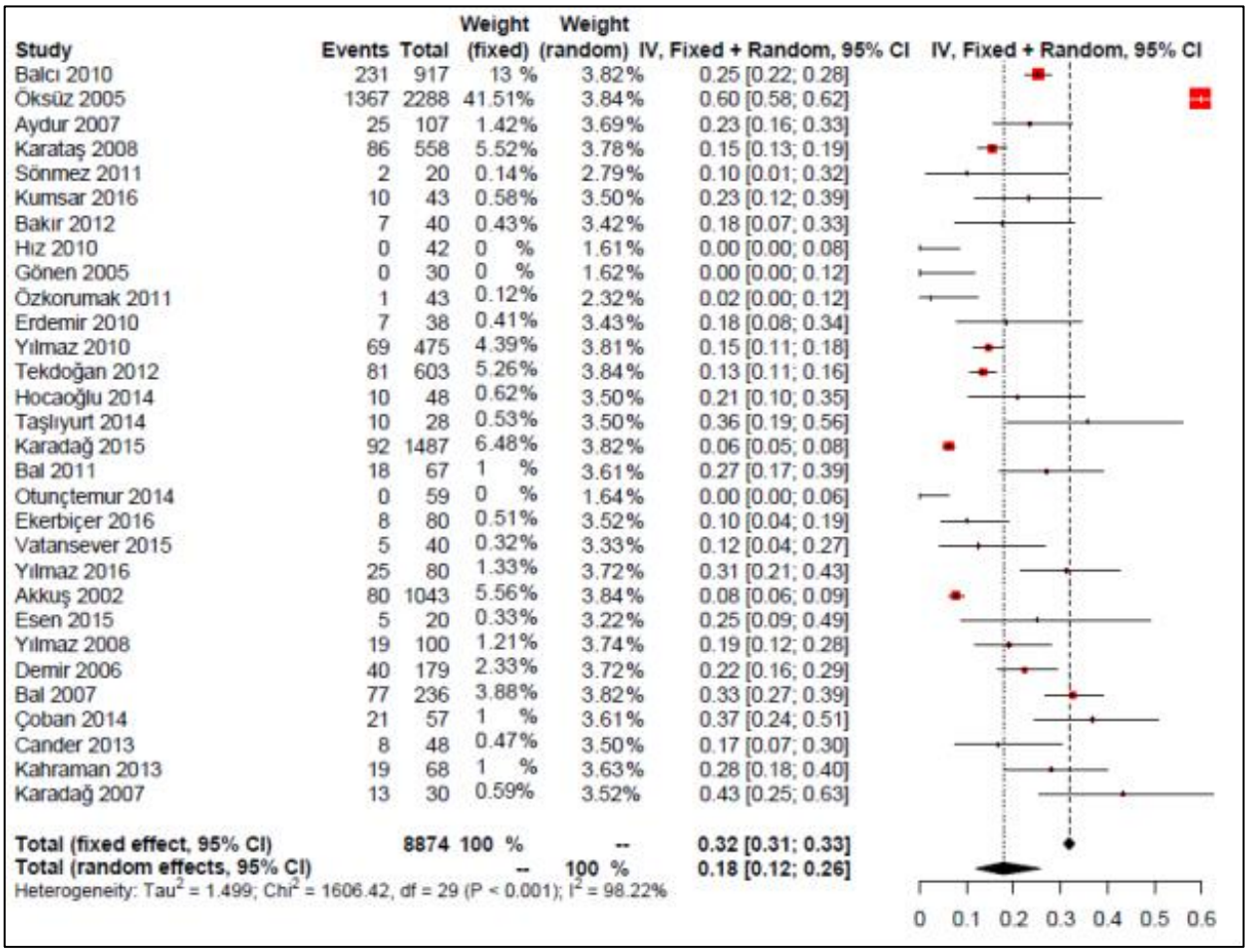

Figure 2. Forest plot for erectile dysfunction

In the studies analyzed for the prevalence of MSD, the total number of healthy volunteer men was 5999 (min=20, max=2760), and the weighted average age was 41.56 (min=28.24, max=54.19). Considering the random-effects model (Heterogeneity analysis results: Q value=126.29, df(Q)=10, p <0.001, I^2 = 92.14% (87.82%-94.86%), Tau square = 0.136) prevalence of MSD was found to be %27.50 (%22-%33.81). According to the fixed effects model, it was found as %37.82 (%36.58-%39.14) (Figure 3). Eleven studies were included in the analysis and the average study quality score was 0.67±0.14. Egger's test results for publication bias: t = - 1.860 and p=0.095. According to these results, it can be said that there is no publication bias (Figure 5).

In the studies analyzed for the prevalence of PE, the total number of healthy volunteer men was 10235 (min=20, max=2593) and the weighted average age was 33.73 (min=20.42, max=41.87). Considering the random-effects model (Heterogeneity analysis results: Q value=1160.84, df (Q)=12, p <0.001, I^2 = 99% (98.72%-99.21%), Tau square =0.821) prevalence of PE was found to be %24.22 (%16-%24.68). According to the fixed effects model, it was found to be 29.91% (28.93%-30.86%) (Figure 4). Thirteen studies were included in the analysis and the

