

Original Research Article

Risk factors and attitudes towards osteoporosis among the Palestinian females in occupied Palestinian territories

Nihal Natour^{1*}, Eman Alshawish²

¹Department of Public Health, An-Najah National University, Palestine

²Department of Nursing, An-Najah National University, Palestine

Received: 27 July 2025

Revised: 19 September 2025

Accepted: 03 October 2025

*Correspondence:

Dr. Nihal Natour,

E-mail: n.natour@najah.edu

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Osteoporosis is a leading cause of fracture associated mortality and morbidity and its prevention is important for Palestinian society.

Methods: A structured questionnaire was distributed to females in Palestinian territories about risk factors for osteoporosis and attitudes towards the diseases. Data was analyzed using SPSS.

Results: 92 women participated in this study, among studied women only 7 were postmenopausal, Age was 30.8 ± 12.3 y, BMI is 25.1 ± 6.6 Kg/m², attitude score was 5.75 ± 1.6 . 58% had bachelor's degree, 44% were teachers, 23.5% were health workers. 65.9% lived in separate houses. Having job was associated with lower attitude towards importance (0.04) of osteoporosis but improved dairy products consumption. The rate of consuming dairy product on regular basis was higher than 50%, but there was high rate of vitamin D deficiency (37%) and low level of physical activity performance (18%).

Conclusions: There is high prevalence for osteoporosis risk factors, but high rate of using dairy products and modest attitude towards importance of osteoporosis.

Keywords: Osteoporosis, Women, Menopause, Dairy, Knowledge, Attitude

INTRODUCTION

The definition of osteoporosis includes reduced bone mineral density and change of bone micro histological architecture structure. Low vitamin D status is common in Middle East and with expected aging, osteoporosis could be a burden in the region.¹ Osteoporosis rate in lumbar spine 24%, femoral neck 14% and total hip 29.7% in a group among postmenopausal women.² Globally, fracture could happen due to osteoporosis and is associated with high rate of morbidity and mortality. Age, female sex, postmenopausal status, hypogonadism, low body mass index, low calcium intake, vitamin D deficiency, alcohol abuse, current smoking, immobilization and long term of certain medications such as glucocorticoids among risk factors for osteoporosis include.³ Osteoporosis is defined

according to WHO as having as having T-score of less than 2.5 below the average bone mineral density. Dual energy X-ray absorptiometry is used to measure bone mineral density. 8.9 million fractures happen annually due to osteoporosis.⁴ Literature on knowledge on osteoporosis in Arab countries shows no consistency in literature, some reports show low scores of knowledges, other reports show good level of knowledge score on osteoporosis.^{5,6}

Knowledge and positive attitude with regards to prevention of osteoporosis will help to reduce osteoporosis before it occurs. Hence the goals of this study were 1) to measure the prevalence of risk factors for osteoporosis among females from Palestinian society. 2) to study the pattern of positive attitude regarding the significance of osteoporosis on human health. 3) to evaluate the

sociodemographic variable that are related to knowledge and attitude scores.

METHODS

The study was a cross sectional study with convenient sample of women from (n=92). The participants were recruited from women in West Bank, particularly Nablus and Qalqilya. The inclusion criteria were women over 18 years who are able to fill the questionnaire. Study excluded females less than 18 years who are unable to fill questionnaire independently.

The study was based on a structured questionnaire that was translated from Saw et al, Paper and electronic forms were distributed to of Palestinian society from February, 2022-April, 2022. The electronic format was distributed through social media to participants. The questionnaire included demographic variables, questions addressed risk factors for osteoporosis like physical activity, smoking, dietary knowledge, vitamin D deficiency, calcium and vitamin D supplementation intake and consumption of dairy products. Attitudes regarding the significance of osteoporosis was asked using 9 questions. Each question answers were yes which was given 1 point and no which was give 0 point. Attitude score was calculated. Use of dairy products was calculated using a Likert scale answer from 0 to 3.

The study was according to declaration of Helsinki and IRB was obtained from University IRB board. Participants were asked if they accept to participate in the study.

