

Non-Pharmacological Interventions to Promote Sexual Function in Women with Type 2 Diabetes

Somayeh Karimi-Valoujaei¹, Zahra Kashi², Seyed-Sedigheh Yousefi³, Hamid Sharif Nia⁴, Soghra Khani⁵

¹M.Sc. Student of Midwifery Counseling, Student Research Committee, Nursing and Midwifery School, Mazandaran University of Medical Sciences, ²Diabetes Research Center, School of Medicine, Mazandaran University of Medical Sciences, ³Traditional Medicine and Complementary Medicine Research Center, Mazandaran University of Medical Sciences, ⁴Department of Nursing, Paramedical and Nursing School of Amol, Mazandaran University of Medical Sciences, ⁵Sexual and Reproductive Health Research Center, Nursing and Midwifery School, Mazandaran University of Medical Sciences, Sari, Iran

ORCID:

Somayeh Karimi-Valoujaei: <https://orcid.org/0000-0002-6960-8853>

Soghra Khani: <https://orcid.org/0000-0001-6958-8234>

Abstract

Sexual dysfunction is known as one of the chronic complications of Type 2 diabetes, having its own negative effects on marital relationships as well as quality of life. Thus, the main objective of the present study is to review nonpharmacological interventions to promote sexual function in women affected with Type 2 diabetes. This review was conducted on the studies published within early 1990–2019. The search was performed using the available databases including Scopus, Science Direct, PubMed, Google Scholar, Magiran, Barakat, and SID. The keywords used include Diabetes, Lifestyle, and Sexual function. A total of 675 articles were obtained based on the inclusion criteria; however, eight articles were found to be completely relevant to the topic of interest. The main results were divided into two main categories: Category I: lifestyle modifications (two articles) and Category II: training/counseling intervention programs (six articles). Moreover, the research instrument utilized in all studies was the Female Sexual Function Index. The results of the selected articles further revealed that lifestyle modifications and training/counseling intervention programs were effective in promoting sexual function among women with Type 2 diabetes. However, the retrieved documents were not adequate to reach a definitive conclusion. Therefore, further interventional studies using different types of counseling methods and lifestyle modifications are suggested to promote sexual function in women with Type 2 diabetes.

Keywords: Counseling, Diabetes, Education, Lifestyle, Sexual function

Address for correspondence: Dr. Soghra Khani, Sexual and Reproductive Health Research Center, Nursing and Midwifery School, Mazandaran University of Medical Sciences, Sari, Iran.

E-mail: s.khani@mazums.ac.ir

Received: 25 November 2019; **Accepted:** 15 January 2020; **Published:** 15 October 2020.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Karimi-Valoujaei S, Kashi Z, Yousefi SS, Sharif Nia H, Khani S. Non-pharmacological interventions to promote sexual function in women with Type 2 diabetes. *J Nurs Midwifery Sci* 2020;7:281-7.

Access this article online

Quick Response Code:



Website:

www.jnmsjournal.org

DOI:

10.4103/JNMS.JNMS_51_19

INTRODUCTION

Women's sexual health status has been recognized as one of the key aspects of marital quality of life. It is also accepted that numerous physical factors such as chronic illnesses can affect female sexual function.^[1] In this respect, Type 2 diabetes is considered the most common chronic disease and silent epidemic of the 21st century across the world, which can disrupt insulin secretion or function and consequently result in impaired carbohydrate, lipid, and protein metabolism and then increase chronic hyperglycemia.^[2,3] It is expected that the number of individuals affected with diabetes mellitus (DM) will increase from 415 million in 2014 to over 642 million in 2040.^[4]

Type 2 diabetes leads to medical and psychological complications in women including sexual dysfunction, for example, hypoactive sexual desire disorder, problems with sexual arousal and orgasm, as well as pain during sex.^[5-7] Sexual dysfunction can be thus introduced as an early warning sign of DM.^[8] The general prevalence rate of sexual dysfunction in diabetic women in America has also been reported by 20%–80%, and the given value in these individuals living in Iran has been estimated by 78.7%.^[8,9]

