Assessment of Knowledge and Awareness Regarding Osteoporosis and its Risk Factors among Female University Students in Mirpur Azad Kashmir: A Questionnaire Based Cross Sectional Study

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Abstract   *To assess the knowledge and awareness of osteoporosis and its risk factors among female university students in Mirpur Azad Kashmir. A cross-sectional study was carried out in female university students in Mirpur Azad Kashmir using a self-administered questionnaire. Knowledge and awareness of osteoporosis was assessed using OKAT (Osteoporosis Knowledge Assessment Tool) and descriptive analysis by using SPSS (version 25). Pearson's Chi-Square test (p < 0.05) was used to assess significance. Mean age of the participants was 22.45 + 1.279 years. Mean total score was 11.86 + 3.3. The overall score of knowledge was moderate (68.8%). There was a significantly high difference about risk factors, complications, and preventive measures of osteoporosis between the two groups (p = 0.000). Discipline and family history of disease were significantly associated with overall knowledge score. This study concluded that overall knowledge of osteoporosis among female students was moderate. A well-structured education programs must be added to curriculum to prevent osteoporosis in later stages.*

Key Words: Home Economics, Mirpur Azad Kashmir, Osteoporosis, OKAT, Pharmacy

Introduction

Osteoporosis is the chronic metabolic disease of skeletal system, that diminishes the quality of life owing to compromised bone strength (El-Tawab, Saba, Elweshahi, & Ashry, 2016; Haq, Tahir, Iqbal, & Naseem, 2015). Osteoporosis is three times more prevalent in females as compared to that of males (Masood, Shahzad, Saqib, & Ashraf, 2014). It is most common in post-menopausal women and according to an estimate 30% of the postmenopausal women suffer from osteoporosis (Pande et al., 2000). Its prevalence is higher in post-menopausal women because of rapid reduction in level of oestrogen (Tanveer, Khalid, & Sulaiman, 2018). Osteoporosis is mainly a bone disease characterized by impaired

structural integrity of the trabecular bone and decreased amount of bone. Hence cortical bones become more thinner and porous (Riaz, Alam, & Umer, 2006). The continuous reduction in the mass of the bone and destruction of the tissues of bone lead towards the high fragility of bones which are more susceptible to breakage than the normal bones (Durmuş et al., 2009). National Institute of Health defines osteoporosis as, "*a disease characterized by decreased bone strength and propensity to fracture*" (Hough et al., 2010). According to the National Osteoporosis Foundation, it is known as a silent disease because there are no obvious signs of bone mass reduction in many people and ultimately

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continuous bone mass loss results in the fractured bones.

Influence of osteoporosis on risk of the fragility fractures significantly affects the quality of life and life expectancy (Durmuş et al., 2009). Near 30 years of age, a person achieves a peak bone mass. 'Heredity' is considered as the most important factor of the peak bone mass. Other determinants are physical activity, nutrition, smoking, hormonal status, and health of an individual (Masood et al., 2014).

Osteoporosis may be classified as either primary or secondary osteoporosis. Primary osteoporosis is more common that is mainly observed in post-menopausal women, hence known as post-menopausal osteoporosis. Secondary osteoporosis is basically a complication of primary cause (El-Tawab et al., 2016). Recent analyses have shown that increased age, a previous fracture due to fragility, less weight (body mass index), and history of hip fractures in family because of osteoporosis are major risk factors in the most of the postmenopausal healthy women (Hough et al., 2010). Risk factors associated with the primary & secondary osteoporosis are either modifiable factors or non-modifiable factors. Modifiable factors are those factors that minimize the risk of disease occurrence if they are removed such as low vitamin D and calcium intake, use of carbonated drinks, sedentary work and lifestyle, low BMI and prolonged recumbency. Non modifiable risk factors are those that occur with the age or they are related with the normal body function of a person and they are present throughout the life. With aging in women, propensity to the falls increasingly becomes more significant (Hough et al., 2010). Non modifiable risk factors include family history, menopause and aging (Haq et al., 2015).