Statistical analysis

Proportions of dependent and independent variables were calculated. Means and standard deviation for age, BMI and attitude score were calculated. Attitude score and dairy

product use score were compared across bivariate risk factors using t-test and attitude score was compared across multivariate variables using ANOVA.

RESULTS

study participants were mainly from Northern West Bank (Nablus and Qalqilya). Mean age was 30.8 ± 12.3 years. Half of the study participants were employed as health workers and in education and other jobs. Mostly, study participants live in separate houses. Income in the group was from less than 3000 shekel to 6000 shekel and 14.1% had health insurance. Risk factors for osteoporosis, 18% engages in physical activity 3 times during the week or more, 12% are smokers, 14% had history for osteoporosis, 37% had vitamin D deficiency. More than half of the study participants consume yogurt sometimes or every day during the week. 38% of women studied took vitamin D supplementation, whereas smaller number took calcium supplementation.

Participants approved that intake of omega 3, proteins, fruits and vegetables, fluoride, caffeine and soda modify bones. 50% of the group agreed that weight, menopause and physical activity could affect bone health as well. Slightly less than 50% belief that alcohol, smoking and diabetes mellitus also contribute to osteoporosis. Very small number of the women in the study agreed that bone health is relevant to frame size.

House wives, educated women and those with adequate vitamin D had higher attitude score towards osteoporosis. The group with higher income had better attitude but this did not reach statistical significance (Table 2 and 3).

Dairy product consumption was significantly higher in group who have jobs and was different across education level groups (Table 4 and 5).

Table 1: A description of the study variables.

Variable	N (%)
Education	
General secondary	8 (9%)
College	14 (15.9%)
B. Sc	51 (58%)
More than B. Sc	15 (17%)
City	
Nablus	25 (28.7%)
Qalqilya	31 (35.6%)
Jenin and Tulkarem, Salfet	20 (22.9%)
Ramallah and hebron	4 (4.6%)
Israel	5 (5.7%)
Jordan	2 (2.2%)
Work	
No	44 (47.8%)
Yes	48 (52.2%)

Continued.

Variable	N (%)
Work type	
House wives	6 (17.6%)
Teachers	15 (44.1%)
Health workers	8 (23.5%)
Other	5 (14.7%)
Housing condition	
5 or more rooms apartment	5 (5.4%)
4 or more rooms apartment	26 (28.6%)
House	60 (65.9%)
Income	
Less than 3000 shekel	33 (39.7%)
3000-6000 shekel	38 (45.8%)
More than 6000 shekel	12 (14.4%)
Insurance	
No	13 (14.1%)
Yes	79 (85.9%)
Risk for osteoporosis	
Do you exercise 3 times a week or more	
No	75 (81.5%)
Yes	17 (18.4%)
Do you smoke	
No	80 (87.9%)
Yes	11 (12%)
History of osteoporosis	
No	79 (85.9%)
Yes	13 (14.1%)
Do you have vitamin D deficiency	
No	57 (63%)
Yes	34 (37%)
Headcover	
No	8 (8.7%)
Yes	84 (91.3%)
Color	
White	34 (37.3%)
Dark	4 (4.3%)
Wheatish	53 (58.2%)
Marital status	
Married	42 (46.2%)
Single	49 (53.8%)
Yogurt consumption	
Never	3 (3.3%)
Sometimes during the week	43 (46.7%)
Few times during the week	10 (10.9%)
Every day during the week	35 (38%)
Not every week	1 (1.1%)
Do you take vitamin D supplementation	
No	57 (61.9%)
Yes	35 (38.1%)
Do you take calcium supplementation	
No	72 (79.1%)
Yes	19 (20.9%)/20.9

Table 2: Description of osteoporosis knowledge among studied women.

