

Original Article



The effectiveness of Pythagorean self-awareness intervention in improving the quality of sexual life of women with multiple sclerosis

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Abstract

Background and aims: The present study aimed to determine the effectiveness of Pythagorean self-awareness intervention in improving the quality of sexual life of women with multiple sclerosis (MS).

Methods: In this quasi-experimental study, among women with MS in Isfahan province who had medical records in Ayatollah Kashani Hospital and Isfahan MS Center, 150 female patients were enrolled by convenience sampling and screened by Sexual Quality of Life-Female (SQOL-F). After screening, 46 patients, whose quality of sexual life score was lower than the mean score of 63, were randomly assigned to experimental and control groups, each comprising 23 patients. The experimental group received the Pythagorean self-awareness intervention, while the control group received no intervention. Both groups were assessed at pre-test, post-test, and two follow-up stages. The data were analyzed by multivariate analysis of covariance (MANCOVA).

Results: The results revealed that the quality of sexual life of the experimental group improved after the intervention ($P < 0.001$). Compared to the pre-test, a significant difference was observed in its components, namely, psychosexual feelings, sexual and relationship satisfaction, self-worthlessness, and sexual repression ($P < 0.001$).

Conclusion: It seems that Pythagorean self-awareness intervention effectively improves the quality of sexual life of women with MS. In addition to the overall improvement in the quality of sexual life, a significant difference was observed in its components compared to the pre-test after the intervention. Therefore, it is essential to plan psychological interventions to improve these women's quality of sexual life.

Keywords: Multiple sclerosis, Pythagorean self-awareness intervention, Quality of sexual life

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Introduction

Multiple sclerosis (MS) is a chronic and progressive disease that causes the demyelination of the central nervous system (1); it often occurs in people aged 18-50 years who are sexually active (2) and is identified by symptoms such as movement, sensory, and sexual dysfunctions (3). Research has shown that physiological and psychological factors influence sexual function, and sometimes the interaction of these two factors (4). Sexual dysfunction is highly prevalent in women with MS and affects various aspects of quality of life (5). Despite the importance of sexual function, its dysfunction has received less attention in women (6,7). Healthy sexual function in women influences feeling healthy and improves their quality of life (8). In contrast, sexual dysfunction can negatively affect mood, relationships, daily functioning, and quality of life (9). Previous research demonstrated that various factors reduce the quality of life of patients with MS, among which sexual dysfunction causes extensive stress in their marital relationship (10,11). The quality of sexual life can be defined as how individuals evaluate their sexual relationship and their response to this evaluation (12,13).

It is noteworthy that sexual dysfunction affects the quality of sexual relations (14).

The women's sexual quality of life includes psychosexual feelings, sexual and relationship satisfaction, self-worthlessness, and sexual repression (15). Psychosexual feelings reflect women's feelings about sexual experiences, and sexual and relationship satisfaction denote the concept of the quantity and quality of sexual relationships and positive feelings about themselves and interpersonal relationships such as intimacy with their spouses. Negative emotions, including feelings of loss of femininity and guilt, signify the dimension of worthlessness in women's sexual life. The last dimension of quality of sexual life (i.e., sexual repression) includes embarrassment and abstinence from sexual activity, along with the loss of pleasure (15).

Sexual dysfunction causes complications such as frustration, disappointment, anger, and increased depression, decreasing the women's quality of life. In addition, psychological aspects are developed for the individual as a partner (16-18). Sexual function is one of the main areas of marital relationships whose dysfunction causes doubts about the love and affection of couples

towards each other, increases their concern about the continuity of the relationship, and ultimately marital conflicts (19).

It seems that physical health is one of the factors affecting the quality of life, especially that of sexual life. Physical health includes knowledge-based information about health and responsibility for maintaining health and treatment. It requires practicing to reduce stress responses in the body, self-care, a healthy lifestyle, proper diet, exercise, and healthy communication with the body through the mindful enjoyment of sensory pleasures (20). Individuals with MS can enhance their well-being through diet, exercise, mindfulness, adherence to MS treatment to improve their interpersonal relationships, and the use of stress and depression management techniques (21,22).

