

CIULEK, Urszula, BILSKA, Wiktoria, ŻYDEK, Ada, ZDUŃCZYK, Wiktoria, DOBOSZ, Anna, DUBIŃSKA, Michalina and PADUCH-JAKUBCZYK, Wiktoria. The Impact of physical activity on menopausal symptoms and health in middle-aged women. *Quality in Sport*. 2024;21:54144. eISSN 2450-3118.

<https://dx.doi.org/10.12775/QS.2024.21.54144>

<https://apcz.umk.pl/QS/article/view/54144>

The journal has had 20 points in Ministry of Higher Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Higher Education and Science of 05.01.2024. No. 32553.

Has a Journal's Unique Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).

Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 r. Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398.

Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).

© The Authors 2024;

This article is published with open access at Licensee Open Journal Systems of Nicolaus Copernicus University in Torun, Poland Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author (s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non commercial license Share alike. (<http://creativecommons.org/licenses/by-nc-sa/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited.

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 08.08.2024. Revised: 19.08.2024. Accepted: 23.08.2024. Published: 29.08.2024.

Impact of physical activity on menopausal symptoms and health in middle-aged women

Urszula Ciulek

Medical University of Lodz, al. Tadeusza Kosciuszki 4, 90-419 Lodz, Poland

urszula.ciulek@wp.pl

<https://orcid.org/0009-0007-8536-2906>

Wiktoria Bilka

Medical University of Lodz, al. Tadeusza Kosciuszki 4, 90-419 Lodz, Poland

bilskawiktoria97@gmail.com

<https://orcid.org/0009-0001-6029-4210>

Ada Żydek

Medical University of Lodz, al. Tadeusza Kosciuszki 4, 90-419 Lodz, Poland

ada7613@gmail.com

<https://orcid.org/0009-0009-1212-643X>

Wiktoria Zduńczyk

Medical University of Lodz, al. Tadeusza Kosciuszki 4, 90-419 Lodz, Poland

wiktoria.zdunczyk3@gmail.com

<https://orcid.org/0009-0005-1822-7777>

Anna Dobosz

Medical University of Lodz, al. Tadeusza Kosciuszki 4, 90-419 Lodz, Poland

4dobosz.anna4@gmail.com

<https://orcid.org/0009-0006-3464-7680>

Michalina Dubińska

Medical University of Lodz, al. Tadeusza Kosciuszki 4, 90-419 Lodz, Poland

dubinska.michalina@gmail.com

<https://orcid.org/0009-0006-8130-7451>

Wiktoria Paduch-Jakubczyk

Medical University of Lodz, al. Tadeusza Kosciuszki 4, 90-419 Lodz, Poland

paduchwiktoria@wp.pl

<https://orcid.org/0009-0008-3226-9430>

Abstract

Introduction and Objective: The average age at which menopause occurs is between 45 and 55 years and it affects both physiological processes and a woman's psyche. The aim of this article is to review and analyze what is known about the effects of physical activity on the physical and mental health of middle-aged women, and to summarize general recommendations for women at this time.

Review and Methods: Review and summary of studies and meta-analysis of studies available in open-source format on PubMed and Google Scholar.

Abbreviated Description of the State of Knowledge: A woman in the menopausal period experiences a range of symptoms, which include hot flashes, muscle and joint pain, problems

sleeping and maintaining a normal body weight, mood swings, depressive symptoms and anxiety. Studies show that physical activity can lead to a reduction in the severity of these symptoms. The enhanced quality of life is also due to the beneficial effects of physical activity on a woman's metabolism. Regular exercise leads to a normalization of lipid metabolism, a reduction in body fat, an improvement in bone density and, therefore, the avoidance of osteoporosis.

Summary: In conclusion, physical activity among menopausal women has numerous benefits. It alleviates the physical, psychological and metabolic symptoms of menopause, resulting in an enhanced quality of life in both psychophysical and sexual domains. Therefore, public health should prioritize the promotion of physical activity among middle-aged women.

Keywords: Menopause; physical activity; women's health

Introduction

Menopause is the final cessation of menstruation as a result of the irreversible loss of follicular activity in the ovaries. It is defined as the last bleeding after which menstruation does not occur for a period of 12 months. This process is often associated with a range of symptoms.

The decline in sex hormones has a significant effect on a woman's physical and mental state [4]. The average age at which menopause occurs is between 45 and 55 years of age [3][8].