The main cause of sexual dysfunction in women with DM is multifactorial including biological, psychological, social, and interpersonal factors. The biological factors are vascular disorders, central and peripheral neuropathies, as well as occurrence of genitourinary tract infections.^[7,8,10] The psychological factors include depression and anxiety as well as impaired self-image and no feelings of sexual appeal. Moreover, the social factors involve work limitations, and the interpersonal factors are associated with marital conflicts, dietary restrictions, and repeated insulin injection.^[11,12] Compared with the biological factors, the psychological ones play the most significant roles in the development of sexual dysfunction in diabetic women.^[13] In this respect, depression is one of the most important psychological risk factors for sexual dysfunction in women with DM, and its prevalence in diabetic women in Iran has been reported to be 58.7%.^[8] It should be noted that sexual dysfunction is often overlooked in DM care, leading to physical, psychological, and social problems; reduced marital satisfaction and quality of life; and severe family conflicts and divorce.^[14]

Medication methods to treat sexual dysfunction include tibolone, premarin, espidifen, flibanserin, and testosterone therapy.^[15] Pharmacological interventions can be also accompanied by numerous side effects including hot flashes, headaches, and visual disturbances.^[15,16] Other therapeutic techniques include educational–counseling program and

lifestyle modifications. Moreover, limited studies have been thus far conducted on diabetic women in terms of treating sexual dysfunction.^[17-20] Education and counseling are effective in improving women's sexual function through the provision of knowledge and problem-solving skills. Healthy lifestyles including nutrition, exercise, and sleep by controlling blood sugar levels protect a person from free radicals and indirectly affect their sexual function by regulating the body's blood flow.^[21]

With regard to search in the related databases, no review study investigating the effectiveness of nonpharmacological interventions (NPIs) to promote sexual function in women with DM was found. Accordingly, the main purpose of this study was to review NPIs to promote sexual function in women living with Type 2 diabetes.

MATERIALS AND METHODS

This scoping review which was registered at Mazandaran University of Medical Sciences under project code 4636 was conducted within five stages including development of research question, search and extraction of related articles, selection of relevant studies, tabulation and summarization of data, and reporting of results.

Development of research question

The main research question addressed in this review study was as follows:

What are the NPIs to promote sexual function in women with Type 2 diabetes?

Extraction of articles meeting inclusion criteria

The following were the inclusion criteria for the present structured review: clinical trials and quasi-experimental studies with control and intervention groups published from 1990 to 2019, studies with sample size mentioned, articles focused on the effect of intervention programs promoting sexual function in women with Type 2 diabetes (no pharmacological interventions were included in the study), and studies describing the results of interventions. It should be noted that articles that did not meet the inclusion criteria, full-text studies in languages other than English and Persian, as well as summaries of articles presented at conferences lacking full texts, case–control or cross-sectional studies, and studies that examined drug interventions were excluded.

Search and extraction of related articles

The researchers used the following keywords or their Persian equivalents in the search strategy in this study: Hyperglycemia, Diabetes mellitus, Diabetes Type 2, Sexual function, sexual behavior, Sexuality, Desire,

Arousal, Lubrication, Orgasm, Pelvic Pain, Vaginismus, Dyspareunia, Penetration Disorder, Intervention, Education, Counseling, Lifestyle, Smoking, exercise, Sleep, Nutrition, Non-pharmacologic, Female, Women.

To identify all articles published online, the search was also performed in international (Google Scholar, Science Direct, Web of Science, Cochrane Library, Springer, PubMed, Scopus, and Elsevier) and national databases (Scientific Information Database, Magiran, and Barakat). Moreover, the references of the retrieved articles were manually searched in journals to extract studies on related topics.

