

Research Article	Pak-Euro Journal of Medical and Life Sciences
DOI: 10.31580/pjmls.v7i1.2917	Copyright © All rights are reserved by Corresponding Author
Vol. 7 No. 1, 2024: pp. 55-60	
www.readersinsight.net/pjmls	Revised: February 20, 2024 Accepted: March 25, 2024
Submission: December 18, 2023	Published Online: March 31, 2024

IMPACT OF NUTRACEUTICALS: BRIDGING THE GAP FOR THE MANAGEMENT OF OSTEOPOROSIS IN FEMALE POPULATION IN KARACHI

Shagufta Nesar¹, Kiran Rafiq², Shafaque Mehboob^{2*}, Huma Naseem³, Mehwish Wajidi⁴, Saima Zahid⁵, Muhammad Salah Uddin Usmani⁶, Maria Siddiqui⁷

¹Jinnah College of Pharmacy, Sohail University, Karachi, Pakistan

²Department of Pharmaceutical Chemistry, Institute of Pharmaceutical Sciences, Jinnah Sindh Medical University, Karachi, Pakistan

³Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Zia-ud-Din Medical University, Karachi, Pakistan

⁴Department of Pharmaceutical Chemistry, Federal Urdu University, Karachi, Pakistan

⁵Department of Pharmaceutical Chemistry, Baqai Institute of Pharmaceutical Sciences, Baqai Medical University, Karachi, Pakistan

⁶Sindh Medical College, Jinnah Sindh Medical University, Karachi, Pakistan

⁷Faculty of Pharmacy, Hamdard University, Karachi, Pakistan

***Corresponding Author:** Dr. Shafaque Mehboob. E. mail: shafaque.mehbb@hotmail.com



Abstract

Background: Nutraceuticals as the bioactive products having therapeutic effects against a variety of illnesses including osteoporosis, a bone disease that can be controlled by eating a proper nutraceutical diet, hence, these nutritional products can help to prevent and manage this disease. Pakistani women have higher prevalence rate this bone disorder as compared to the women of another part of world due to the risk factors associated with it. Nutraceuticals, therefore, may be effective in women suffering this bone disorder.

Objective: The objective of the current study is to find impact of nutraceuticals in management of osteoporosis in female population in Karachi who were presenting to the OPD.

Methods: This was a multi-centered cross-sectional study, undertaken to study effects of nutraceuticals in female population suffering from osteoporosis and its correlation with demographic as well as socio-economic factors from January to March 2023 in females between 20- 60 years and above in OPD (Jinnah Post Medical College, Zain and T.O clinics) in Karachi.

Results: The study showed that out of 450 respondents, 54.85% were in group-1 (aged between 20-39 years), 38.88% in group-2 (aged between 40-59 years) and 6.22% % in group-3 (60 years and above). Results showed that the respondents' age, economic level and education was significantly ($p > 0.001$) correlated with their knowledge status, use of nutraceuticals and positive effect of it in recovery. 79% participants were observed to have knowledge about nutraceuticals and 71% were using nutraceuticals.

Key words: Bone creation, Female population of Karachi, Nutraceuticals, Osteoporosis

INTRODUCTION

In 1989, Stephen DeFelice introduced the term "nutraceuticals" as the bioactive products having therapeutic effects against a variety of illnesses including osteoporosis, a bone disease that can be controlled by eating a proper nutraceutical diet, hence, these nutritional products can help to prevent and manage the disease (1). The word "Nutraceuticals" is an amalgam of the two phrases "nutrition" and "pharmaceutical," which both relate to vital components found in food (2). Nutritional supplements are now an extremely significant prophylactic approach to fighting against osteoporosis (3). Nutraceuticals can be used to maintain the body's structure or function, slow the ageing process, prevent chronic diseases, and promote bone health as it contains several vitamins, minerals and other micro-nutrients (4). Several studies reported about a number of risk factors associated with osteoporosis such as deficient of calcium intake, excessive consumption of animal protein, less physical activities, caffeine and alcohol consumption (5, 6).

Reduced density of typically calcified bone (mass/volume) and complications associated with post menopause also reported contributing factors to increase prevalence rate of osteoporosis in different populations (7). This bone disease is largely characterized by decreasing bone mineral density (BMD), poor microstructure, and a higher risk of fragility fractures. Due to an ageing population and increased life expectancy, this silent disease is quickly turning into a global epidemic (8). Due to its effects on public health, this illness has been called "The Silent Epidemic of the 21st century" which is frequently found in female population of various age, belonging to different socio-economic background. It is the most prevalent of the metabolic bone diseases and is a serious, persistent, progressive, and clinically silent condition (9). Nutraceuticals are dietary substances osteoporosis is hypothesized to be controlled by intake of a number of nutraceuticals that support the equilibrium of cartilage metabolism and lessen articular discomfort. (10).