The most prevalent and characteristic symptoms are hot flashes, sweats, mood swings and a general sensation of weakness. Additional symptoms may include vaginal dryness, joint discomfort, sleep disturbances, and in some cases, depression and anxiety. Mood swings are also characteristic of the menopausal period. These symptoms fall into three categories: vasomotor, somatic and psychological [18], although vasomotor symptoms, for example, have been associated with clinical depression and depressive symptoms in the perimenopausal period, after adjusting for a number of factors including age, race and history of depression [22][23]. Women experiencing them report a decline in various aspects of mental health and quality of life [19][20][21].

Oestrogens are hormones that have a positive effect on fat and sugar metabolism and the redistribution of fatty tissue. Therefore, their decline in the body is associated with an increased risk of developing obesity, type 2 diabetes, cardiovascular disease and metabolic

syndrome [11][12]. Oestrogens have also been shown to have a protective effect on bone mineral density, so a decrease in their levels may contribute to the development of osteoporosis and increased susceptibility to fractures [14][16].

As for the psychological symptoms associated with the menopause, these may be related to fluctuations in hormone concentrations, but attention is also drawn to the psychological aspect of the menopause, which is the beginning and acceptance of a new stage in life.

Physical activity is recognised as one of the most effective non-pharmacological methods of relieving menopausal symptoms. It is an extremely important factor in preventing and delaying the development of diseases such as overweight, obesity, diabetes, cardiovascular disease and osteoporosis. This is because it improves lipid profiles, regulates blood sugar levels and maintains bone density. Exercise that strengthens the musculoskeletal system can help reduce joint pain.

Physical training also affects mental well-being. Regular physical activity has been shown to reduce symptoms of depressive and anxiety disorders and improve mood and sleep quality. In addition, women who take part in sport have higher self-esteem, which is particularly important during the menopause [4][9][10].

Methodology

A comprehensive review of the scientific literature on the topic concerning the effects of physical activity on the health of menopausal women was conducted with the aim of providing a helpful contribution to the existing body of knowledge in this area. A systematic search was performed using a number of databases, including PubMed, Google Scholar and Scopus. In order to ensure that the data included is as up-to-date as possible, the articles were selected based on their date of publication, with a particular focus on those published between 2000 and 2023. The objective is to gain a comprehensive understanding of the effects of exercise on the physical, mental and metabolic health of menopausal women, articles focusing on different forms of physical activity were selected. In order to ensure methodological quality, studies were required to meet certain scientific standards for methodology, such as randomisation, control groups and an adequate sample size. A variety of studies were selected for analysis, including those examining different forms of physical activity, such as aerobic exercise, strength training, yoga, and other forms of training. It was not possible to include all

the articles that met the selection criteria. The content of the selected studies was then examined to ascertain whether they met the quality and thematic requirements. The data from the individual articles were collected and then analyzed qualitatively in order to draw conclusions about the impact of physical activity on the health of menopausal women.

A combination of Medical Subject Headings (MeSH) terms and key phrases related to the aforementioned topics were used to search the literature, including 'menopause', 'physical activity', 'women's health', 'aerobic exercise', 'yoga' and 'strength training'. The review also drew on knowledge from specialist books on related topics.

Among the studies reviewed were experimental studies, which included randomized controlled trials (RCTs), considered the gold standard in clinical research due to providing the most reliable evidence on the effectiveness of interventions [31]. Another type of research was observational studies, which looked at the relationship between physical activity levels and health in menopausal women. While not as rigorous as RCTs, they provide information on correlations and mechanisms of action. The last type were intervention studies that included programmes to promote increased physical activity among the women studied and analyzed the impact of these interventions on various aspects of health.

The results of the research were assessed for their impact on the three main aspects of menopausal health, which are physical, mental and metabolic health. The effects of physical activity on cardiovascular health, bone density, body composition, blood glucose levels, mood, depressive and anxiety symptoms and sleep quality, changes in lipid profile, body weight and risk of developing metabolic syndrome and type 2 diabetes were analyzed.

Thematic analysis was used to interpret the qualitative data by identifying recurring themes and patterns in the findings. To compare the effects of different forms of physical activity on the health of menopausal women, quantitative results were collated.