Although significant information is not available on epidemiology and demographics of fractures but according to a survey that was recently conducted by the International Osteoporosis Foundation, the cost on the fractures of the hip in Pakistan is 1200 to 2400 US Dollar per fracture of the hip that indicates a massive burden of the disease especially on the poor or middle class population of the Pakistan (Haq et al., 2015). The hospital cost of treating a hip fracture is very high.

Several studies have been conducted about knowledge and awareness of osteoporosis in several countries including Pakistan but no such study was conducted in Mirpur Azad Kashmir (El-Tawab et al., 2016; Haq et al., 2015; Tanveer et al., 2018; Zakai & Zakai, 2015). The present study was thus conducted in the territory of Mirpur Azad Kashmir to assess the knowledge and awareness regarding osteoporosis.

Material and Method

Study design

This study was a questionnaire based cross-sectional survey. In this survey the self-administered questionnaires were distributed among female university students after briefing about the objectives of study and taking their consent.

Study settings

This study was conducted in Home economics department of Mirpur University of Science and Technology (MUST) AJK, Mohi-ud-Din Islamic Institute of Pharmaceutical Sciences (MIIPS) and Akson college of pharmacy (MUST) AJK.

Study duration

The duration of our study was from November, 2018 to January, 2019.

Sampling technique

A convenient sampling technique was used for data collection.

Study population

Only female students, studying in fourth and final year of Pharmacy and home-economics departments of Mirpur University of Science and Technology AJK were included in this study.

Study tool

The Osteoporosis Knowledge Assessment Tool (OKAT) used in preceding studies those were conducted for the

assessment of osteoporosis knowledge. We adopted it and modified it as per our need. This tool contains 20 questions and was divided in two main sections, one for demographic data and other contain knowledge-based questions. This tool was basically a dichotomous type in which each question had "Yes" or "No" & "don't know" options. Also, a question regarding the source of information was added in this questionnaire and the subjects were allowed to select more than 1 option given. The data collection was then done by using this questionnaire.

Scoring Method

Each question contained "Yes" or "No" & "Don't know" options. One mark was given to each answer correctly selected, while on wrong and don't know

answer 0 mark was awarded. Thus, our score range is from 0-20. A score ≤ 8 was recorded as poor knowledge, 9-15 as moderate and a score >15 was considered as good knowledge.

Ethical Consideration

We took permission from IRB of Akson College of Pharmacy. We assure to maintain the confidentiality of participants. We took verbal consent from each participant.

Data Analysis

All the data was collected and analysed by using statistical package for social sciences (SPSS) version. 25. It was used to summarize and describe the data.

Inclusion Criteria

Participants included in our study were volunteer female students studying in final year and second last year from pharmacy and home economics departments.

Exclusion Criteria

All male students were excluded and those female students not studying in fourth or final year and not willing to take part were excluded.

Results

Table 1 contains the demographic data. The average age of the participants was 22.45±1.279 years. About 82.5% belonged to age group 20-23 years while 17.39% belonged to age group ranging from 24 to 28 years. Majority of the participants were single (87.7%) and 54.3% were hostel boarders. Participants were divided into two groups according to their discipline of study i.e, pharmacy and home economics. About 67.4 % responders were from pharmacy department while 32.6% were from home-economics department. They were further divided into final year students and 2nd last year students. Majority of the respondents (68.8%) didn't have osteoporosis in them or in their family.

Table 1: Demographic Characteristic of the Participants

Characteristics	Frequency	Percentage
Age (22.45±1.279) years		
20-23	114	82.5%
24-28	24	17.39%
Marital status		
Single	121	87.7%
Married	17	12.3%
Discipline		
PHARM-D	93	67.4%
Home-economics	45	32.6%
Year of study		
Final year	65	47.1%
2nd last year	73	52.9%
Living status		
Hostel boarders	75	54.3%
Day scholars	63	45.7%
Family history of disease?		
Yes	43	31.2%
No	95	68.8%

The sources of information among both groups are given in table 2. The major source of information was internet among both groups with percentage 46.7% in home-economics group and 54.8% in pharmacy group while friends & family being the 2nd and curriculum was the 3rd source of information regarding osteoporosis.