In Pakistan, More than 6 million Pakistanis are estimated to have osteoporosis. Poor bone marrow density, malnutrition during poor pregnancy conditions, high birth rate, loss of a significant amount of calcium during lactation and fail to replace it in a timely manner increase risk of developing osteoporosis (11-13).

The prevalence of osteoporosis in previous studies on Pakistani women, were found to be 12.9% (14). In another study, conducted on Pakistani women, osteoporosis was 16% (15). According to the results of another study conducted in Karachi, women between the ages of 15 and 30 have lower BMD than women over the age of 45 (16). Therefore, it was pointed that Pakistani women have an increased burden of osteoporosis as compared to the women of another part of world (17). However, nutraceuticals could be very effective in preventing and managing osteoporosis (18). The objective of the current study was to find impact of nutraceuticals in management of osteoporosis in female population in Karachi who were presenting to the OPD.

MATERIALS AND METHODS

This was a multi-centered cross-sectional study, undertaken to study effects of nutraceuticals in female population suffering from osteoporosis and its correlation with demographic as well as socio-economic factors from January to March 2023 in females OPD. In order to highlight age relationship to osteoporosis, participants were divided into three groups, group-1 (aged between 20-39 years), group-2 (aged between 40-59 years) and group-3 (60 years and above).

SAMPLE SIZE

A sample size 500 patients was taken under consideration which was bigger than calculated sample size (377) by Rao soft calculator, taking CI (Confidence level=95%) and Margin of error=5%.

INCLUSION AND EXCLUSION CRITERIA

All the participants were female, aged above 20 years and diagnosed with osteoporosis, taking OPD in different hospitals. Female having any trauma, chronic disorders or pregnancy were not included in the present study. Out of 500 patients, 50 patients were not agreeing to response.

This survey-based research project is focused on women who have visited the OPD of the orthopedics department of different hospitals (Jinnah Post Medical College, Zain and T.O clinics) in Karachi. A questionnaire was developed based on previous research and approved by ethical committee and doctors of relevant department. The questionnaire helped to analyze different variables such as age, weight, height, medical history regarding bone disorders or factors affecting it like poor food intake and menopause as well as basic information and education (11-13). Statistical analysis was done using SPSS, frequencies were presented as percentages and significant value was taken ($p > 0.005$) using Tukey method.

RESULTS

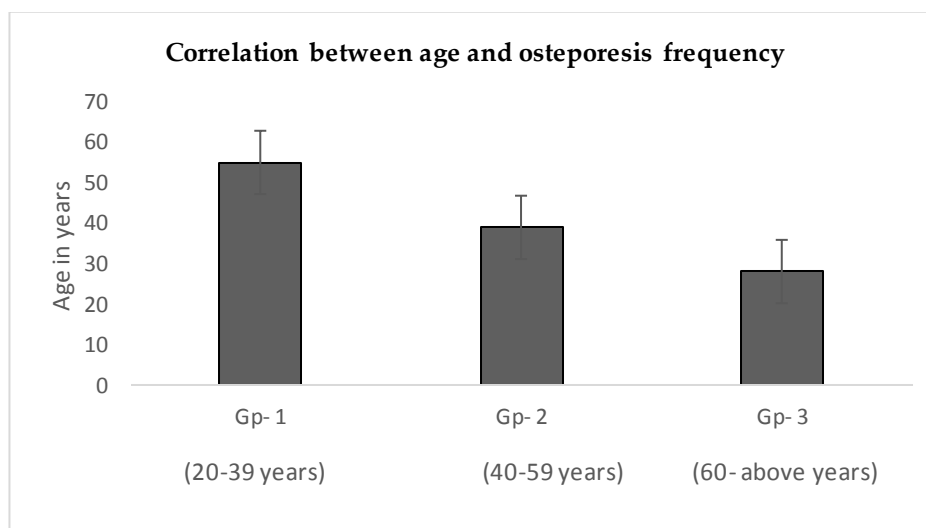
The study showed that out of 450 respondents, 54.85% were in group-1 (aged between 20-39 years), 38.88% in group-2 (aged between 40-59 years) and 6.22% % in group-3 (60 years and above). This showed strong correlation between age to frequency of osteoporosis in female patients in Karachi (Table I, Fig. 1).