The primary search was conducted by a researcher (student). Then, the second researcher (supervisor) performed the supplementary search. After the search was completed, a list of articles was prepared by the researchers and then, by studying and reviewing the articles at each stage of title screening, abstract and full text of the studies related to the research question were included in the final list.

Tabulation and summarization of data

Articles were searched separately in different areas including lifestyle, nutrition, sports, education, and counseling and finally classified into two categories: (1) lifestyle modification and (2) educational–counseling programs. After reading the abstracts and the full texts of the eligible articles, the data were extracted and then categorized by author’s name/date, research type, objectives, setting, sampling method, age, types of intervention, duration of intervention, follow-up, and results [Table 1].

RESULTS

In the initial search of the articles, 675 studies were found and imported into the EndNote X7, and then 323 articles were removed for being duplicated. During the screening stage, 110 and 165 studies were crossed out considering their titles and abstracts, respectively. After that, the full texts of 77 articles were examined and 69 studies were deleted as they had not met the inclusion criteria. Finally, eight articles were included in the present review [Figure 1].

Table 1 summarizes that five articles were in English and three studies were in Persian; as well, the articles had been published between 2013 and 2019. The research instrument used in all studies was the Female Sexual Function Index (FSFI).

CATEGORIZATION OF INTERVENTIONS

Nonpharmaceutical interventions to promote sexual function in women with DM were divided into two

categories: lifestyle modifications and training/counseling intervention programs.

Category I: Lifestyle modifications to promote sexual function in women with Type 2 diabetes

Two studies had examined the effects of lifestyle on sexual function in women with DM.^[17,22] Accordingly, in the study of Wing *et al.*, group and individual sessions had been held with the aim of reducing body weight by 10% through cutting calories and fat and intensifying physical activity. The findings of this study had demonstrated that reducing body weight interventions could have had beneficial effects on sexual function in women with DM who were also suffering from sexual dysfunction.^[22]

In the study by Maiorino *et al.*, the goal of the Mediterranean diet was to obtain a maximum of 50% of calories from carbohydrates and at least 30% of calories from fat. It should be noted that the main source of fat in this diet was 30–50 g of olive oil. Furthermore, the goal of the low-fat diet was to have a maximum of 30% calories from fat and <10% calories from unsaturated fat. The main purpose of the intervention had been thus to limit energy consumption to 1500 and 1800 kcal/day for women and men, respectively. The findings had ultimately revealed that the Mediterranean diet had improved sexual function in men and women with Type 2 diabetes in the long term.^[17]

Category II: Training/counseling intervention programs to promote sexual function in women with Type 2 diabetes

A total of six studies had evaluated the effectiveness of training/counseling intervention programs in sexual

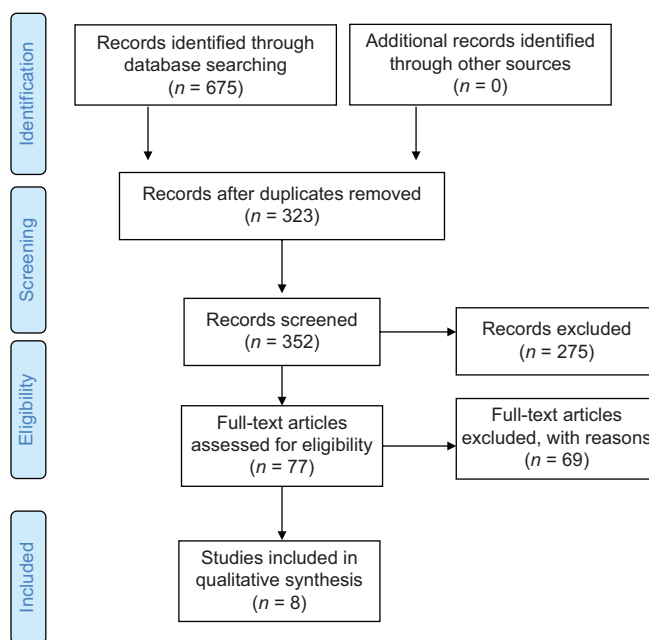


Figure 1: Process of articles selection

Table 1: A summary of some studies conducted toward nonpharmacological interventions to promote sexual function in women with Type 2 diabetes