In addition, research results demonstrated that Kegel exercises improve women's sexual function (23,24), and some studies have also reported the effectiveness of yoga on sexual function and sexual satisfaction of women with MS (25,26). However, several studies revealed that physical health improved through diet, exercise, and a healthy lifestyle, and coping strategies could reduce depression and fatigue in these patients, increase their quality of life, and indirectly enhance the quality of their sexual life (22,24,25). Therefore, the research gap is highly felt in this regard. Furthermore, from the psychological perspective, sexual dysfunction in women with MS causes mood swings and feelings of unattractiveness and changes their marital relationships and fear of sexual rejection (4).

In general, the novelty of this study lies in attempting to improve the quality of sexual life of women with MS, and the Pythagorean self-awareness intervention was used for this purpose. Thus, the question posed in this regard is whether the Pythagorean self-awareness intervention improves the quality of sexual life of women with MS.

Materials and Methods

Participants

The statistical population of the present study comprised all women with MS in Isfahan province who had a medical record in the Isfahan MS center from 2020 to 2021, of whom 150 cases were screened by convenience sampling using Sexual Quality of Life-Female (SQOL-F) with the mean score of 63. Then, 46 of these patients whose SQOL-F score was lower than the mean were randomly divided into experimental and control groups. The inclusion criteria were being in the age range of

19-45, having a sexual partner, showing consent to participate in the study, having no mental disorders and chronic physical illnesses other than MS that affect the mood and insights of patients, and having a minimum literacy (junior high school). On the other hand, the exclusion criteria were the absence of more than two sessions during the intervention, pregnancy, divorce or separation from the spouse, recurrence of the disease, lack of doing the assignments, and unwillingness to continue the intervention.

Instrument

SQOL-F: It is a self-report measure to assess the effect of sexual dysfunction on women's quality of sexual life and includes 18 items, and its sub-scales are psychosexual feelings, sexual and relationship satisfaction, self-worthlessness, and sexual repression (27). The total score is in the range of 18-108 or 0-90, whose higher scores indicate a better sexual quality of life (27). SQOL-F was validated in Iran by Roshan Chesli et al (28); its Cronbach's alpha reliability coefficient was 0.93, and the split-half reliability of its sub-scales ranged between 0.86 and 0.93. Regarding the content validity rate (CVR) and content validity index of the questionnaire, Roshan Chesli et al (28) inquired experts' ideas and their judgment of factor loadings and their relevance. The CVR obtained in their study was 0.89, and all items were identified as relevant by judges.

Procedure

The Pythagorean group intervention, which was developed by Darviri et al (1) and included eight one-hour sessions, was used to enhance physical health and subsequently improve the quality of sexual life of women with MS. Both groups were assessed by pre-test, post-test, and two follow-up phases. It is noteworthy that the control group received the same intervention at the end of the study. Informed consent was obtained from the participants before conducting the study. The description of the intervention sessions is provided in Table 1. The data were analyzed by multivariate analysis of covariance (MANCOVA), and the assumptions were checked before conducting the analysis.

Results

MANCOVA was used to determine the effectiveness of Pythagorean self-awareness intervention in improving the components of quality of sexual life (i.e., psychosexual

Table 1. Pythagorean intervention sessions

Intervention sessions
1. Healthy lifestyle cognitive education (related to smoking, diet, exercise, and sleep), stress management, and self-efficacy
2. Diaphragmatic breathing exercises with the help of biofeedback, as well as tips on diet, exercise, and sleep
3. Evaluation sessions and group discussions on practical topics or ideas that may have arisen in recent days
4. Five minutes of diaphragmatic breathing a day
5. Training on memory
6. Lecture on lifestyle
7. Lecture on interpersonal relationships
8. Final evaluations

feelings, sexual and relationship satisfaction, self-worthlessness, and sexual repression) of women with MS. Table 2 presents the descriptive statistics of both groups' pre-test, post-test, and follow-up scores of sexual quality of life components.

Table 2 lists the descriptive statistics of the two groups in the pre-test, post-test, and follow-up stages. According to the results, the two groups differed in the post-test and follow-up stages, whose significance was checked by inferential statistics. After checking the assumptions, MANCOVA was performed on post-test and follow-up scores by controlling pre-test scores. The results of this analysis are summarized in Tables 3 and 4.

Table 3 reveals a significant difference between the experimental and control groups in at least one of the dependent variables ($F=11.6$, $P<0.001$). The one-way analysis of covariance was used to find the difference (Table 4).