Table I. Correlation between demography and osteoporosis

Demographic Information	Frequency (%)	P value
Age		
20 – 39 years	247 (54.88)	< 0.001
40 – 59 years	175 (38.88)	
60 and above	28 (6.22)	
Weight		
Under 50 kg	70 (15.55)	< 0.001
50-60 kg	185 (41.11)	
61-80 kg	130 (28.88)	
Above 80 kg	40 (8.88)	
Prefer not to say	25 (5.55)	
Height		
Under 150 cm	85 (18.88)	> 0.001 (not significant)
150-160 cm	180 (40.0)	
161-170 cm	125 (27.77)	
Above 170 cm	35 (7.77)	
Prefer not to say	25 (5.55)	
Social Status		
Single	80 (17.77)	> 0.001 (not significant)
Married	225 (50.0)	
Divorced	90 (20.0)	
Widow	55 (12.22)	
Economic level		
Bad	158 (35.11)	< 0.001
Moderate	148 (32.88)	
Good	126 (28.0)	
High	18 (4.0)	
Education		
S. S. C	160 (35.55)	< 0.001
H. S. C.	132 (29.33)	
Bachelors	120 (26.66)	
Masters	30 (6.66)	
PhD	08 (1.77)	

Table I also showed that maximum participants were in between 50 and 60 kg weight (185, 41.1%), 225 (or 50%) were married, and 158 (35.11%), had low incomes and secondary school education 160 (35.55%).

**Fig. 1.** Correlation between age and osteoporosis

The study showed that the collection of complete information from 450 patients, and it was intriguing to observe that the majority of participants were aware that they suffered from osteoporosis

(Table II). 53% of patients had a family history, 72.88% disease, 79% participants were observed to have knowledge about nutraceuticals and 71% were using nutraceuticals. The majority (82.6%) of participants feeling better with rapid recovery after taking nutraceuticals in different forms with their medications (Table II) which was higher than that number who got information about nutraceuticals. Total 378 (84%) patients were maintained on calcium supplements that include calcium carbonate, multivitamins, vitamin D+Calcium and others (Table II, Fig. 2). Additionally, the respondents' age, economic level and education were significantly correlated with their knowledge status and use of nutraceuticals. Use of nutraceuticals played very effective role in female patients of osteoporosis in recovery (Fig. 3).

Age and weight gain, being a female, and living below the poverty line were the significantly predominant factors ($p < 0.001$). Education level was also an important factor associated with the knowledge and use of Nutraceuticals ($p < 0.001$). The overall data reveal a significant correlation of Osteoporosis with age, economic level, education and marital status.

Table II. Response of participants about nutraceuticals

S. No.	Items	Yes Frequency (%)	No Frequency (%)
1	Do you have any family history regarding Osteoporosis or bone disease?	239 (53)	211 (47)
2	Do you have any awareness about Nutraceuticals?	355 (79)	95(21)
3	Are you taking any Calcium supplements	378 (84)	72 (16)
4	After taking nutraceuticals with your medications have you ever felt any positive effect or rapid recovery from Osteoporosis	372 (82.66)	78 (17)