average study quality score was 0.70±0.15. Egger's test results for publication bias: t = - 0.935 and p=0.369. According to these results, it can be said that there is no publication bias (Figure 5).

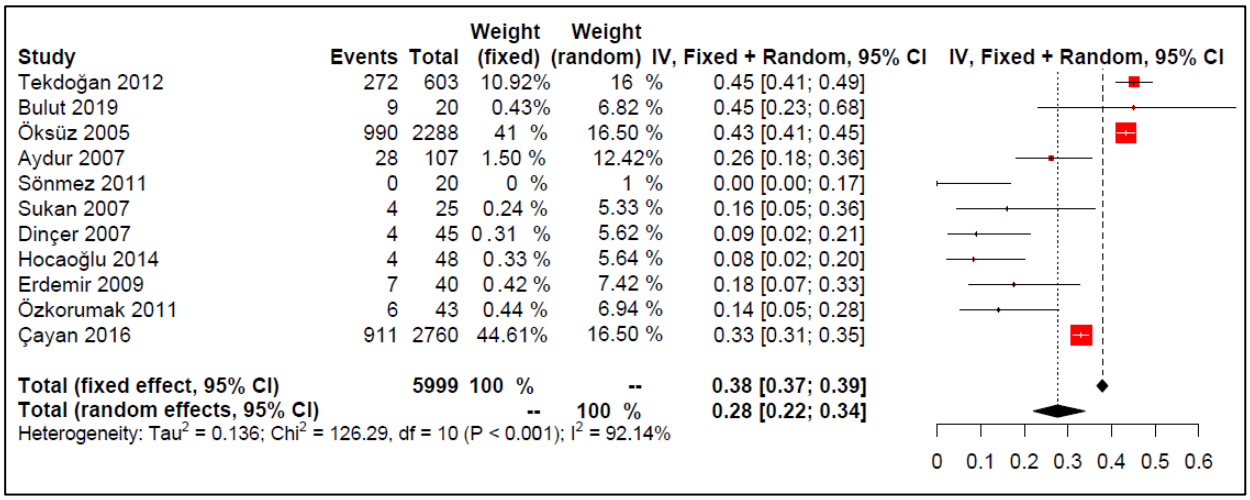

Figure 3. Forest plot for nonspecific male sexual dysfunction

Meta-regression Results

If there is high heterogeneity between studies, meta-regression is applied to reveal the factors that may cause this heterogeneity. Since significant correlations vary between medium and very high among many of the predictor variables previously described, the effects of these variables on the prevalence of MSD, ED, and PE were investigated by separate meta-regression models.

In studies on ED (k = 30), only the evaluation method had a significant effect on ED prevalence (When the reference category is accepted as the face-to-face interview; β_{FSHQ}=2.526, p <0.001, and β_{IIEF}=0.869, p=0.024, R^2=68.83%. For other assessment tools; p >0.05). None of the other variables, including age, had a significant effect.