This review paper aims to provide a comprehensive overview of the impact of physical activity on the health of menopausal women. To enable this, a methodology based on rigorous criteria for the selection and analysis of review articles was used. Diverse research methods and analysis of qualitative and quantitative data were used to provide a picture of the benefits of physical activity in the menopausal period.

Results

Research indicates that more physically active women endure the menopause better [24][25][26]. They report less nervousness and relief from menopausal symptoms [27][28], more positive effect regardless of menopausal status, and fewer depressive signs [21][26][29]. Regular aerobic exercise, such as walking, running and swimming, has also been shown to benefit cardiovascular health in middle-aged women.

In 2017, Lundberg Slingsby and colleagues conducted a study on the effects of exercise on platelet function in premenopausal and postmenopausal women. The programme lasted three months and included aerobic exercise. The study showed that regular physical activity reduced baseline platelet reactivity and increased platelet sensitivity to prostacyclin in both groups of women. This is associated with a decreased likelihood of thrombus formation, which is important for menopausal women who are at higher risk of thromboembolic events [1].

In a further significant article, Javadivala et al. (2020) investigated the efficacy of implementing educational and physical exercise programmes. They discovered that the study group who engaged in regular physical activities and educational sessions exhibited a reduction in the frequency and severity of menopausal symptoms, particularly hot flashes. There was also an improvement in sleep quality and a less severe joint pain. The results of the study clearly show that regular exercise and education improve the well-being of middle-aged women [2].

The article by Javadivala et al. (2020) also demonstrated the role of social support in achieving goals. The study group that received such help showed greater motivation and consistency [2].

Regular physical training in menopausal women decreased body fat and increased bone density. Hyvärinen et al. pointed out that regular exercise leads to beneficial changes in body composition, improved lipid profile, maintenance of normal blood glucose levels, which consequently prevents the onset of type 2 diabetes and metabolic syndrome [5].

In postmenopausal women, osteoporosis is a major risk. To maintain normal bone density, regular strength training is recommended. This has been demonstrated by Sternfeld and Dugan, who emphasize that strength exercise, such as weightlifting, increases bone mineral density, leading to a lower risk of fractures and an improved overall quality of life [7].

Another physical activity that significantly improves the mental health of menopausal women is yoga. Elavsky and McAuley's conducting a randomized controlled trial demonstrated that the practice of yoga has a positive impact on mood, well-being, reduces stress, anxiety and depressive symptoms and improves sleep quality [4][13].

Participation in physical activity significantly correlates with a better quality of life, consisting of mental, physical and sexual health. Bondarev et al. demonstrated that women who regularly engage in physical activity have more energy, milder menopause-related symptoms and better self-esteem [6]. Dabrowska-Galas et al. and El Hajj et al. confirmed that women who are physically active report a higher quality of life in all the aspects mentioned above [3].

Tailoring educational programmes to individual needs and preferences, and addressing barriers such as lack of access to gyms or lack of time, has led to increased public interest and uptake.

Research clearly shows the regular exercise affects both the physical and mental health of women [17]. It has also been shown that educational programmes can play an important role in improving public awareness of the menopause and promoting physical activity in middle-aged women.

Discussion

The findings of the studies suggest that regular physical activity has a favorable impact on the alleviation of menopause-related symptoms. One such study was conducted by Lundberg Slingsby et al. (2017), which demonstrated a correlation between high-intensity aerobic training practiced for a minimum of three months and a decline in platelet reactivity to prostacyclin in both pre- and postmenopausal women. This emphasizes the cardioprotective benefits of regular aerobic exercise. Moreover, a study by JavadiVala et al. (2020) demonstrated that a structured physical activity programme significantly reduced the frequency and severity of menopausal symptoms, including hot flushes, sleep problems and joint discomfort [2].

Incorporating education and physical activity promotion programmes into public health initiatives has the potential to significantly improve the quality of life of menopausal women. It is recommended that future research prioritizes the long-term benefits of physical activity

and the development of effective intervention strategies that take into account women's individual needs and preferences. In addition, the formation of support groups and communities has the potential to increase motivation to engage in physical activity, thereby improving the overall effectiveness of these interventions.

In conclusion, it can be stated that regular physical activity is of great importance for the maintenance of good health during menopause. It confers a plethora of physical and mental health benefits, mitigates the intensity of menopausal symptoms, and augments the overall quality of life. It is recommended that public health initiatives prioritize the promotion of physical activity among menopausal women.