Author/place/year (reference)	Type of study	Objectives	Sampling method/sample size	Age (years)	1. Type of intervention 2. Duration of study 3. Follow-up	Results
Naderyanfar <i>et al.</i> /Iran/2019 ^[26]	RCT	Effect of distance education on the sexual function of patients with type II diabetes	Randomization/60 women (30 women in the intervention group and 30 women in the control group)	Not reported	1. Distance education using educational video 2. Four weeks 3. One month	Distance education can be used as an effective method for improving the sexual function of women with Type 2 diabetes
Mehrabi <i>et al.</i> /Iran/2019 ^[23]	RCT	Effectiveness of sexual counseling using PLISSIT model on sexual function of women with type 2 diabetes mellitus	Randomization/100 women (50 women in the intervention group and 50 women in the control group)	35-55	1. Sexual counseling based on PLISSIT model 2. Not reported 3. Four and 8 weeks	Sexual counseling based on PLISSIT model could improve sexual function in diabetic women
Maiorino <i>et al.</i> /Italy/2016 ^[17]	RCT	Assessing long-term effects of the Mediterranean diet compared with low-fat diet	Randomization/215 women (108 individuals in the Mediterranean diet group and 107 individuals in low-fat diet group)	30-75	1. Effect of the Mediterranean diet compared with low-fat diet 2. Not reported 3. Eight years	The Mediterranean diet improved sexual function in women living with DM
Moradi <i>et al.</i> /Iran/2016 ^[24]	RCT	Effect of counseling on sexual function in women with DM	Randomization/113 women (57 women in the intervention group and 56 women in the control group)	>20	1. Sexual counseling using 90-min sessions 2. Three times a week, lasting 3 weeks 3. Two months	Sexual counseling had a significant impact on sexual function in women with DM
Wing <i>et al.</i> /America/2013 ^[22]	RCT	Effect of lifestyle interventions on sexual function in obese women with DM	Randomization/375 women (182 women in supportive training group and 193 women in lifestyle intervention group)	45-75	1. Reducing body weight 2. Weekly sessions for the first 6 months and then 3 sessions in months 7-12 3. One year	Weight loss in obese women with diabetes had a positive effect on sexual function
Ahmadizadeh <i>et al.</i> /Iran/2013 ^[25]	RCT	The effectiveness of cognitive-behavioral therapy on sexual dysfunction in diabetic women	Randomization/40 women (20 women in the intervention group and 20 women in the control group)	25-55	1. Cognitive behavioral therapy 2. Eight sessions 3. Three sessions	Cognitive behavioral therapy is effective on sexual dysfunction in diabetic women
Hassan Khedr <i>et al.</i> /Egypt/2018 ^[19]	Semi-experimental	Evaluating effects of sexual counseling based on PLISSIT model	Randomization/90 women (46 women in the intervention group and 44 women in the control group)	18-48	1. Sexual counseling based on PLISSIT model 2. Eight individual sessions, for 45-60 min, up to 2 months 3. Immediately, 6 months after intervention	Sexual counseling based on PLISSIT model could promote sexual function in diabetic women
Samir <i>et al.</i> /Egypt/2017 ^[20]	Semi-experimental	Investigating effects of a training program based on PRECEDE model	Randomization/176 women (88 women in each group)	20-48	1. Training based on PRECEDE model 2. Four sessions, for 30-40 min 3. Three, 4, and 8 weeks after intervention	Training programs based on PRECEDE model could improve sexual function in diabetic women

RCT: Randomized controlled trial, DM: Diabetes mellitus

function in women with DM. Sexual counseling programs in three studies had been thus based on the PRECEDE^[20] and the PLISSIT models,^[19,23] and one study had utilized a typical counseling program.^[24] One study had used cognitive behavioral therapy^[25] and one study had used education program.^[26]