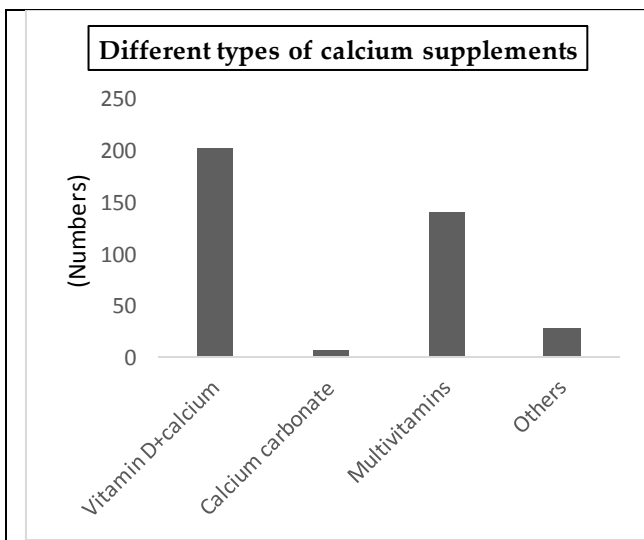


Fig. 2. Use of different types of calcium supplements

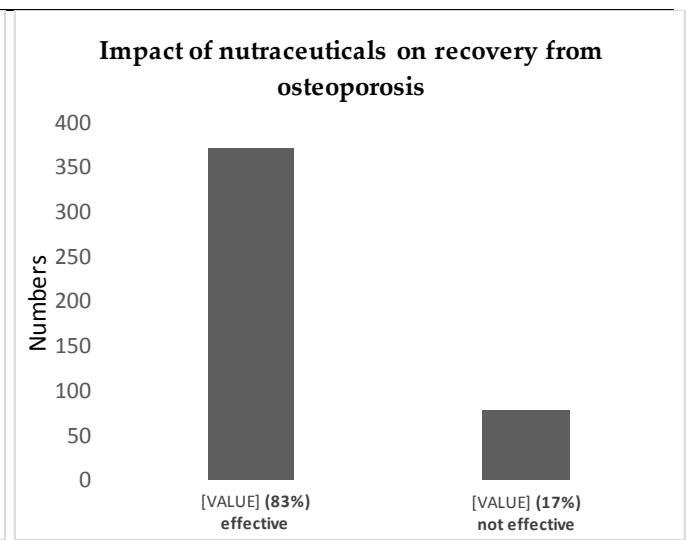


Fig. 3. Comparative effect of nutraceutical between patients of osteoporosis using nutraceutical to the patients not using nutraceutical

DISCUSSION

Osteoporosis results from bone mass loss and skeletal microarchitecture degradation. In their 40s, both men and women's bone mass begin to decline, increasing their risk of fragility fractures. However, due to estrogen insufficiency, women lose bone more quickly than men do, especially in the first 5 to 10 years after menopause, whereas males lose bone slowly. Fractures caused by inadequate bone density are linked to a number of risk factors. Various health issues, particularly musculoskeletal diseases, are brought on by regional variations in work cultures and way of life (19). On the other hand, present study showed that maximum patients were aged between 20-39 years old which showed facts in limited study subjects and

emphasized that future study should cover bigger cohort to give better picture. In addition to this, current study is also an alarming situation for young women in Pakistan to be more vigilant about their bone health conditions.

High percentage of frequency of disease recovery in patients taking different types of nutraceuticals and significant correlation of osteoporosis ($p > 0.001$) to the age group emphasized to take nutraceutical therapy or at least food intake contain minerals and vitamins which supports healthy bone development in early age as compared to merely pharmaceutical treatment after osteoporosis (20). 79% patients got information about nutraceuticals which showed that we still need our audience to make them believe to use nutraceuticals in our literature, public awareness programs and workshops as they believe in OPD doctors (83%) during visits. Nutraceuticals are dietary substances that support the equilibrium of cartilage metabolism and lessen articular discomfort. Osteoarthritis and osteoporosis are hypothesized to be controlled and, more particularly, prevented by dietary intake of a number of nutraceuticals. Osteoporosis is a significant health concern in Pakistan, particularly among the aging population. Factors contributing to the prevalence include the aging population, lack of awareness, nutritional factors, sedentary lifestyle, limited healthcare access, and hormonal imbalances. To address osteoporosis, public awareness, healthcare professionals training, promoting a diet rich in calcium and vitamin D, regular exercise, and discouraging tobacco and alcohol consumption are essential. However, the situation may have evolved since the last update in 2021 (21, 22).

Our results (Table I) showed significant correlation of osteoporosis ($p > 0.001$) with both, marital status and economic conditions. These factors effects bone marrow density, particularly in case of women and increase prevalence rate of osteoporosis (14-17, 23). Hence, present study also gave idea that women in Pakistan are at high risk of bone marrow disorders including osteoporosis (17).

Therefore, it is important to make awareness among women, health practitioners and policy makers to utilize benefits of nutraceutical containing different vitamins, minerals and rich in dietary benefits in bridging the gap for management of osteoporosis in low socio-economic country with low health care facilities like Pakistan.

CONCLUSION

Current study showed significant correlation of osteoporosis with age, weight, utilization of nutraceuticals, marital status and economic conditions. As these factors effects bone marrow density, therefore, it is important to make awareness among women, health practitioners and policy makers to utilize benefits of nutraceutical containing different vitamins, minerals and rich in dietary benefits in bridging the gap for management of osteoporosis in low socio-economic country with low health care facilities like Pakistan.

Limitations of the study:

Study was limited with specific age group and in one city of Asia, although many factors are common across the whole country and to the teenager females. Therefore, it is strongly recommended to perform the study in different countries of Asia and Africa on different age grouped females with low literacy rate.

Acknowledgements:

The corresponding author acknowledged Mehak Ali, Marium Mumtaz, Maira Kanwal and Hadia Naz from the Faculty of Pharmacy, Hamdard University for their facilitation in current research.

Conflict of interest:

Authors have no conflict of interest.

References:

1. Browicz K, Zohary D. The genus *Amygdalus* L. (Rosaceae): species relationships, distribution and evolution under domestication. *Genetic Resources and Crop Evolution*. 1996;43(3):229-47.