A review of the literature highlights the necessity of incorporating physical activity into the daily routines of middle-aged women, which include the alleviation of menopausal symptoms and the enhancement of overall physical and mental health [17]. However, it is evident that there are obstacles to the regular practice of physical activity that must be overcome. Factors such as a lack of access to gyms, time constraints, and a lack of motivation can impede the participation of women in regular exercise. It is therefore crucial to promote straightforward, readily accessible forms of physical activity, such as walking, cycling and home-based exercises, which can be effortlessly incorporated into daily routines. Educating the public about the benefits of exercise and promoting physical activity are important issues. Emphasizes the significance of education, not only for women going through the menopause, but also for their families and friends. Changes in the way menopause is taught in schools can play a main role [15]. Wasley and Gailey emphasize the importance of education in raising awareness of the menopause and coping with its effects [15]. Educational programmes have an extremely significant role to play - but care must be taken to tailor them to women's individual needs and preferences, and to take into account constraints such as lack of access to gyms and support groups, and lack of time or motivation [15]. The evidence suggests that women who belong to support groups, fitness clubs or similar communities are more likely to engage in regular exercise.

The role of social support in the promotion of physical activity is also of significant importance. The involvement of women in support groups, fitness clubs, or community networks has been demonstrated to enhance motivation and facilitate the maintenance of a regular exercise routine. It is recommended that future research continue to explore the long-

term benefits of physical activity and develop intervention strategies that are both effective and sustainable. It is of the utmost importance that approaches to the care of menopausal women are personalized, taking into account the specific needs and preferences of each individual. Moreover, the incorporation of support systems and contemporary technology can enhance the engagement and efficacy of physical activity programmes.

Future Research Directions

Randomized controlled trials (RCTs) are the gold standard for clinical trials - they allow the effectiveness of interventions to be assessed directly and reliably [31]. It is important that they take into account the importance of different types of physical activity, as well as their intensity and frequency, to develop optimal exercise programmes for menopausal women. Cultural and socioeconomic differences, which are associated with different opportunities and limitations for certain types of physical activity, are also important to explore [30]. Research should include an understanding of the exact mechanism of how physical activity affects menopausal symptoms, which will facilitate the development of more precise recommendations for women during this time. Research should focus not only on the short-term benefits of regular exercise, but also on the longer-term effects, which will contribute to a better understanding of the impact of physical activity during this period over the years.

Conclusions

Menopause is a complex, natural process in a woman's life that affects various aspects of a woman's health. The unpleasant symptoms associated with menopause can be alleviated by introducing physical activity into one's life as a non-pharmacological method. A review of the literature has made it clear that regular exercising reduces menopausal symptoms, improve physical and mental condition. The promotion of physical activity among menopausal women should be a public health priority. This will ensure an improved quality of life for women during this difficult period of life.

A review of the articles and literature leads to several recommendations, including the promotion of personalized exercises for menopausal women, the creation of support groups and communities that increase motivation to take part in physical activity. Other

recommendations include the creation of educational programmes that outline the benefits of exercising and the use of modern technology to increase engagement in regular exercise.

Future research should focus on the long-term benefits of physical activity and the development of effective intervention strategies that take into account women's individual needs and preferences. All of these activities will increase awareness among women of the importance of movement to alleviate the symptoms of menopause and reduce associated diseases.

Disclosure

Author's contribution

Conceptualization, Wiktoria Bilaska and Urszula Ciulek; methodology, Urszula Ciulek and Wiktoria Zduńczyk; software, Wiktoria Paduch-Jakubczyk; check, Michalina Dubińska, Anna Dobosz and Michalina Dubińska; formal analysis, Michalina Dubińska and Ada Żydek; investigation, Wiktoria Bilaska; resources, Anna Dobosz, Ada Żydek and Wiktoria Zduńczyk; data curation, Anna Dobosz; writing - rough preparation, Wiktoria Paduch-Jakubczyk, Wiktoria Bilaska and Anna Dobosz; writing - review and editing, Michalina Dubińska, Ada Żydek, Wiktoria Zduńczyk and Urszula Ciulek; visualization, Wiktoria Bilaska; supervision, Wiktoria Paduch-Jakubczyk, Ada Żydek and Urszula Ciulek; project administration, Wiktoria Paduch-Jakubczyk and Wiktoria Zduńczyk; receiving funding, no specific funding. All authors have read and agreed with the published version of the manuscript.