In this respect, Samir *et al.* had examined the impact of training programs based on the PRECEDE model as a

diagnostic tool for behavior in which the first step in its implementation was behavioral identification. The model could assess the impact of three factors on health-related behaviors including predisposing, reinforcing and facilitating, and enabling factors. In the first and the second sessions, the predisposing factors influencing behavior had been evaluated and patients' responses and opinions had been written in two parallel lists in the form of positive and negative factors related to patients' behaviors in

need of improvement and subjective predictors (beliefs, values, ideas, and knowledge), and then facilitating factors affecting behavior had been examined. In the third and fourth sessions, the researchers had addressed the question, “What kind of patients need to change their behaviors?” and then they had selected two behaviors for each woman. Eventually, subjective predictors created after the behaviors had been reinforced. The results of this study had revealed that the training intervention program based on the PRECEDE model had been effective in promoting sexual function in women with DM.^[20]

Hassan Khedr *et al.* and Mehrabi *et al.* (2018) had also studied the impact of sexual counseling based on the PLISSIT model and had correspondingly examined sexual function in women with DM. It should be noted that the PLISSIT model is one of the counseling methods to deal with sexual problems which can be completed in four levels. At the first level (permission), the researchers talk with patients about their problems via creating a safe and reliable environment. At the second level (limited information), brief information is provided about the effect of DM on sexual function. At the third level (specific suggestions), a problem-solving approach is utilized to deal with patients’ problems and counseling is offered based on patients’ needs. At the fourth level (intensive therapy), patients are also referred to higher levels in cases of complicated sexual problems or untreated ones in earlier stages. The results had also implied that the PLISSIT model had been effective as a counseling method to promote sexual function in diabetic women.^[19]

In the study by Moradi *et al.*, the impact of counseling on sexual function in women with Type 2 diabetes had been similarly investigated. In the interventional sessions, the educational content had been focused on promoting sexual function and marital relationships in groups of five, using three 90-min sessions, once a week. Phone follow-up had been correspondingly provided to remind patients’ referrals in a timely manner before the sessions. The results revealed that sexual counseling could have a significant effect on sexual function in women with DM.^[24]

In the study of Ahmadizadeh *et al.*, the cognitive behavioral approach is used which is a combination of behavioral-cognitive theories and social exchange paradigm. In cognitive behavioral therapy, a set of imaginary and irrational expectations, beliefs, and perceptions are identified as cognitive errors related to couple intimacy, which provide problem-solving and communication skills. The results showed that cognitive behavioral therapy is effective on sexual dysfunction in women with diabetes.^[25]

DISCUSSION

This study intended to present a review of interventions to promote sexual function in women with Type 2 diabetes. Women with DM also face numerous problems in their sexual function, leading to a reduction in their quality of life. Therefore, interventions are needed in different dimensions to promote their sexual function. This study also showed that a variety of interventions such as lifestyle modifications and training/counseling intervention programs could be effective in improving diabetic patients’ sexual function.

Studies showed that reducing body weight improved female sexual function. There had been also a statistically significant difference in the total scores of the FSFI in women with sexual dysfunction between both groups during the 1-year follow-up, but this difference had not been significant in terms of sexual satisfaction.^[22] One study reported a similar statistically significant difference between both groups in the total scores of the FSFI, implying that the Mediterranean diet had improved sexual function in patients with Type 2 diabetes within 1- and 8-year follow-up of the intervention.^[17] In another study, it was concluded that there was a statistically significant difference between both groups in the total scores of the FSFI, but no significant difference had been observed in its related domains (sexual desire, sexual arousal, lubrication and orgasm, sexual satisfaction, and pain during sex).^[27] Another study had also shown that low-fat diet, physical activity, and lifestyle modifications had resulted in a statistically significant difference in the total score of the FSFI, sexual arousal, lubrication, sexual satisfaction, and frequency of sex, but this difference had not been significant in terms of sexual desire, orgasm, and pain during sex.^[28]