Table 2: Source of Information of Osteoporosis Knowledge

Source Of Information	PHARM-D Group (%)	Home-economics Group (%)
Television	11.8	11.1

Source Of Information	PHARM-D Group (%)	Home-economics Group (%)
Internet	54.8	46.7
Newspaper	14.1	6.7
Curriculum	32.2	28.9
Friends & Family	40.9	26.7

The overall knowledge score was moderate (68.8%). Pharmacy students had moderate (76.3%) to good (15.1 %) knowledge while home-economics students had moderate (53.3%) to poor (44.4%) knowledge.

Table 3. Knowledge Scoring Among PHARM-D and Home-Economics Groups

Knowledge Scoring	PHARM-D Group		Home-economics Group	
	Frequency	Percentage	Frequency	Percentage
Good (>15)	14	15.1%	1	2.2%
Moderate (9-15)	71	76.3%	24	53.3%
Poor (≤8)	8	8.6%	20	44.4%

The level of knowledge regarding osteoporosis among students of pharmacy and home-economics departments is given in table 4. Each correct answer was marked as 1 while 0 was awarded to wrong one and don't know answer. Thus, our score range was 0-20. The mean total score of knowledge obtained was 11.86±3.3. The overall knowledge score was moderate (68.8%). Pharmacy students had moderate (76.3%) to good (15.1 %) knowledge while home-economics students had moderate (53.3%) to poor (44.4%) knowledge. Most of the participants in both groups were familiar with term osteoporosis. Chi-square test was used to assess the association between the discipline and the question asked. Majority of the pharmacy students i.e, 97.8% and 66.7% home-economics students knew that it is a disease related to the bones and there was a statistically significant difference between both groups (p<0.001) about this question. Also, there was a significant difference between both groups regarding the questions about complications and effect of physical activity on osteoporosis at p-value 0.011 and 0.017 respectively. Only 31.2% of pharmacy students and 13.3 % of home-economics students gave the correct answer about the age of gaining bone mass. Majority of the respondents gave incorrect answer about the question that lower weight women have more risk of developing osteoporosis i.e, 62.4% of pharmacy and 44.4% of home-economics gave incorrect answer. Regarding the question that early menopause can be a cause of osteoporosis, 67.7% pharmacy students and 42.2% home-economics students gave the correct answer while 17.2% & 33.3% of pharmacy and home-economics students respectively were unaware of this cause, indicating a significantly higher difference between both groups(p=0.016). 32.2% pharmacy and 40% home-economics students gave incorrect answer about the cause of osteoporosis. In response of the question that, without preventive measures osteoporosis can result in fractures after 50 years of age we found a significantly higher difference between both groups (p<0.0001). Majority of the participants of both groups i.e, 73.1% of pharmacy and 53.3% of home-ecnomics students gave incorrect answer regarding the fulfilment of calcium requirement by one glass of milk in children of age 9-17 years. Moreover there was a significant difference between two groups regarding questions i.e, family history as a risk factor of osteoporosis, source of vitamin D & calcium and sign & symptoms of osteoporosis (p=0.032, p<0.001 and p<0.001 respectively).

Table 4. Level of Osteoporosis knowledge in PHARM-D and Home-Economics Groups

	Questions	Correct answers	Yes % (n)	No % (n)	Don't know % (n)	Yes % (n)	No % (n)	Don't know % (n)	P
1	Do you know about osteoporosis?	Yes	98.9% (92)	0% (0)	1.1% (1)	86.7 % (39)	6.7% (3)	6.7% (3)	0.007
2	Osteoporosis is a disease of bones	Yes	97.8% (91)	2.2% (2)	0% (0)	66.7 % (30)	20% (9)	13.3% (6)	0.000