Variable	N (%)
Is the following dietary factors related to osteoporosis	
% Answered yes	
Omega 3	46 (50%)
Protein	72 (78%)
Fruits and vegetables	66 (72%)
Fluoride	47 (51%)
Caffeine	16 (17%)
Soda	43 (47%)
Is the following dietary factors related to osteoporosis	
% Answered yes	
Smoking	45 (49%)
Physical activity	61 (66%)
Diabetes mellitus	36 (40%)
Alcohol	30 (33%)
Weight	87 (94.5%)
Menopause	67 (72.8%)
Body frame	7 (7.6%)
Attitude score	
Is osteoporosis related to Bone density	
No	26 (28.6%)
Yes	65 (71.4%)
Is osteoporosis related to Fall risk	
No	44 (44%)
Yes	45 (46%)
Is osteoporosis related to Fracture	
No	0 (0%)
Yes	91 (100%)
Is osteoporosis related to Curvature	
No	15 (16.5%)
Yes	76 (83.5%)
Is osteoporosis related to Short Stature	
No	41 (44.6%)
Yes	51 (55.4%)
Is osteoporosis make you Worried	
No	24 (24%)
Yes	76 (76%)
Is osteoporosis more risky than Cancer	
No	71 (78%)
Yes	20 (22%)
Is osteoporosis more risky than Heart disease	
No	63 (69.2%)
Yes	28 (30.8%)

Table 3: Comparison of attitude score towards osteoporosis according to categorical variables of the study.

Variable	Attitude towards osteoporosis	t-value	P value
Work			
No (44)	6.2±1.4	2.3	0.02
Yes (48)	5.4±1.8		
Menopause			
No (84)	5.7±1.6	0.6	0.52
Yes (7)	6.1±1.9		
Insurance			

Continued.

Variable	Attitude towards osteoporosis	t-value	P value
No (13)	5.2±1.8	-1.2	0.22
Yes (79)	5.8±1.6		
Do you exercise 3 times a week			
No (75)	5.7±1.7	-0.5	0.6
Yes (17)	5.9±1.6		
Smoking			
No (80)	5.7±1.7	-0.4	0.7
Yes (11)	5.9±1.3		
Osteoporosis history			
No (79)	5.75±1.7	-0.05	0.96
Yes (13)	5.77±1.4		
Vitamin D deficiency			
No (57)	6.0±1.6	2.1	0.04
Yes (34)	5.3±1.6		
Headcovered			
No (8)	5.4±1.1	1.8	0.19
Yes (84)	5.8±1.7		
Married			
No (49)	5.9±1.5	0.75	0.45
Yes (42)	5.6±1.8		
Do you use vitamin D supplementation			
No (57)	6.0±1.6	1.5	0.14
Yes (35)	5.4±1.7		
Do you use calcium supplementation			
No (72)	5.9±1.6	1.28	0.2
Yes (19)	5.3±1.9		

Table 4: Comparison of attitude score towards osteoporosis according to categorical variables of the study.

Variable	Attitude	T-value	P value
Study Year			
Tawjihi or less (8)	5.0±1.9	2.3	0.08
College (14)	5.3±1.5		
Bachelor (51)	6.1±1.6		
Graduate (15)	5.3±1.6		
City			
Nablus (25)	5.3±2.1	1.1	0.35
Middle West Bank (51)	5.9±1.5		
Ramallah (3)	7.0±1.0		
Israeli Arab (5)	6.0±0.7		
Other(3)	6.3±1.2		
Work type			
Health (8)	5±1.9	0.92	0.46
Student (5)	5±1.9		
Housewife (6)	5.5±1.0		
Teaching (16)	5.9±1.8		
Other (7)	6.3±1.0		
Living condition			
Village (26)	5.8±1.9	0.53	0.59
Refugee camp (5)	5.0±1.0		
City (60)	5.8±1.6		
Income			
Less than 3000 shekel (33)	5.9±1.6	1.5	0.22
3000-6000 shekel (38)	5.4±1.6		

Continued.

Variable	Attitude	T-value	P value
More than 6000 shekel(12)	6.2±1.7		
Color			
Wheatish (34)	5.5±1.6	1.7	0.19
White (53)	5.8±1.7		
Dark (4)	7.0±0.82		
Yogurt Consumption			
Never (3)	6±2.6	1.56	0.21
Few times (11)	6.2±1.3		
Sometimes (43)	6.0±1.6		
Everyday (35)	5.3±1.7		
BMI Groups			
underweight (7)	6.4±1.8	0.46	0.71
Normal (42)	5.7±1.7		
Overweight (20)	5.6± 1.7		
Obese (22)	5.7±1.5		

Table 5: Comparison between dairy product consumption score according to study category.