As shown in Table 4, the one-way analysis of covariance is significant for all components. The test power also indicates the adequacy of the sample size. The pairwise comparison was employed to find the difference between the means of the experimental and control groups (Table 5).

Based on data in Table 5, the experimental group scored higher in all components of quality of sexual life in the post-test, first, and second follow-up stages. Overall, these

Table 2. Descriptive statistics of groups in components of sexual quality of life

Variable		Experimental				Control			
		Pre-test	Post-test	Follow-up 1	Follow-up 2	Pre-test	Post-test	Follow-up 1	Follow-up 2
Psychosexual feelings	Mean	17.17	21.28	20.71	20.6	17.16	16.08	15.59	15.82
	SD	4.34	4.1	4.01	3.77	4.76	4.71	4.78	4.65
Sexual and relationship satisfaction	Mean	15.52	19.38	18.57	17.75	15	15	14.60	14.21
	SD	4.07	3.24	2.89	3.22	4.57	4.34	4.25	4.16
Self-worthlessness	Mean	9.73	12.47	12.23	11.55	9.69	9.86	9.78	10
	SD	2.13	2.11	1.92	1.7	1.96	1.98	1.75	1.65
Sexual repression	Mean	9.6	11.28	11.23	11	9.6	9.73	9.73	9.73
	SD	1.55	1.58	1.54	1.52	1.64	1.56	1.62	1.68
Total score	Mean	51.91	64.33	62.66	60.8	50.3	50.47	49.86	49.56
	SD	9.41	8.88	8.32	8.09	9.1	9.08	9.55	9.02

Table 3. Results of MANCOVA for sexual quality of life scores

	Value	F	Hypothesis df	Error df	P	Partial Eta squared
Pillai's trace	0.86	11.6	13	24	0.01	1
Wilks' lambda	0.13	11.6	13	24	0.01	1
Hotelling's trace	6.28	11.6	13	24	0.01	1
Roy's largest root	6.28	11.6	13	24	0.01	1

Note. MANCOVA: Multivariate analysis of covariance.

Table 4. One-way analysis of covariance for post-test, follow-up, and total scores of sexual quality of life

Dependent Variable	Sum of squares	df	Mean square	F	P value	Partial Eta squared	Test power
Psychosexual feelings (post-test)	180.99	1	180.99	68.22	<0.001	0.65	1
Sexual and relationship satisfaction (post-test)	134.31	1	134.31	79.66	<0.001	0.68	1
Self-worthlessness (post-test)	54.01	1	54.01	46.12	<0.001	0.65	1
Sexual repression (post-test)	18.02	1	18.02	26.21	<0.001	0.42	0.99
Total score (post-test)	1351.57	1	1351.57	162.87	<0.001	0.81	1
Psychosexual feelings (follow-up 1)	142.77	1	142.77	61.17	<0.001	0.63	1
Sexual and relationship satisfaction (follow-up 1)	96.78	1	96.78	50.54	<0.001	0.58	1
Self-worthlessness (follow-up 1)	46.13	1	46.13	37.48	<0.001	0.51	1
Sexual repression (follow-up 1)	17.34	1	17.34	22.92	<0.001	0.38	0.99
Total score (follow-up 1)	1090.27	1	1090.27	136.26	<0.001	0.79	1
Psychosexual feelings (follow-up 2)	134.58	1	134.58	55.32	<0.001	0.6	1
Sexual and relationship satisfaction (follow-up 2)	72.27	1	72.27	27.63	<0.001	0.43	0.99
Self-worthlessness (follow-up 2)	16.47	1	16.47	14.01	<0.001	0.3	0.95
Sexual repression (follow-up 2)	11.44	1	11.44	12.44	<0.001	0.35	0.93
Total score (follow-up 2)	773.21	1	773.21	773.21	<0.001	0.71	1

Table 5. Pairwise comparisons of experimental and control groups in components and total score of sexual quality of life