2. DeFelice SL. The nutraceutical revolution: its impact on food industry R&D. *Trends Food Sci Technol.* 1995; 6:59–61.
3. Kalra, E. K. Nutraceutical-definition and introduction. *Aaps Pharmsci.* 2003;5(3):27-28.
4. <https://my.clevelandclinic.org/health/diseases/4443-osteoporosis>.
5. Amrein K, Scherkl M, Hoffmann M, Neuwersch-Sommeregger S, Köstenberger M, Tmava Berisha A, Martucci G, Pilz S, Malle O. Vitamin D deficiency 2.0: an update on the current status worldwide. *Eur J Clin Nutr.* 2020;74(11):1498-1513.
6. Kirazlı Y, Atamaz Çalış F, El Ö, Gökçe Kutsal Y, Peker Ö, Sindel D, Tuzun Ş, Gogas Yavuz D, Durmaz B, Akarirmak Ü, Bodur H, Hamuryudan V, Inceboz U, Öncel S. Updated approach for the management of osteoporosis in Turkey: a consensus report. *Arch Osteoporos.* 2020;15(1):137.
7. Castrogiovanni P, Trovato FM, Loreto C, Nsir H, Szychlinska MA, Musumeci G. Nutraceutical Supplements in the Management and Prevention of Osteoarthritis. *Int J Mol Sci.* 2016;17(12):2042.
8. Wang A, Leong DJ, Cardoso L, Sun HB. Nutraceuticals and osteoarthritis pain. *Pharmacol Ther.* 2018;187:167-179.
9. Colletti A, Cicero AFG. Nutraceutical Approach to Chronic Osteoarthritis: From Molecular Research to Clinical Evidence. *Int J Mol Sci.* 2021;22(23):12920.
10. Olsen NJ. Nutraceuticals for the treatment of osteoarthritis. *Minerva Med.* 2011;102(1):33-40.
11. Lopez HL. Nutritional interventions to prevent and treat osteoarthritis. Part II: focus on micronutrients and supportive nutraceuticals. *PM R.* 2012;4(5 Suppl):S155-68.
12. Edmonds S. Therapeutic targets for osteoarthritis. *Maturitas.* 2009 Jul 20;63(3):191-4.
13. Wang Y, Prentice LF, Vitetta L, Wluka AE, Cicuttini FM. The effect of nutritional supplements on osteoarthritis. *Altern Med Rev.* 2004;9(3):275-96.
14. Frech TM, Clegg DO. The utility of nutraceuticals in the treatment of osteoarthritis. *Curr Rheumatol Rep.* 2007;9(1):25-30.
15. Aronson JK. Defining 'nutraceuticals': neither nutritious nor pharmaceutical. *Br J Clin Pharmacol.* 2017 Jan;83(1):8-19.
16. Hirota T, Hirota K. [Bone and Nutrition. Nutritional management of osteoporosis]. *Clin Calcium.* 2015;25(7):1049-55.
17. Hou YC, Wu CC, Liao MT, Shyu JF, Hung CF, Yen TH, Lu CL, Lu KC. Role of nutritional vitamin D in osteoporosis treatment. *Clin Chim Acta.* 2018 Sep;484:179-191.
18. Ring M. Women's Health: Polycystic Ovarian Syndrome, Menopause, and Osteoporosis. *Prim Care.* 2017 Jun;44(2):377-398.
19. Szychlinska M.A., Castrogiovanni P., Trovato F.M., Nsir H., Zarrouk M., Lo Firno D., Di Rosa M., Imbesi R., Musumeci G. Physical activity and Mediterranean diet based on olive tree phenolic compounds from two different geographical areas have protective effects on early osteoarthritis, muscle atrophy and hepatic steatosis. *Eur. J. Nutr.* 2019;58:565–581.
20. Ameye L.G., Chee W.S. Osteoarthritis and nutrition. From nutraceuticals to functional foods: A systematic review of the scientific evidence. *Arthritis Res. Ther.* 2006;8:127.
21. Khan AH, Jafri L, Ahmed S, Noordin S. Osteoporosis and its perspective in Pakistan: A review of evidence and issues for addressing fragility fractures. *Ann Med Surg (Lond).* 2018;29:19-25.
22. Ragle RL, Sawitzke AD. Nutraceuticals in the management of osteoarthritis : a critical review. *Drugs Aging.* 2012;29(9):717-31.
23. Akhtar S. Mini Review: Prevalence and correlates of vitamin D deficiency -perspectives from Pakistan. *Pak J Pharm Sci.* 2016;29(4):1325-30.