Variable	Yogurt consumption	t-value	P value
Work			
No (44)	2.0±0.8	-2.1	0.04
Yes (48)	2.4±0.7		
Menopause			
No (84)	2.2±0.7	0.85	0.51
Yes (7)	2.0±0.8		
Insurance			
No (13)	2.4±0.9	1	0.35
Yes (79)	2.2±0.8		
Do you exercise 3 times a week			
No (75)	2.19±0.78	-0.23	0.82
Yes (17)	2.24±0.75		
Smoking			
No (80)	2.24±0.78	1.3	0.19
Yes (11)	1.91±0.70		
Osteoporosis history			
No (79)	2.16±0.79	-0.95	0.35
Yes (13)	2.38±0.65		
Vitamin D deficiency			
No (57)	2.26±0.7	1.03	0.3
Yes (34)	2.09±0.87		
Head covered			
No (8)	2.25±0.71	0.21	0.84
Yes (84)	2.19±0.78		
Married			
No (49)	2.06±0.83	-1.8	0.07
Yes (42)	2.36±0.69		
Do you use vitamin D supplementation			
No (57)	2.18±0.81	-0.32	0.75
Yes (35)	2.23±0.73		
Do you use calcium supplementation			
No (72)	2.19±0.76	-0.35	0.73
Yes (19)	2.26±0.81		
Study year			
Tawjihi or less (8)	2.50±0.53	2.82	0.04

Continued.

Variable	Yogurt consumption	t-value	P value
College (14)	2.07±0.92		
Bachelor (51)	2.06±0.73		
Graduate (15)	2.6±0.51		
City			
Nablus (25)	2.36±0.81	0.68	0.61
Middle West bank (51)	2.20±0.78		
Ramallah (3)	1.67±0.58		
Israeli Arab (5)	2.40±0.55		
Other (3)	2.33±0.58		
Work type			
Health (8)	2.25±0.71	0.08	0.99
Student (5)	2.20±0.84		
Housewife (6)	2.33±0.82		
Teaching (16)	2.31±0.79		
Other (7)	2.14±0.69		
Living condition			
Village (26)	2.08±0.63	0.55	0.58
Refugee camp (5)	2.20±0.84		
City (60)	2.27±0.82		
Income			
Less than 3000 shekel (33)	2.09±0.72	1.33	0.27
3000-6000 shekel (38)	2.37±0.75		
More than 6000 shekel (12)	2.08±1.0		
Color			
Wheatish (34)	2.29±0.63	0.45	0.64
White (53)	2.13±0.86		
Dark (4)	2.25±0.96		

DISCUSSION

This present study consisted of premenopausal inactive women with poor vitamin D status. Large proportion of the study use supplementation and had moderate positive attitude towards the value of osteoporosis on human health. Regular dairy consumption was common across study group weekly. Employment and level of education were the two factors that were related to attitude score and level of dairy products consumption. Other factors, such as income, housing conditions, type of occupation were not significant predictors of study outcomes.

Low physical activity and vitamin D insufficiency were common risk factors for osteoporosis in the study group. Socioeconomic factors are associated with the risk for osteoporosis, for example low education reduces bone mineral density independent of other factors.⁷ In our study, education was associated with improved attitude score related osteoporosis, yet this was not statistically significant due to small sample size. The study group understood the importance of nutrient factors in osteoporosis incidence, also the study group used vitamin D supplementation and calcium supplementation.

Palestine is Middle Eastern country with ample sunshine, however, literature indicated that in MENA region there is

high prevalence of vitamin D deficiency which is consistent with our results.⁸ Islamic dressing could be a factor in relation to vitamin D deficiency, however in our study rate of women without headcover was low in our study.⁹ There is no conclusive understanding of the importance of smoking on bone health.¹⁰ Smoking rate in the study is not high. Obesity and being overweight is present in almost 46% in the group. Postmenopausal obese women will likely have higher bone mineral density and lower prevalence of vertebral fracture, whereas low BMI and physical inactivity are associated with low bone mineral density.¹⁰⁻¹² In our study group 7.7% had low BMI whereas majority did not practice physical activity).