Factor	Factor			Mean d	Standard error	P value
Psychosexual feelings	Post-test	Experimental	Control	4.22*	0.5	<0.001
	Follow-up 1	Experimental	Control	3.74*	0.47	<0.001
	Follow-up 2	Experimental	Control	3.63*	0.48	<0.001
Sexual and relationship satisfaction	Post-test	Experimental	Control	3.59*	0.38	<0.001
	Follow-up 1	Experimental	Control	3.04*	0.41	<0.001
	Follow-up 2	Experimental	Control	2.64*	0.47	<0.001
Self-worthlessness	Post-test	Experimental	Control	2.45*	0.34	<0.001
	Follow-up 1	Experimental	Control	2.26*	0.35	<0.001
	Follow-up 2	Experimental	Control	1.42*	0.34	<0.001
Sexual repression	Post-test	Experimental	Control	1.43*	0.26	<0.001
	Follow-up 1	Experimental	Control	1.39*	0.26	<0.001
	Follow-up 2	Experimental	Control	1.14*	0.29	<0.001
Total score	Post-test	Experimental	Control	11.58*	0.88	<0.001
	Follow-up 1	Experimental	Control	10.4*	0.87	<0.001
	Follow-up 2	Experimental	Control	8.81*	0.91	<0.001

findings confirmed the effectiveness of this intervention in improving the components and the total score of the quality of sexual life.

Discussion

The present study sought to determine the effectiveness of Pythagorean self-awareness intervention in improving the components of the quality of sexual life of women with MS. The results revealed the effectiveness of this intervention. It should be noted that after this intervention, a significant difference was observed in its components compared to the pre-test, in addition to the overall improvement in the quality of sexual life. Although no similar study was found in this regard, the findings are somewhat consistent with those of Najafidoulatabad et al (25), Esposito et al (29), Darviri et al (1), Biernacki et al (30), Simos et al (31), Charalampopoulou et al (32), and Sadeghi Bahmani et al (33).

Charalampopoulou et al (32) stated that sexual dysfunction is one of the concerns of breast cancer patients. They concluded that Pythagorean self-awareness intervention improved all aspects of the quality of life, including physical, emotional, and functional aspects, and reduced breast cancer patients' concerns. Sexual dysfunction in women with MS causes negative mood swings, less interaction with a partner, feelings of unattractiveness, guilt, and fear of sexual rejection, and the components of the quality of sexual life (i.e., self-blame and sexual repression) increase, leading to a decrease in the quality of sexual life.

Furthermore, Darviri et al (1) reported that Pythagorean self-awareness intervention had beneficial effects on the physical, mental, and psychological well-being of patients with MS. In explaining these results, it can be stated that the physical and psychological well-being of patients with MS can improve their sexual function and thus the quality of their sexual life. This improves the patients' mood and their relationship with their partners resulting in a

reduction in self-blame and sexual repression while an increase in the quality of sexual life.

Health is a lifelong process that makes individuals aware of themselves and their feelings, and they feel best by adopting positive behaviors and a healthy lifestyle. Therefore, the patient with MS can be on the health path by attending to the body and mind, promoting health through proper diet, exercise, and specific therapies, strengthening interpersonal relationships, and using mental and emotional techniques when faced with anxiety and depression (22).

Similarly, the Pythagorean self-awareness intervention was used in this study, whose constructs (i.e., proper diet, exercise, improving interpersonal relationships, and stress-coping techniques) are consistent with ways to promote health from the perspective of the National Association of MS. Exercise is one of the constructs of this intervention. Physical activity is recommended for patients with MS because there is ample evidence that physical activity improves muscle function, aerobic fitness, and mobility. Meta-analysis and systematic studies have shown that individuals with MS who engage in exercise and lifestyle activities (including physical activities) experience an improvement in quality of life (34-36), and exercise could enhance their quality of life (37). Citak et al (23) found that Kegel exercises positively influenced women's sexual function. Likewise, Najafidoulatabad et al (25) reported the beneficial effects of yoga on sexual function, and as a result, sexual satisfaction. Similarly, Sadeghi Bahmani et al (33) acknowledged that water sports could improve the sexual performance of women with MS.

From the psychological perspective, sexual dysfunction in women with MS causes negative mood swings, less attractiveness, changes in gender roles and patterns, difficulties in communicating with a partner, feelings of guilt, fear of rejection, or abandonment of sex (38). Therefore, these negative feelings can lead to the avoidance

of sexual activity or sexual repression by creating a feeling of inadequacy and worthlessness, reducing the quality of sexual life. Previous studies revealed that exercising effectively reduced depression (39) and improved the quality of life of women with MS (40,41). It could also reduce the symptoms of fatigue (42), thus sexual desire increases with mood improvement, improving the quality of sexual life.