	Questions	Correct answers	Yes % (n)	No % (n)	Don't know % (n)	Yes % (n)	No % (n)	Don't know % (n)	P
3	Osteoporosis makes bones weak and fragile (easy to break) and less dense.	Yes	94.6% (88)	2.2% (2)	3.2% (3)	77.8 % (35)	6.7% (3)	15.6% (7)	0.011
4	Physical activity increases the risk of osteoporosis	No	34.4% (32)	52.7% (49)	12.9% (12)	15.6 % (7)	55.6 % (25)	28.9% (13)	0.017
5	Most people gain bone mass after 30 years of age	No	49.5% (46)	31.2% (20)	19.4% (18)	42.2 %19	13.3 % (6)	44.4% (20)	0.004
6	Lower weight women have osteoporosis>heavy women	Yes	23.7% (22)	62.4% (58)	14% (13)	31.1 % (14)	44.4 % (20)	24.4% (11)	0.118
7	Most important time to build bone strength is between 9 and 30 years of age	Yes	81.7% (76)	7.5% (7)	10.8% (10)	51.1 % (23)	24.4 % (11)	24.4% (11)	0.001
8	You can get osteoporosis, if you suffer from menopause at early age (before the age of 50 years)	Yes	67.7% (63)	15.1% (14)	17.2% (16)	42.2 % (19)	24.4 % (11)	33.3% (15)	0.016
9	Osteoporosis affects both men and women equally	No	26.9% (25)	65.6% (61)	7.5% (7)	46.7 % (21)	40% (18)	13.3% (6)	0.017
10	Without preventive measures, 20% of women older than 50 years will have a fracture due to osteoporosis in their lifetime	Yes	77.4% (72)	10.8% (10)	11.8% (11)	40% (18)	15.6 % (7)	44.4% (20)	0.000
11	There are treatments for osteoporosis after it develops	Yes	64.5% (60)	21.5% (20)	14% (13)	62.2 % (28)	11.1 % (5)	26.7% (12)	0.104
12	A lifetime of low intake of calcium and vitamin D does not increase the risk of osteoporosis	No	32.2% (30)	64.5% (60)	3.2% (3)	40% (18)	33.3 % (15)	26.7% (12)	0.000
13	Smoking does not increase the risk of osteoporosis	No	25.8% (24)	43% (40)	31.2% (29)	22.2 % (10)	53.3 % (24)	24.4% (11)	0.514
14	Walking has a great effect on bone health	Yes	81.7% (76)	7.5% (7)	10.8% (10)	64.4 %	20% (9)	15.6% (7)	0.054
15	After menopause, women not on oestrogen need about 1500 mg of calcium (for example, 5 glasses of milk) daily	Yes	50.5% (47)	22.6% (21)	26.9% (25)	51.1% (23)	11.1% (5)	37.8% (17)	0.192
16	You can get osteoporosis, if you avoid sunlight (lacking Vitamin D)	Yes	77.4% (72)	15.1% (14)	7.5% (7)	66.7% (30)	26.7% (12)	6.7% (3)	0.262
17	Children 9-17 years of age get enough calcium from one glass of milk each day to prevent osteoporosis	No	73.1% (68)	15.1% (14)	11.8% (11)	53.3% (24)	24.4% (11)	22.2% (10)	0.067
18	Family history of osteoporosis is a risk factor	Yes	40.9% (38)	49.5% (46)	9.7% (9)	35.6% (16)	37.8% (17)	26.7% (12)	0.032
19	Sardines(fish) are rich in calcium and vitamin D	Yes	71% (66)	12.9% (12)	16.1% (15)	33.3% (15)	31.1% (14)	35.6% (16)	0.000
20	Low back pain, fractures, loss of height and loss of teeth are complications of	Yes	79.6% (74)	9.7% (9)	10.8% (10)	44.4% (20)	11.1% (5)	44.4% (20)	0.000

Discussion

Osteoporosis is a health problem that is worldwide prevalent but more common among females especially among women after menopause. Therefore, a sound knowledge about osteoporosis among these young students will be useful for them in adopting the nutritional and living standards that in turn will help them to prevent this bones related disease in later ages. Moreover, being pharmacy students who are a part of public health team and being home-economics students who can play a role as a nutritionist, the awareness regarding the osteoporosis & its risk factors is essential. In turn they can play a major role in raising the awareness and preventive measures among general public. According to an estimate provided by WHO, every year about nine million osteoporotic fractures occur in the world. These facts and figures reveal that by year 2050, occurrence of osteoporotic fractures in Asia will be more than fifty percent. If osteoporosis remains neglected, then the prevalence of this disease will continue to increase (Tanveer et al., 2018).