Funding statement

This research received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

Not applicable.

Conflict of interest Statement

The authors deny any conflict of interest.

References

1.Lundberg Slingsby MH, Nyberg M, Egelund J, Mandrup CM, Frikke-Schmidt R, Kirkby NS, Hellsten Y. Aerobic exercise training lowers platelet reactivity and improves platelet sensitivity to prostacyclin in pre- and postmenopausal women. *Journal of Thrombosis and Haemostasis*. 2017;15:2419-2431.

<https://doi.org/10.1111/jth.13866>

2.Javadi Z, Allahverdi Pour H, Asghari Jafarabadi M, Emami A. An Interventional strategy of physical activity promotion for reduction of menopause symptoms. *Health Promotion Perspectives*. 2020;10(4):383-392.

<https://doi.org/10.34172/hpp.2020.57>

3.Dabrowska-Galas M, Naworska B, Chlebus M, Plinta R. High physical activity level may reduce menopausal symptoms. *Menopause Review*. 2014;20(1):10-15.

<https://doi.org/10.3390/medicina55080466>

4.Elavsky S, McAuley E. Physical activity and mental health outcomes during menopause: A randomized controlled trial. *Annals of Behavioral Medicine*. 2007;33(2):132-142.

<https://doi.org/10.1007/bf02879894>

5. Hyvärinen M, Juppi H-K, Taskinen S, Karppinen JE, Karvinen S, Tammelin TH, Kovanen V, Aukee P, Kujala UM, Rantalainen T, Sipilä S, Laakkonen EK. Metabolic health, menopause, and physical activity—a 4-year follow-up study. *Menopause*. 2021;28(8):914-921.

<https://doi.org/10.1038/s41366-021-01022-x>

6. Bondarev D, Sipilä S, Finni T, Kujala UM, Aukee P, Laakkonen EK, Kovanen V, Kokko K. The role of physical activity in the link between menopausal status and mental well-being. *Menopause*. 2018;25(11):1432-1441

<https://doi.org/10.1097/gme.0000000000001490>

7. Sternfeld B, Dugan S. Physical activity and health during the menopausal transition. *Obstetrics and Gynecology Clinics of North America*. 2011;38(3):537-566.

<https://doi.org/10.1016/j.ogc.2011.05.008>

8. Bręborowicz, G.H. (2017). *Położnictwo i ginekologia*. Wydanie 3. Poznań: Wydawnictwo Lekarskie PZWL.

9. Bosworth HB, Bastian LA, Kuchibhatla MN, et al.: Depressive symptoms, menopausal status, and climacteric symptoms in women at midlife. *Psychosomatic Medicine*. 2001, 63:603–608.

<http://dx.doi.org/10.1097/00006842-200107000-00013>

10. Dennerstein L, Dudley EC, Hopper JL, Guthrie JR, Burger HG: A prospective population-based study of menopausal symptoms. *Obstetrics & Gynecology*. 2000, 96:351–358

[https://doi.org/10.1016/s0029-7844\(00\)00930-3](https://doi.org/10.1016/s0029-7844(00)00930-3)

11. Karvinen S, Jergenson MJ, Hyvärinen M, Aukee P, Tammelin T, Sipilä S, et al. Menopausal status and physical activity are independently associated with cardiovascular risk factors of healthy middle-aged women: cross-sectional and longitudinal evidence. *Front Endocrinol*. 2019;10.

<https://doi.org/10.3389/fendo.2019.00589>

12. Sternfeld B, Bhat AK, Wang H, Sharp T, Quesenberry CP. Menopause, physical activity, and body composition/fat distribution in midlife women. *Med Sci Sports Exerc.* 2005;37:1195–202.

<https://doi.org/10.1249/01.mss.0000170083.41186.b1>

13. Allahverdi Pour H, Karimzadeh Z, Alizadeh N, Asghari Jafarabadi M, Javadivala Z. Psychological well-being and happiness among middle-aged women: a cross-sectional study. *Health Care Women Int.* 2019; In Press.