Some researchers also studied the effect of nutrition on sexual function. Esposito et al (29) suggested that the Mediterranean diet might improve the sexual function of women with metabolic syndrome. Further, in adults with type 2 diabetes, the Mediterranean diet might alleviate the inflammatory problems and cardiovascular risk (43) and thereby improve the sexual function of patients with diabetes (29). The World Health Organization (44) stated that the quality of sexual life reflects the health status and quality of life of individuals in society. Furthermore, these two concepts have a close relationship. Therefore, it can be acknowledged that improving the quality of life can also improve the quality of sexual life.

The patients were often reluctant to answer or felt embarrassed to respond to the questions. Other limitations were the existence of uncontrolled variables in conducting the research and the use of self-report measures compared to the experimental settings. Furthermore, the data collection phase of this study coincided with the COVID-19 pandemic. Hence, obtaining permission from the medical sciences centers and the MS Association of Isfahan province was not an easy task. Due to the lower level of immunity of these patients compared to healthy individuals, these patients experienced additional stress, and the researcher helped reduce stress as much as possible with relaxation techniques. Given that this study was conducted on married women with MS in Isfahan province, caution should be exercised in generalizing the results of the present study to other regions and cities. Moreover, the participants were selected by the convenience sampling method. Last but not least, this study was performed only on women with MS and its results cannot be used to improve the quality of sexual life of male patients.

Conclusion

The results demonstrated that this intervention improved the quality of their sexual life. Based on the findings, the quality of sexual life and its dimensions, namely, sexual psychological feeling, sexual-communication satisfaction, self-worthlessness, and sexual repression improved in women with MS after the Pythagorean self-awareness intervention. Therefore sexual education and counseling should be considered one of the major healthcare issues for women with MS since it plays an important role in improving the quality of their sexual life.

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Authors' Contribution

Conception and design, acquisition of data, analysis, and interpretation of data were performed by LA, MC, and TS. Drafting of the manuscript was done by LA. Critical revision of the manuscript for important intellectual content and statistical analysis was carried out by TS, AG, and IAS. The final draft was approved by MC, TS, AG, and IAS. All authors read and approved the manuscript.

Conflict of Interests

The authors declare no conflict of interest.

Ethical Approval

This article is part of the student dissertation on the ethical code of IR.IAU.SHK.REC.1400.001 approved by the Islamic Azad University, Shahrekord Branch.