This study was conducted to evaluate the knowledge about osteoporosis & its risky factors among female science and arts students. Among science group only pharmacy students were selected because they are a part of health care profession hence, they can take part in programmes which can provide awareness regarding osteoporosis. While among arts group home-economics students were selected because they study food & nutrition and can play a vital role in osteoporosis preventive strategies. Nutritional deficiency of dietary intake of vitamin D & calcium is one of the major risk factors of osteoporosis. As home economics students study food and nutrition so they can provide better guidance about proper diet. Also, as major intervention in preventing osteoporosis is proper dietary intake so home-economics students being part of diet and nutritional studies can play a major role in providing awareness to the community.

In this study a questionnaire was distributed among pharmacy and home-economics female students. The questionnaire had two sections, one for demographic data and second for knowledge assessment according to osteoporosis knowledge assessment tool (OKAT) (Winzenberg, Oldenburg, Frendin, & Jones, 2003).

The average age of the volunteers was 22.45±1.279 and the overall knowledge score was moderate i.e, 11.86±3.3 with percentage of 68.8%.

Among pharmacy students majority of the participants i,e, 76.3 % (n=71) had moderate knowledge while only 15.1 % (n=14) had good knowledge about osteoporosis. In case of home-economics group 53.3% (n=24) had moderate while 44.4% (n=20) had poor knowledge regarding osteoporosis. Thus, the ratio of osteoporosis knowledge is less among home-economics students as compared to the pharmacy students.

Different studies have been conducted among female students regarding awareness and knowledge about osteoporosis and related factors. A similar study was conducted among college women, in their study 90% of the respondents were aware of osteoporosis and 43% obtained information regarding disease from health care provider. They concluded that the educational institutions and health care providers have not played significant role in providing osteoporosis related awareness (Kasper, Peterson, Allegrante, Galsworthy, & Gutin, 1994). This is the reason why pharmacy students, being a part of health care professional team, should be well aware of osteoporosis.

In this study the major source of information was internet among both groups with percentage 46.7% in home-economics group and 54.8% in pharmacy group. Although in modern era internet is playing a main role in spreading information but there is a need of addition of detailed osteoporosis knowledge and dietary requirements to prevent osteoporosis in curriculum. Similarly, in a study conducted in Malaysia Public University among students of pharmacy, medical and other allied health programs, they concluded that pharmacy students need more focused learning during their academics regarding nutrition and exercise in order to play a role in preventing osteoporosis (Elnaem et al., 2017).

In another study the role of pharmacist in spreading knowledge about osteoporosis was evaluated. They concluded that a community pharmacist can play role in improving awareness regarding osteoporosis and in screening it among females (Law & Shapiro, 2005). Present study was also conducted among pharmacy students to evaluate their knowledge regarding osteoporosis. Although 76.3% of pharmacy students have moderate knowledge about osteoporosis but being a part of health care team they must have good knowledge about osteoporosis, only then they can play role in improving its awareness among general public. On the

other hand in home-economics group although 53.3% have moderate knowledge but 44.4% have poor knowledge about osteoporosis. Therefore, there is a need of improving their knowledge regarding osteoporosis because being nutritionist they can play their role in dietary prevention of the osteoporosis.

A study was conducted in Pakistan regarding awareness of osteoporosis among women of age 15-55. They concluded the 65% response rate. They revealed that although respondents were aware of osteoporosis, but they were not adopting adequate measures to prevent osteoporosis. They suggested that there is a need of well-structured health care programmes for spreading knowledge and awareness about osteoporosis (Shakeel, Naveed, Iffat, & Nazeer, 2015).

Conclusion and Recommendations

This study concluded that the overall knowledge of osteoporosis among participants was moderate (68.8%). There was a high ratio of osteoporosis knowledge among pharmacy students than home-economics students. Although most of the participants were familiar with the term osteoporosis but the knowledge about risk factors and complications of osteoporosis was less among both pharmacy, and home-economics students. The internet was a main source of information.