<https://doi.org/10.1080/07399332.2019.1703990>

14. PHYSICAL ACTIVITY AND THE STRENGTH OF BONE IN
MENOPAUSE PATIENTS IN NATIONAL SPORTS HOSPITAL IN 2017
Laras Bani Waseso, Basuki Supartono, Cut Fauziah

<http://dx.doi.org/10.20527/jbk.v14i1.4587>

15. Menopause and the role of physical activity – The views and knowledge of women aged 40–65 David Wasley and Samantha Gailey

<https://doi.org/10.1177/20533691241235273>

16. Ganong, WF 2008, Buku Ajar Fisiologi Kedokteran, EGC, Jakarta.

17. Park SH, Han KS, Jang YJ. Effects of Physical Activity on Reducing Depression and Menopausal Symptoms: A Meta-Analysis. *Journal of Korean Academy of Psychiatric and Mental Health Nursing.* 2023;32(3):325-339.

<http://dx.doi.org/10.12934/jkpmhn.2023.32.3.325>

18. Greene JG: Constructing a standard climacteric scale. *Maturitas.* 1998, 29:25–31.

19. Dennerstein L, Lehert P, Guthrie J: The effects of the menopausal transition and biopsychosocial factors on well-being. *Archives of Women's Mental Health*. 2002, 5:15–22.

<https://doi.org/10.1007/s007370200018>

20. Blumel JE, Castelo-Branco C, Binfa L, et al.: Quality of life after the menopause: A population study. *Maturitas*. 2000, 34:17–23.

[https://doi.org/10.1016/s0378-5122\(99\)00081-x](https://doi.org/10.1016/s0378-5122(99)00081-x)

21. Schneider HPG: The quality of life in the postmenopausal woman. *Best Practice & Research Clinical Obstetrics & Gynaecology*. 2002, 16:395–409.

<https://doi.org/10.1053/beog.2002.0289>

22. Freeman EW, Sammel MD, Lin H, Nelson DB: Associations of hormones and menopausal status with depressed mood in women with no history of depression. *Archives of General Psychiatry*. 2006, 63:375–382.

<https://doi.org/10.1001/archpsyc.63.4.375>

23. Joffe H, Hall JE, Soares CN, et al.: Vasomotor symptoms are associated with depression in perimenopausal women seeking primary care. *Menopause*. 2002, 9:392–398.

<https://doi.org/10.1097/00042192-200211000-00003>

24. Blumenthal JA, Fredrikson M, Matthews KA, et al.: Stress reactivity and exercise training in premenopausal and postmenopausal women. *Health Psychology*. 1991, 10:384–391.

<https://doi.org/10.1037//0278-6133.10.6.384>

25. Slaven L, Lee C: Psychological effects of exercise in adult women: The impact of menopausal status. *Psychology and Health*. 1994, 9:297–303.

<https://doi.org/10.1080/08870449408407488>

26. Slaven L, Lee C: Mood and symptom reporting among middle-aged women: The relationship between menopausal status, hormone replacement therapy, and exercise participation. *Health Psychology*. 1997, 16:203–208.

<https://doi.org/10.1037//0278-6133.16.3.203>

27. Wilbur J, Miller A, Montgomery A: The influence of demographic characteristics, menopausal status, and symptoms on women's attitudes toward menopause. *Women & Health*. 1995, 23:19–39.

https://doi.org/10.1300/j013v23n03_02

28. Gold EB, Sternfeld B, Kelsey JL, et al.: Relation of demographic and lifestyle factors to symptoms in a multi-racial/ ethnic population of women 40–55 years of age. *American Journal of Epidemiology*. 2000, 152:463–473.

<https://doi.org/10.1093/aje/152.5.463>

29. Ivarsson T, Spetz AC, Hammar M: Physical exercise and vasomotor symptoms in postmenopausal women. *Maturitas*. 1998, 29:139–146.

[https://doi.org/10.1016/s0378-5122\(98\)00004-8](https://doi.org/10.1016/s0378-5122(98)00004-8)

30. Menopausal symptoms, physical activity level and quality of life of women living in the Mediterranean region Aya El Hajj, Nina Wardy, Sahar Haidar, Dana Bourgi, Mounia El Haddad1, Daisy El Chammas, Nada El Osta, Lydia Rabbaa Khabbaz, Tatiana Papazian

<https://doi.org/10.1371/journal.pone.0230515>

31. Should RCT's be used as the gold standard for evidence based medicine?

Abhimanyu S. Ahuja

<https://doi.org/10.1016%2Fj.imr.2019.01.001>