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References

1. Darviri C, Zavitsanou C, Delikou A, Giotaki A, Artemiadis A, Anagnostouli M, et al. Pythagorean self-awareness serves successfully as a new cognitive behavioral-based technique in multiple sclerosis physical and psychosocial well-being and quality of life. *Psychology*. 2016;7(4):572-83. doi: [10.4236/psych.2016.74059](https://doi.org/10.4236/psych.2016.74059).
2. Reich DS, Lucchinetti CF, Calabresi PA. Multiple sclerosis. *N Engl J Med*. 2018;378(2):169-80. doi: [10.1056/NEJMra1401483](https://doi.org/10.1056/NEJMra1401483).
3. Marck CH, Jelinek PL, Weiland TJ, Hocking JS, De Livera AM, Taylor KL, et al. Sexual function in multiple sclerosis and associations with demographic, disease and lifestyle characteristics: an international cross-sectional study. *BMC Neurol*. 2016;16(1):210. doi: [10.1186/s12883-016-0735-8](https://doi.org/10.1186/s12883-016-0735-8).
4. Pöttgen J, Rose A, van de Vis W, Engelbrecht J, Pirard M, Lau S, et al. Sexual dysfunctions in MS in relation to neuropsychiatric aspects and its psychological treatment: a scoping review. *PLoS One*. 2018;13(2):e0193381. doi: [10.1371/journal.pone.0193381](https://doi.org/10.1371/journal.pone.0193381).
5. Nazari F, Shaygannejad V, Mohammadi Sichani M, Mansourian M, Hajhashemi V. Sexual dysfunction in women with multiple sclerosis: prevalence and impact on quality of life. *BMC Urol*. 2020;20(1):15. doi: [10.1186/s12894-020-0581-2](https://doi.org/10.1186/s12894-020-0581-2).
6. Sahay R. Female Sexual Dysfunction in Women with Multiple Sclerosis [dissertation]. USA: University of Cincinnati; 2010.
7. Parish SJ, Hahn SR, Goldstein SW, Giraldo A, Kingsberg SA, Larkin L, et al. The International Society for the Study of Women's Sexual Health Process of Care for the Identification of Sexual Concerns and Problems in Women. *Mayo Clin Proc*. 2019;94(5):842-56. doi: [10.1016/j.mayocp.2019.01.009](https://doi.org/10.1016/j.mayocp.2019.01.009).
8. Forbes MK, Baillie AJ, Schniering CA. Critical flaws in the female sexual function index and the international index of erectile function. *J Sex Res*. 2014;51(5):485-91. doi: [10.1080/00224499.2013.876607](https://doi.org/10.1080/00224499.2013.876607).
9. Domingo S, Kinzy T, Thompson N, Gales S, Stone L, Sullivan A. Factors associated with sexual dysfunction in individuals with multiple sclerosis: implications for assessment and treatment. *Int J MS Care*. 2018;20(4):191-7. doi: [10.7224/1537-2073.2017-059](https://doi.org/10.7224/1537-2073.2017-059).
10. Tepavcevic DK, Kostic J, Basuroski ID, Stojsavljevic N, Pekmezovic T, Drulovic J. The impact of sexual dysfunction on the quality of life measured by MSQoL-54 in patients with multiple sclerosis. *Mult Scler*. 2008;14(8):1131-6. doi: [10.1177/1352458508093619](https://doi.org/10.1177/1352458508093619).
11. Bronner G, Elran E, Golomb J, Korczyn AD. Female sexuality in multiple sclerosis: the multidimensional nature of the problem and the intervention. *Acta Neurol Scand*. 2010;121(5):289-