Use of calcium and vitamin D supplementation is common in this study group. Calcium and vitamin D supplementation reduce osteoporosis risk and some clinical trials proved that vitamin D increases bone mineral density and reduces fracture risk. Calcium supplementation is not associated with osteoporosis and could lead to few adverse health outcomes including increase in cardiovascular diseases.¹³ In a systematic review of 11 studies on adults with age more 50 years, vitamin D supplementation leads to lower total fracture incidence but was not related with hip fracture, whereas vitamin D and calcium supplementation did not have effect on total fracture risk or hip fracture.¹⁴

Education improved the attitude score but this did not reach statistical significance. In a study among Saudi University students, education improved the knowledge on osteoporosis ($r^2=0.28$).¹⁵ In a study among Lebanese women older than 40, education was associated with better score on osteoporosis. Females who did not take supplementation and who did not practice physical activity had lower knowledge on osteoporosis. Similar relationship were not identified in our study due to the age gap between this group and the study among Lebanese women.¹⁶ Teachers had better attitude score relevant to healthcare workers. Saudi nurses, who had less 10 years of experience had lower knowledge on osteoporosis.¹⁷ Among Iranian nurses, knowledge regarding osteoporosis was not satisfactory.¹⁸ This finding contradicts the role of health workers in disease management in any society. However, school teachers had modest knowledge on other health aspects such as diabetes.¹⁹ Teacher's workforce should have important role in spreading health education and awareness. Improving health knowledge among teachers is imperative.²⁰

Work and education improved dairy products consumption. Total dairy products consumption was related to lower odds ratio of osteoporosis in cross sectional and case control studies (0.63; 95% CI: 0.55–0.73).²¹ Dairy consumption at level 2-3 servings per day is recommended in most countries, but in countries like USA, however many people do not achieve recommended levels.²² Sex, education, age, BMI and satisfaction with body weight were important determinant of dairy product consumption.²³

In this study there was no relationship between health attitudes or dairy consumption with housing conditions. Unlike a study in Germany, where poorer housing conditions were found to be associated with worse mental and physical health and 11% increase in doctor visits.²⁴ The relationship between housing and human wellbeing could be due to availability of space for physical activity.²⁵ The findings in this study could be due to the fact that participants were residents in separate houses rather than apartments in complex buildings.²⁵

CONCLUSION

In conclusion, Palestinian women need to have better access to knowledge on osteoporosis to improve disease prevention lifestyle modifications. In general, Palestinian women thought weight, menopause, physical activity are related to osteoporosis. It has detrimental consequences, but less important than diseases like cancer and heart diseases.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Sweileh WM, Al-Jabi SW, Zyoud SeH, Sawalha AF, Ghanim MA. Osteoporosis is a neglected health priority in Arab World: a comparative bibliometric analysis. Springerplus. 2014;3:1-7.
2. Abd-Alhameed I, Saba E, Darwish HM. Prevalence and awareness of osteoporosis among postmenopausal Palestinian women. Arch Osteop. 2010;5:111-8.
3. Akkawi I, Zmerly H. Osteoporosis: Current Concepts. Joints. 2018;6:122-7.
4. Pouresmaeili F, Kamalidehghan B, Kamarehei M, Goh YM. A comprehensive overview on osteoporosis and its risk factors. Therap Clin Manag. 2018;14:2029-49.
5. El Hage C, Hallit S, Akel M, Dagher E. Osteoporosis awareness and health beliefs among Lebanese women aged 40 years and above. Osteop Int. 2019;30:771-86.
6. Gharib AF, Ismail, K., Farghaly, A., Hagag, et al. Assessment of the knowledge and attitudes on osteoporosis among female students at the College of Applied Medical Sciences, Taif City, Saudi Arabia. J Med Res Health Sci. 2019;2:788–93.
7. Tariq S, Baig M and Shahzad M. Calcaneal ultrasound assessment of bone health and association of socio-demographic characteristics with bone mineral density in pre and postmeno-pausal females. Osteoporosis international. Springer london Ltd 236 Grays Inn Rd, 6TH Floor, London WC1X 8HL, England. 2017: 173-4.
8. Al Attia HM, Ibrahim MA. The high prevalence of vitamin D inadequacy and dress style of women in the sunny UAE. Arch Osteop. 2012;7:307-10.
9. Fayed HL, Saleh AH. Frequency of vitamin D inadequacy among Saudi males visiting a Rheumatology Outpatient Clinic of a tertiary hospital in Al-Qassim region: Effect of vitamin D supplementation. Egypt Rheumatol. 2017;39:249-54.
10. Gheita TA, Hammam N. Epidemiology and awareness of osteoporosis: a viewpoint from the Middle East and North Africa. Int J Clin Rheumatol. 2018;13:134-47.
11. Kharroubi A, Saba E, Smoom R, Bader K, Darwish H. Serum 25-hydroxyvitamin D and bone turnover markers in Palestinian postmenopausal osteoporosis and normal women. Arch Osteop. 2017;12:1-8.
12. El Maghraoui A, Sadni S, El Maataoui A. Influence of obesity on vertebral fracture prevalence and vitamin D status in postmenopausal women. Nutr metabol. 2015;12:1-7.
13. Reid IR, Bolland MJ. Controversies in medicine: the role of calcium and vitamin D supplements in adults. Med J Australia. 2019;211:468-73.
14. Kahwati LC, Weber RP, Pan H. Vitamin D, calcium or combined supplementation for the primary prevention of fractures in community-dwelling adults: evidence report and systematic review for the