In studies on PE, we found that the crude divorce rate and the publication year of the study had a significant effect on PE prevalence ($\beta_{Crude\ Divorce\ Rate}$=1.584, p=0.053, R^2=7%, k=11 and β_{Time}= - 0.125, p=0.002, R^2=67.33%, k=13). No significant effect of other variables was detected.

Considering studies evaluating male sexual dysfunction as non-specific, the effects of female first marriage age, male first marriage age, male-female first marriage age difference and crude divorce rates on MSD prevalence have a significant effect ($\beta_{First\ marriage\ age\ women}$= -0.382, p=0.026, R^2=6.9%, k=10; $\beta_{First\ marriage\ age\ man}$= - 0.379, p=0.018, R^2=12.88%, k=11; $\beta_{Difference\ Between\ Age}$= -1.856, p=0.012, R^2=15.84%, k=10; $\beta_{Crude\ Divorce\ Rate}$= 1.341,

p<0.001, R^2=34.93%, k=10). Other variables have no significant effect. The regression graphics of all models are shown in Figure 6.

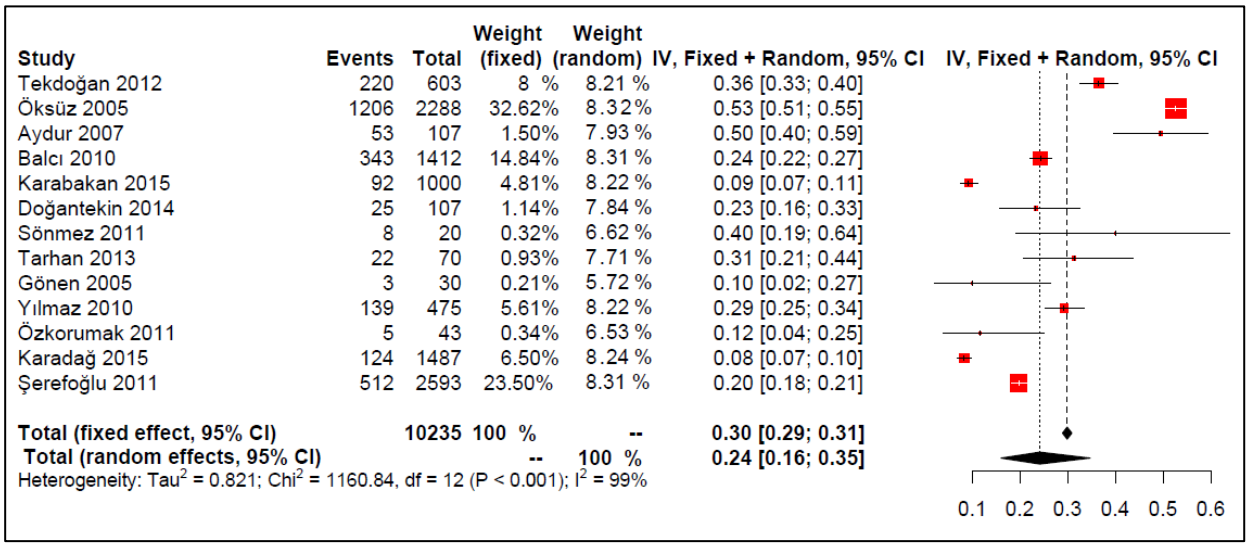

Figure 4. Forest plot for premature ejaculation

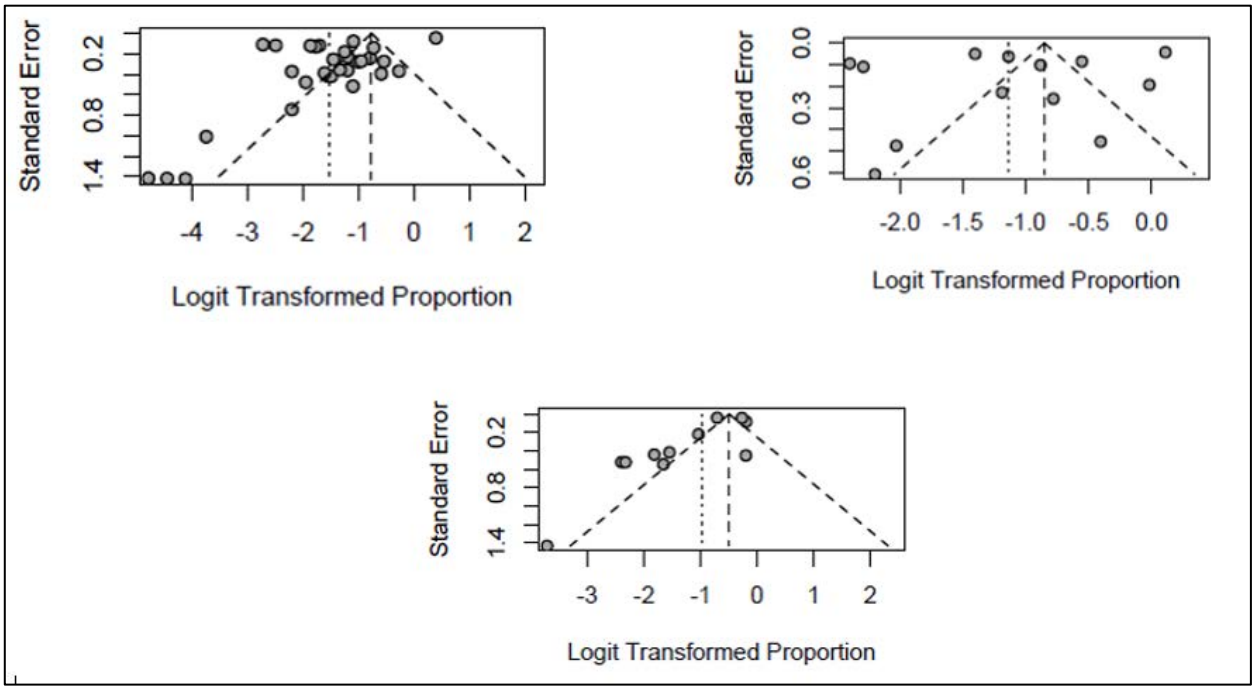

Figure 5. Funnel plots for erectile dysfunction, premature ejaculation and nonspecific male sexual dysfunction