301. doi: [10.1111/j.1600-0404.2009.01314.x](https://doi.org/10.1111/j.1600-0404.2009.01314.x).
12. Dogan T, Tugut N, Golbasi Z. The relationship between sexual quality of life, happiness, and satisfaction with life in married Turkish women. *Sex Disabil.* 2013;31(3):239-47. doi: [10.1007/s11195-013-9302-z](https://doi.org/10.1007/s11195-013-9302-z).
 13. Stephenson KR, Meston CM. Differentiating components of sexual well-being in women: are sexual satisfaction and sexual distress independent constructs? *J Sex Med.* 2010;7(7):2458-68. doi: [10.1111/j.1743-6109.2010.01836.x](https://doi.org/10.1111/j.1743-6109.2010.01836.x).
 14. Ramezani N, Dolatian M, Shams J, Alavi H. The relationship between self-esteem and sexual dysfunction and satisfaction in women. *J Arak Uni Med Sci.* 2012;14(6):57-65. [Persian].
 15. Maasoumi R, Lamyian M, Montazeri A, Azin SA, Aguilar-Vafaie ME, Hajizadeh E. The sexual quality of life-female (SQOL-F) questionnaire: translation and psychometric properties of the Iranian version. *Reprod Health.* 2013;10(1):25. doi: [10.1186/1742-4755-10-25](https://doi.org/10.1186/1742-4755-10-25).
 16. Hösl KM, Deutsch M, Wang R, Roy S, Winder K, Niklewski G, et al. Sexual dysfunction seems to trigger depression in female multiple sclerosis patients. *Eur Neurol.* 2018;80(1-2):34-41. doi: [10.1159/000492126](https://doi.org/10.1159/000492126).
 17. Nehrych O, Pyrohova V, Nehrych T. Quality of life in females patients with multiple sclerosis: the impact of sexual dysfunction. *Ego J.* 2020;2(3):185-9.
 18. Pöttgen J, Rose A, van de Vis W, Engelbrecht J, Pirard M, Lau S, et al. Sexual dysfunctions in MS in relation to neuropsychiatric aspects and its psychological treatment: a scoping review. *PLoS One.* 2018;13(2):e0193381. doi: [10.1371/journal.pone.0193381](https://doi.org/10.1371/journal.pone.0193381).
 19. Hughes DB, Perez E, Garcia RM, Aragón OR, Erdmann D. Sexual and overall quality of life improvements after surgical correction of "buried penis". *Ann Plast Surg.* 2016;76(5):532-5. doi: [10.1097/sap.0000000000000378](https://doi.org/10.1097/sap.0000000000000378).
 20. Blycker GR, Potenza MN. A mindful model of sexual health: a review and implications of the model for the treatment of individuals with compulsive sexual behavior disorder. *J Behav Addict.* 2018;7(4):917-29. doi: [10.1556/2006.7.2018.127](https://doi.org/10.1556/2006.7.2018.127).
 21. Motl RW, Mowry EM, Ehde DM, LaRocca NG, Smith KE, Costello K, et al. Wellness and multiple sclerosis: The National MS Society establishes a Wellness Research Working Group and research priorities. *Mult Scler.* 2018;24(3):262-7. doi: [10.1177/1352458516687404](https://doi.org/10.1177/1352458516687404).
 22. Brunette J, Reaves D. MS & Wellness. National Multiple Sclerosis Society; 2013.
 23. Citak N, Cam C, Arslan H, Karateke A, Tug N, Ayaz R, et al. Postpartum sexual function of women and the effects of early pelvic floor muscle exercises. *Acta Obstet Gynecol Scand.* 2010;89(6):817-22. doi: [10.3109/00016341003801623](https://doi.org/10.3109/00016341003801623).
 24. Sobhgol SS, Priddis H, Smith CA, Dahlen HG. The effect of pelvic floor muscle exercise on female sexual function during pregnancy and postpartum: a systematic review. *Sex Med Rev.* 2019;7(1):13-28. doi: [10.1016/j.sxmr.2018.08.002](https://doi.org/10.1016/j.sxmr.2018.08.002).
 25. Najafidoulatabad S, Mohebbi Z, Nooryan K. Yoga effects on physical activity and sexual satisfaction among the Iranian women with multiple sclerosis: a randomized controlled trial. *Afr J Tradit Complement Altern Med.* 2014;11(5):78-82. doi: [10.4314/ajtcam.v11i5.13](https://doi.org/10.4314/ajtcam.v11i5.13).
 26. Thakur P, Mohammad A, Rastogi YR, Saini RV, Saini AK. Yoga as an intervention to manage multiple sclerosis symptoms. *J Ayurveda Integr Med.* 2020;11(2):114-7. doi: [10.1016/j.jaim.2019.04.005](https://doi.org/10.1016/j.jaim.2019.04.005).
 27. Symonds T, Boolell M, Quirk F. Development of a questionnaire on sexual quality of life in women. *J Sex Marital Ther.* 2005;31(5):385-97. doi: [10.1080/00926230591006502](https://doi.org/10.1080/00926230591006502).
 28. Roshan Chesli R, Soleimani Z, Erfan T, Mantashlou S, Hashemi A. Evaluate the psychometric properties of sexual quality of life questionnaire (SQOL-F). *J Clin Psychol Person.* 2019;17(1):213-24. doi: [10.22070/cpap.2020.2898](https://doi.org/10.22070/cpap.2020.2898).