- US Preventive Services Task Force. *JAMA*. 2018;319:1600-12.
15. Khan JA, McGuigan FE, Akesson KE. Osteoporosis knowledge and awareness among university students in Saudi Arabia. *Arch Osteop*. 2019;14:1-7.
16. El Hage C, Hallit S, Akel M, Dagher E. Osteoporosis awareness and health beliefs among Lebanese women aged 40 years and above. *Osteop Int*. 2019;30:771-86.
17. Alghamdi MA, Mohammed AGA. Knowledge and awareness of osteoporosis among Saudi physicians and nurses: a cross-sectional study. *Open Access Macedonian J Med Sci*. 2018;6:913.
18. Mahdaviazad H, Keshtkar V, Emami MJ, Kargarshouroki Z, Vosoughi AR. Osteoporosis guideline awareness among Iranian nurses: results of a knowledge and attitudes survey. *Journal of Preventive Medicine and Hygiene*. 2021; 62: E415.
19. Almeahmad RM, Qadir SAB, Taweel KM, Marouf MA, Algarni AH, Qadah BM. Awareness of school teachers about diabetes Mellitus. *The Egyptian J Hospital Med*. 2018;70:1230-3.
20. Byrne J, Rietdijk W, Pickett K. Teachers as health promoters: Factors that influence early career teachers to engage with health and wellbeing education. *Teach Teacher Edu*. 2018;69:289-99.
21. Malmir H, Larijani B, Esmailzadeh A. Consumption of milk and dairy products and risk of osteoporosis and hip fracture: a systematic review and Meta-analysis. *Critical Rev Food Sci Nutr*. 2020;60:1722-37.
22. Rabiei S, Zahedi M, Abtahi M. Consumption of milk and dairy products in Iranian population; barriers and facilitators. *Clin Nutri Open Sci*. 2021;38:1-23.
23. Guiné RP, Florença SG, Carpes S, Anjos O. Study of the influence of sociodemographic and lifestyle factors on consumption of dairy products: preliminary study in Portugal and Brazil. *Foods*. 2020;9:1775.
24. Palacios J, Eichholtz P, Kok N, Aydin E. The impact of housing conditions on health outcomes. *Real Estate Economics*. 2021;49:1172-200.
25. Swope CB, Hernández D. Housing as a determinant of health equity: A conceptual model. *Social Sci Med*. 2019;243:112571.

Cite this article as: Natour N, Alshawish S. Risk factors and attitudes towards osteoporosis among the Palestinian females in occupied Palestinian territories. *Int J Adv Med* 2025;12:524-32.