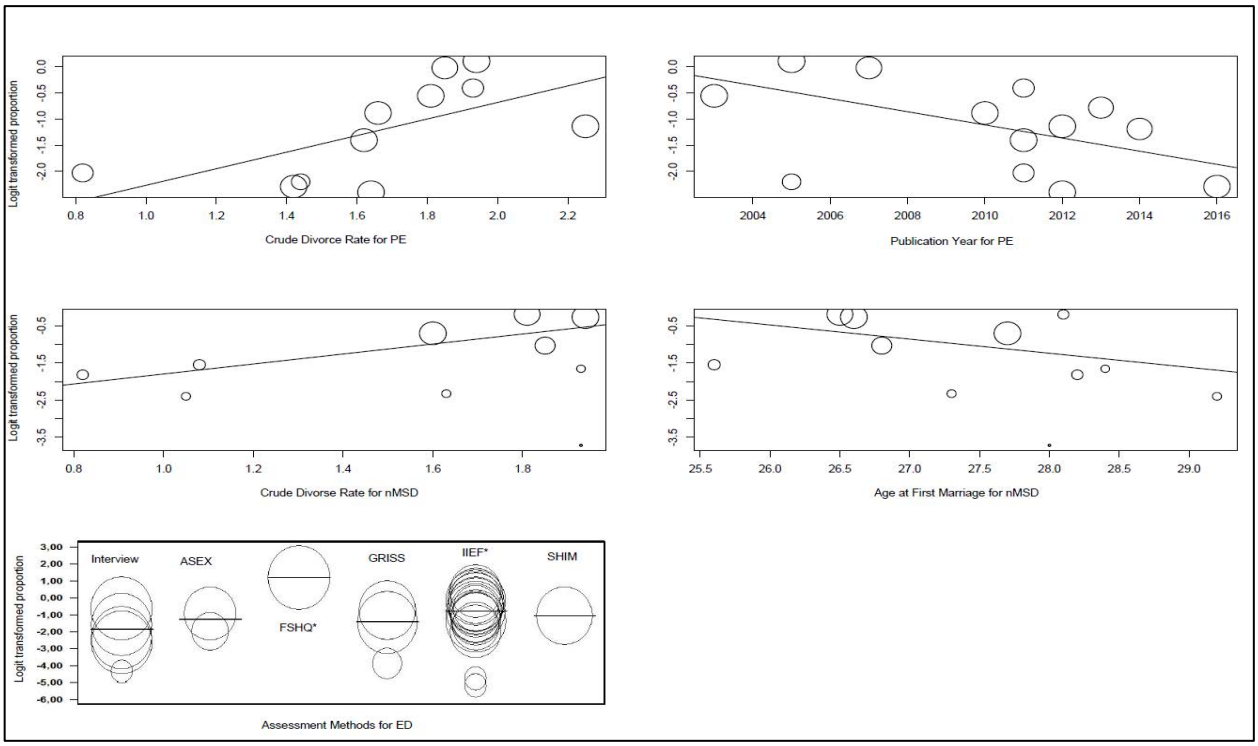

Figure 6. Meta-regression models for erectile dysfunction, premature ejaculation and nonspecific male sexual dysfunction

Discussion

The MSD is mostly seen as ED and PE. However, SD can be considered dimensionally as well as categorically. Multiple sub-threshold symptoms may not be diagnosed with ED or PE. However, a more general, inclusive, nonspecific or overall SD classification based on the total scores of the scales is also used, especially in the research area rather than in clinical practice. In our study, the equivalent of this is MSD. We found the prevalence of MSD 28%. In the literature, male sexual health is mainly categorically handled. In one study, overall MSD was reported as 66%[24] and in another study as %31.[17] Our study appears to be the first prevalence of MSD reported based on a meta-analysis.

In our study, we found the prevalence of erectile dysfunction as 18%. Studies reporting the prevalence of ED have reached very different results, such as 5-79%.[8,9,25] These different results appear to be due to two main reasons. First, the sample may not represent the general population (i.e., a small sample, an elderly sample, a sample of individuals with medical disease, or a sample in cultural subgroups). The second is the differences in ED evaluation methods. As a matter of fact, in our study, IIEF is the most commonly used method in ED evaluation, but six different methods were used. Also, the lack of a single cut-off point for ED in evaluation

methods is another problem. In some studies, accepting even "mild" cases as ED may have caused different and high prevalence rates. In our study, we accepted the "mild-moderate" level and above as ED.

In our study, the prevalence of PE was 24%. Studies on PE prevalence seem to yield relatively more consistent results than ED studies. Indeed, the prevalence of PE has been reported to be 20-31 %.[9,25]

As far as we can see, there is no meta-analysis study on SD prevalence in men to represent the men aged 18-65. Our work is first in this sense. However, our meta-analysis is a national study and a meta-analysis covering international studies is needed.

Meta-regression

There is high heterogeneity among studies, including meta-analysis. Our study has shown that the reason for this heterogeneity is not the quality of the included studies. MSD is under the influence of many biopsychosocial factors. Meta-regression results may shed some light on these possible factors.

According to our results, FSHQ and IIEF diagnose significantly higher ED than other assessment methods. IIEF identifies mild, mild-moderate, moderate, and severe cases for the diagnosis of ED. Therefore, it can be defined as a compassionate measuring tool. For this reason, some “sub-threshold” cases may be categorized as ED even if there is no disorder. When the FSHQ Turkish validity study is examined, it is understood that the items measuring erectile dysfunction are K, L, M, and P items. However, item M is a question about infertility. In addition, it was observed that the J question (premature ejaculation) was loaded with similar weight in the ejaculation dimension along with the erection dimension. In other words, the Turkish version of this scale may evaluate infertility and premature ejaculation while evaluating male dysfunction. Therefore, ED scores may be high.