In all of the studies, random sampling methods were employed and the research instrument adopted was the FSFI. It could be concluded that lifestyle modifications such as nutrition and exercise improved the total scores of the FSFI in women. The Mediterranean diet could have thus reduced systemic vascular inflammation by decreasing the levels of C-reactive protein and lifestyle modifications could have improved insulin resistance and anthropometric parameters, consequently enhancing the total scores of the FSFI, but there had been no statistically significant difference in the mean scores of different domains of the FSFI in some studies.

Thus, overweight and obesity seemed to exacerbate sexual dysfunction by bringing changes in hormone levels and changes in self-image. Other reasons of sexual dysfunction might be due to no consideration of psychological issues in studies.^[29]

Another finding of the present study was the effect of training/counseling intervention programs on sexual function in women with Type 2 diabetes. Studies showed that sexual counseling based on the PLISSIT model in women with DM had revealed a statistically significant difference between control and experimental groups in terms of the total score of the FSFI and all its domains, but in another study, no significant difference had been reported between both groups in terms of lubrication.^[20] A study on sexual function in breastfeeding mothers showed that the mean score of the FSFI in the experimental group before intervention was 19.35 ($P < 0.001$) and that was 27.90 ($P = 0.002$) after intervention, which was a statistically significant difference. Moreover, there had been a statistically significant difference in the mean scores of both groups 4 weeks after the intervention, but a significant difference had been observed in the mean scores of sexual desire, lubrication, and pain during sex over time in the control group.^[30] The results of one study showed that the PLISSIT model had a positive impact on posthysterectomy sexual problems and problem-solving skills related to sexual desire.^[31] A study reported that there was a statistically significant difference between both groups regarding sexual desire, sexual arousal, sexual satisfaction, pain during sex, as well as total scores of the FSFI when employed a counseling method based on the PRECEDE model in diabetic women. However, no significant difference had been reported between both groups in terms of lubrication.^[20]

In all studies, random allocation in an individual manner and the FSFI were used. Analyzing different studies, it was concluded that training/counseling intervention programs had positive effects on female sexual function, but there was no statistically significant difference in the mean scores of different domains of the FSFI in some studies. For example, in a study conducted on breastfeeding mothers, a significant difference was observed in orgasm, sexual satisfaction, and pain during sex in the control group.^[30] This might be due to the fact that many psychobiological factors affecting sexual function such as postpartum depression, hemorrhage, postoperative pain, and episiotomy pain decreased and women had adapted to postpartum conditions over time, which had led to a reduction in postpartum sexual problems.

In studies on diabetic women, the statistical difference in lubrication was also not significant.^[20] It seemed that vascular disorders and neuropathies in patients with diabetes had reduced vaginal lubrication. Furthermore, this study did not address the type of treatment as well as the advanced complications of DM.

However, in another study, the differences seemed to be due to discrepancy in the type of counseling model,

follow-up duration, and number of training sessions.^[19] The limitation of the present study is the lack of access to all databases and lack of access to the full texts of some studies.

CONCLUSION

Considering the findings of the present study and the increasing prevalence rates of sexual dysfunction in women with DM, given the importance of female sexual health status and its effect on marital quality of life, and with regard to limited studies on counseling and lifestyle modifications to promote sexual function in women with DM, it is hoped that adopting nonpharmacological strategies (lifestyle modifications, counseling methods, and community-based training intervention programs) promotes sexual function and enhances marital relationships among women with DM.

Conflicts of interest

There are no conflicts of interest.

Authors' contributions

S. Karimi-Valoujarei contributed with study conception, data collection, and drafting the manuscript. S. Khani supervised the study design and helped with conducting this study. Z. Kashi, S. S. Yousefi, and H. Sharif Nia were the study advisors. All the authors critically evaluated the article and provided the final draft.