 29. Esposito K, Giugliano F, Maiorino MI, Giugliano D. Dietary factors, Mediterranean diet and erectile dysfunction. *J Sex Med.* 2010;7(7):2338-45. doi: [10.1111/j.1743-6109.2010.01842.x](https://doi.org/10.1111/j.1743-6109.2010.01842.x).
 30. Biernacki T, Sandi D, Kincses ZT, Füvesi J, Rózsa C, Mátyás K, et al. Contributing factors to health-related quality of life in multiple sclerosis. *Brain Behav.* 2019;9(12):e01466. doi: [10.1002/brb3.1466](https://doi.org/10.1002/brb3.1466).
 31. Simos DS, Kokkinos A, Tentolouris N, Dimosthenopoulos C, Mantzou E, Artemiadis A, et al. Pythagorean self-awareness intervention: a novel cognitive stress management technique for body weight control. *Eur J Clin Invest.* 2019;49(10):e13164. doi: [10.1111/eci.13164](https://doi.org/10.1111/eci.13164).
 32. Charalampopoulou M, Bacopoulou F, Syrigos KN, Filopoulos E, Chrousos GP, Darviri C. The effects of Pythagorean Self-Awareness Intervention on breast cancer patients undergoing adjuvant therapy: a pilot randomized controlled trial. *Breast.* 2020;49:210-8. doi: [10.1016/j.breast.2019.12.012](https://doi.org/10.1016/j.breast.2019.12.012).
 33. Sadeghi Bahmani D, Motl RW, Razavian N, Khazaie H, Brand S. Aquatic exercising may improve sexual function in females with multiple sclerosis - an exploratory study. *Mult Scler Relat Disord.* 2020;43:102106. doi: [10.1016/j.msard.2020.102106](https://doi.org/10.1016/j.msard.2020.102106).
 34. Reynolds ER, Ashbaugh AD, Hockenberry BJ, McGrew CA. Multiple sclerosis and exercise: a literature review. *Curr Sports Med Rep.* 2018;17(1):31-5. doi: [10.1249/jsr.0000000000000446](https://doi.org/10.1249/jsr.0000000000000446).
 35. Motl RW, Sandroff BM, Kwakkel G, Dalgas U, Feinstein A, Heesen C, et al. Exercise in patients with multiple sclerosis. *Lancet Neurol.* 2017;16(10):848-56. doi: [10.1016/s1474-4422\(17\)30281-8](https://doi.org/10.1016/s1474-4422(17)30281-8).
 36. Platta ME, Ensari I, Motl RW, Pilutti LA. Effect of exercise training on fitness in multiple sclerosis: a meta-analysis. *Arch Phys Med Rehabil.* 2016;97(9):1564-72. doi: [10.1016/j.apmr.2016.01.023](https://doi.org/10.1016/j.apmr.2016.01.023).
 37. Reina-Gutiérrez S, Cavero-Redondo I, Martínez-Vizcaíno V, Núñez de Arenas-Arroyo S, López-Muñoz P, Álvarez-Bueno C, et al. The type of exercise most beneficial for quality of life in people with multiple sclerosis: a network meta-analysis. *Ann Phys Rehabil Med.* 2022;65(3):101578. doi: [10.1016/j.rehab.2021.101578](https://doi.org/10.1016/j.rehab.2021.101578).
 38. Foley FW, Sanders A. Sexuality, multiple sclerosis and women. *MS Manage.* 1997;4(1):3-10.
 39. Ensari I, Motl RW, Pilutti LA. Exercise training improves depressive symptoms in people with multiple sclerosis: results of a meta-analysis. *J Psychosom Res.* 2014;76(6):465-71. doi: [10.1016/j.jpsychores.2014.03.014](https://doi.org/10.1016/j.jpsychores.2014.03.014).
 40. Stroud NM, Minahan CL. The impact of regular physical activity on fatigue, depression and quality of life in persons with multiple sclerosis. *Health Qual Life Outcomes.* 2009;7:68. doi: [10.1186/1477-7525-7-68](https://doi.org/10.1186/1477-7525-7-68).
 41. Afkar A, Ashouri A, Rahmani M, Emami Sigaroudi A. Effect of exercise therapy on quality of life of patients with multiple sclerosis in Iran: a systematic review and meta-analysis. *Neurol Sci.* 2017;38(11):1901-11. doi: [10.1007/s10072-017-3047-x](https://doi.org/10.1007/s10072-017-3047-x).
 42. Pilutti LA, Greenlee TA, Motl RW, Nickrent MS, Petruzzello SJ. Effects of exercise training on fatigue in multiple sclerosis: a meta-analysis. *Psychosom Med.* 2013;75(6):575-80. doi: [10.1097/PSY.0b013e31829b4525](https://doi.org/10.1097/PSY.0b013e31829b4525).
 43. Fox CS, Golden SH, Anderson C, Bray GA, Burke LE, de Boer IH, et al. Update on prevention of cardiovascular disease in adults with type 2 diabetes mellitus in light of recent evidence: a scientific statement from the American Heart Association and the American Diabetes Association. *Diabetes Care.* 2015;38(9):1777-803. doi: [10.2337/dci15-0012](https://doi.org/10.2337/dci15-0012).
 44. World Health Organization (WHO). Defining Sexual Health: Report of a Technical Consultation on Sexual Health, 28-31 January 2002. Geneva: WHO; 2006.