As the age increases, the frequency of ED or MSD is expected to increase.[26] However, in our study, we did not find a significant relationship between ED or MSD prevalence and age. A possible reason for this result may be the average age of the sample collected for meta-analysis to be 37.32 for ED and 41.56 for MSD. The average age in a single study is 61. Apart from this study, the average age in all studies is below 60, and the number of studies under the age of 45 is relatively much higher. It has been reported that testosterone levels decrease by 1.50% each year after the age of 40 in men, but this decrease is faster after the age of 60. Also, the decrease in testosterone in men and associated sexual dysfunction is not as fast as in women and shows differences between individuals. [27] It can be said that our samples are not old enough to cause MSD or ED, and this sample is homogeneous in terms of sexual psychophysiology. A second explanation is that the meta-analysis sample consists of men aged 18-65, considered healthy people. Probably it is not only age-related changes that increase the risk of ED or MSD, but also what increases the risk are systemic diseases such as diabetes and hypertension,

which increase in frequency with age. Our meta-analysis was conducted with a sample selected from men aged 18-65, considered healthy. Therefore, the number of individuals with comorbid diseases is relatively low. This may explain our results regarding the relationship between age and ED or MSD.

According to the results of our study, the prevalence of PE decreases over time. Unlike ED, PE is more affected by psychosocial factors. Risks for PE may be reduced by increasing knowledge and experience about sexual health over the years. Of course, effective treatment may have caused these results. An interesting and controversial result regarding PE and MSD is the high frequency of PE in populations with high divorce rates. Healthy sex life is one of the essential components of couples' maintaining a healthy relationship. Therefore, male or female sexual dysfunctions may contribute to divorces by negatively affecting this relationship. Of course, the relationship between divorce and PE and MSD can also be addressed from the other side. In other words, problems in the relationship quality of the couple may negatively affect the sexual health of the couple.

Finally, meta-regression models point to a negative relationship between the prevalence of MSD and the male age at first marriage. The positive effects of long-term and regular sexual life and consequently increased sexual knowledge and experience on sexual health may explain this result.

Advantages and limitations of the study

This study is the first meta-analysis study on the prevalence of MSD, ED and PE in Turkey. It presents epidemiological data on MSD, ED and PE in detail. It also provides information on possible factors affecting the frequency of MSD. The results of this study show that male sexual dysfunctions are common in the general population. Male sexual dysfunctions, especially PE and some ED patients, are treatable diseases, they generally respond well to psychosocial interventions, and as a public health problem, preventive and therapeutic approaches are definitely needed.[28] In this way, the quality of life and well-being will increase both directly (healthy life) and indirectly (the contribution of healthy sex life to physiology and psychological health).

One of the limitations of the study is the high I^2 values, that is, heterogeneity between the studies. In prevalence studies, very different results can be reported due to reasons such as study design, classification of the related disorder, assessment tools, the publication year of study, and regional differences.[29] Although meta-analysis studies provide more reliable results on prevalence rates, heterogeneity between studies is still a disadvantage. However, heterogeneity is not uncommon in many meta-analysis studies.[30] This limitation was tried to be overcome by using “random” models in the analysis. Another limitation concerns some variables included in meta-regression. First, these variables were collected from the official website of TSI and reflect the demographic and cultural characteristics of the region where the study is conducted. However, it should be noted that most of the studies included in the meta-analysis do not include such variables. Finally, it should be

underlined that differences in the measurement and determination of sexual dysfunctions, study designs, and publication quality should be taken into account in the interpretation of results.

The prevalence of MSD, ED, and PE in Turkey is similar to the results of other international prevalence studies. However, treatment facilities and access to these facilities are relatively limited and need to be developed to meet the needs.

Ethical considerations: Since this is a meta-analysis study, application to an ethics committee was not required. Only publicly available data were used in the study.

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Conflict of Interest: The authors declare that there is no conflict of interest.

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