Financial support and sponsorship

Nil.

Acknowledgments

This review study was part of a Master's Thesis in Counseling in Midwifery fulfilled at Mazandaran University of Medical Sciences in 2019. The project was also funded by Mazandaran University of Medical Sciences. The researchers, hereby, express their gratitude to the Student Research Committee of Mazandaran University of Medical Sciences for supporting this project.

This review study was part of a Master's Thesis in Counseling in Midwifery fulfilled at Mazandaran University of Medical Sciences with the project code 4636 in 2019. The project was also funded by Mazandaran University of Medical Sciences. The researchers, hereby, express their gratitude to the Student Research Committee of Mazandaran University of Medical Sciences for supporting this project.

REFERENCES

1. Afzali M, Khani S, Hamzegardeshi Z, Elyasi F, Mohammadpour RA. Reviewing female sexual satisfaction predictors. *J Transylvanian Rev*

- 2017;25:4895-905.
2. Ahmadi A, Hasanzadeh J, Rahimi-Madiseh M, Lashkari L. Effective factors in the quality of life in patients with type 2 diabetes in Chaharmahal&Bakhtiari province. *J North Khorasan Univ Med Sci* 2011;3:7-13.
 3. Kargarian Marvasti S, Abolghasemi J, Heydari I, Rimaz S. Effective factors in the time of development of neuropathy in type II diabetic patients. *Iran J Epidemiol* 2017;13:80-9.
 4. Unnikrishnan R, Anjana RM, Mohan V. Diabetes mellitus and its complications in India. *Nat Rev Endocrinol* 2016;12:357-70.
 5. Owiredu WK, Amidu N, Alidu H, Sarpong C, Gyasi-Sarpong CK. Determinants of sexual dysfunction among clinically diagnosed diabetic patients. *Reprod Biol Endocrinol* 2011;9:70.
 6. Alirezaei S. Effects of infertility on female sexual function. *Iran J Obstetrics, Gynecol Infertil* 2017;19:91-101.
 7. Naeij E, Moosazadeh M, Khani S, Firouzi A, Barzegari S. Effect of counseling and educational interventions on sexual functioning of women with natural menopause: A systematic review and meta-analysis. *Menopause* 2019;9:40-51.
 8. Elyasi F, Kashi Z, Tasfieh B, Bahar A, Khademloo M. Sexual dysfunction in women with type 2 diabetes mellitus. *Iran J Med Sci* 2015;40:206-13.
 9. Abu Ali RM, Al Hajeri RM, Khader YS, Shegem NS, Ajlouni KM. Sexual dysfunction in Jordanian diabetic women. *Diabetes Care* 2008;31:1580-1.
 10. Enzlin P, Mathieu C, Vanderschueren D, Demyttenaere K. Diabetes mellitus and female sexuality: A review of 25 years' research. *Diabet Med* 1998;15:809-15.
 11. Movahhed FS. On the relationship between coping strategies and mental health of diabetic patients. *Fundamentals Mental Health* 2010;12:480-7.
 12. Mousavi SI, Alizadeh Chaharborj T, Sheikh MR. Frequency of psychiatric disorder symptoms in diabetic patients of Yasuj City in 2014. *J Neyshabur Univ Med Sci* 2016;4:65-71.
 13. Thomas AM, LoPiccolo J. Sexual functioning in persons with diabetes: Issues in research, treatment, and education. *Clin Psychol Rev* 1994;14:61-86.
 14. Jahanfar SH, Molaei MM. In: *The Literature of Sexual Dysfunction*. Tehran: Salem; 2002. p. 34.
 15. Kizilay F, Gali HE, Serefoglu EC. Diabetes and sexuality. *Sex Med Rev* 2017;5:45-51.
 16. Moreira SG Jr., Brannigan RE, Spitz A, Orejuela FJ, Lipshultz LI, Kim ED. Side-effect profile of sildenafil citrate (Viagra) in clinical practice. *Urology* 2000;56:474-6.