Being the part of health care professional team pharmacists must have adequate knowledge regarding the risk factors, preventive measures and complications of the osteoporosis. On the other hand, being a part of food & nutrition, home-economics group should also have sound knowledge about osteoporosis. Only then, they can play a role in osteoporosis knowledge awareness.

There is a need of well-structured educational programmes regarding osteoporosis, its complications, factors those increase its risk and all preventive actions to be taken, in different institutes of Mirpur Azad Kashmir. Moreover, a detailed knowledge regarding osteoporosis, and all actions to be taken to prevent this disease must also be included in their curriculum.

References

Durmuş, D., Akyol, Y., Ulus, Y., Tander, B., Alaylı, G., & Cantürk, F. (2009). Awareness and Sources of Information About Osteoporosis Among Medical Students. *From the World of Osteoporosis/Turkiye Osteoporoz Dunyasindan, 15*(2).

El-Tawab, S. S., Saba, E. K. A., Elweshahi, H. M. T., & Ashry, M. H. (2016). Knowledge of osteoporosis among women in Alexandria (Egypt): A community based survey. *The Egyptian Rheumatologist, 38*(3), 225-231.

Elnaem, M. H., Jamshed, S. Q., Elkalmi, R. M., Baharuddin, M. F., Johari, M. A., Ab Aziz, N. A. B., . . . Ismail, N. A. B. (2017). Osteoporosis Knowledge among future healthcare practitioners: Findings from a Malaysian public university. *Journal of pharmacy & bioallied sciences, 9*(2), 115.

Haq, N., Tahir, M., Iqbal, Q., & Naseem, Q. (2015). Exploration of Osteoporosis Knowledge and Perception among Young Women in Quetta. *Pakistan. J Osteopor Phys Act, 3*(3), 1-6.

Hough, S., Ascott-Evans, B. H., Brown, S. L., Cassim, B., De Villiers, T. J., Lipschitz, S., . . . Sonnendecker, E. W. (2010). NOFSA guideline for the diagnosis and management of osteoporosis: Guideline abstract. *Journal of Endocrinology, Metabolism and Diabetes in South Africa, 15*(3), 107-108.

Kasper, M. J., Peterson, M. G., Allegrante, J. P., Galsworthy, T. D., & Gutin, B. (1994). Knowledge, beliefs, and behaviors among college women concerning the prevention of osteoporosis. *Archives of family medicine, 3*(8), 696.

Law, A. V., & Shapiro, K. (2005). Impact of a community pharmacist-directed clinic in improving screening and awareness of osteoporosis. *Journal of Evaluation in Clinical Practice, 11*(3), 247-255.

Masood, Z., Shahzad, S., Saqib, A., & Ashraf, K. (2014). Osteopenia And Osteoporosis. *The Professional Medical Journal, 21*(03), 477-483.

Pande, K. C., de Takats, D., Kanis, J. A., Edwards, V., Slade, P., & McCloskey, E. V. (2000). Development of a questionnaire (OPQ) to assess patient's knowledge about osteoporosis. *Maturitas, 37*(2), 75-81.

Riaz, S., Alam, M., & Umer, M. (2006). Frequency of osteomalacia in elderly patients with hip fractures. *J Pak Med Assoc, 56*(6), 273-276.

Shakeel, S., Naveed, S., Iffat, W., & Nazeer, F. (2015). Yousuf v (2015) Pakistani Women Knowledge, Beliefs and Attitudes towards Osteoporosis. *J Bioequiv Availab, 7*, 270-273.

Tanveer, F., Khalid, Z., & Sulaiman, M. (2018). Knowledge, Attitude and Practice of Osteoporosis Prevention among Female Medical Students. *prevention, 52*(5), 17.13.

Winzenberg, T. M., Oldenburg, B., Frendin, S., & Jones, G. (2003). The design of a valid and reliable questionnaire to measure osteoporosis knowledge in women: the Osteoporosis Knowledge Assessment Tool (OKAT). *BMC musculoskeletal disorders, 4*(1), 17.

Zakai, G., & Zakai, H. (2015). Awareness about osteoporosis among university students in Jeddah, Saudi Arabia. *J Adv Lab Res Biol, 35*, 392-397.