 17. Maiorino MI, Bellastella G, Caputo M, Castaldo F, Improta MR, Giugliano D, *et al.* Effects of Mediterranean diet on sexual function in people with newly diagnosed type 2 diabetes: The MÈDITA trial. *J Diabetes Complications* 2016;30:1519-24.
 18. Giugliano F, Maiorino MI, Di Palo C, Autorino R, De Sio M, Giugliano D, *et al.* Adherence to Mediterranean diet and sexual function in women with type 2 diabetes. *J Sex Med* 2010;7:1883-90.
 19. Hassan Khedr NE, Metwally NS, Salama AE. Effect of PLISSIT model sexual counseling on sexual function among women with diabetes. *J Nurs Health Sci* 2018;7:34-42.
 20. Samir N, Mohamed R, Ali Ameen D, Hussein A. Effectiveness of educational program based on PRECEDE model on improving sexual function among diabetic women. *J Nurs Health Sci* 2017;6:61-9.
 21. Molkara T, Akhlaghi F, Ramezani MA, Salari R, Vakili V, Kamalinejad M, *et al.* Effects of a food product (based on *Daucus carota*) and education based on traditional Persian medicine on female sexual dysfunction: A randomized clinical trial. *Electron Physician* 2018;10:6577-87.
 22. Wing RR, Bond DS, Gendrano IN 3rd, Wadden T, Bahnson J, Lewis CE, *et al.* Effect of intensive lifestyle intervention on sexual dysfunction in women with type 2 diabetes: Results from an ancillary Look AHEAD study. *Diabetes Care* 2013;36:2937-44.
 23. Mehrabi M, Lotfi R, Rahimzadeh M, Khoei EM. Effectiveness of sexual counseling using PLISSIT model on sexual function of women with type 2 diabetes mellitus: Results from a randomized controlled trial. *Int J Diabetes Dev Ctries* 2019;39:1-7.
 24. Moradi M, Geranmayeh M, Mirmohammadali M, Mehran A. The effect of sexual counseling on sexual function in women with type 2 diabetes mellitus. *Hayat* 2016;22:148-58.
 25. Ahmadizadeh A, Abolghasemi SH, Hezarkhani S. The effectiveness of cognitive-behavioral therapy on sexual dysfunction in diabetic women. *Contemp Psychol* 2013;7 Suppl:124-7.
 26. Naderyanfar F, Kadkhodaei F, Mansouri A, Rezaei Keykhahi K, Nehbandani S. Evaluation of distance education using educational videos on the sexual function of women with diabetes type II. *J Diabetes Nurs* 2019;7:740-51.
 27. Esposito K, Ciotola M, Giugliano F, Schisano B, Autorino R, Iuliano S, *et al.* Mediterranean diet improves sexual function in women with the metabolic syndrome. *Int J Impot Res* 2007;19:486-91.
 28. Aversa A, Bruzziches R, Francomano D, Greco EA, Violi F, Lenzi A, *et al.* Weight loss by multidisciplinary intervention improves endothelial and sexual function in obese fertile women. *J Sex Med* 2013;10:1024-33.
 29. Raisi M, Tehran AH, Jafarbegloo E, Khoramirad A, Noroozi M. Association of body mass index with sexual dysfunction in women referred to health centers of Qom City, 2010, Iran. *Qom Univ Med Sci J* 2013;7:53-9.
 30. Tork-Zahrani S, Azad M, Ozgoli G, Banaei M, Mahmoudikohani F. The effectiveness of consultation based on PLISSIT model on sexual function of lactating women. *J Urmia Nurs Midwifery Fac* 2016;14:639-47.
 31. Hosseini N, Amini A, Alamdari A, Shams M, Vossoughi M, Bazarganipour F. Application of the PRECEDE model to improve sexual function among women with hysterectomy. *Int J Gynaecol Obstet* 2016;132:229-33.