Lifestyle Behaviors of Patients with Osteoporosis about Fractures Prevention

Assist. Instructor Shaymaa Mohammed Hussein (MSC)

University of Baghdad- College of

Nursing- Adult Nursing Department

shaymaa@conursing.uobaghda.edu.iq

Assist. Professor Tahsen Rajab Mohammed (PhD)

University of Baghdad- College of

Nursing- Adult Nursing Department

dr.tahseen@conursing.uobaghdad.edu.iq

Lifestyle Behaviors of Patients with Osteoporosis about Fractures Prevention

Lifestyle Behaviors of Patients with Osteoporosis about Fractures Prevention

Assist. Instructor Shaymaa Mohammed Hussein (MSC)

Assist. Professor Tahsen Rajab Mohammed (PhD)

ABSTRACT:

The study aims to determine the demographic data and the lifestyle behaviors of patients with OP. A descriptive study design was implemented on (60) non probability purposive sample with OP. The findings revealed the mean age was (54.2) years old with standard deviation (11.7) years, the females accounted (83.3%), the obese sample represented (48.3%), and the primary educational attainment formed (40%). Living style reflected that (93.4%) were used carpet, (85%) weren't using cane during walking, and (96.7%) were used slipless shoes. Also, using of general transportation methods represent (81.7%), all of the sample were used lightening at homes, and (83.3%) complaining from dizziness. As well, (55%) evaluate themselves with low physical activity level, (75%) walking regularly, (55%) didn't have recreational activities, (40%) have performed activities three times a week, and (61.7%) percent have (1 – 2) hours duration of activities. The study recommended to disseminate the awareness about OP, perform a continuous workshops to enhance the knowledge, behaviors, and practices, improving early detection and management of OP, and implementing further interventional studies.

Keywords: lifestyle Behavior, Patients with Osteoporosis, Fractures Prevention.

سلوكيات نمط الحياة لمرضى هشاشة العظام حول الوقاية من الكسور

الملخص

تهدف الدراسة إلى تحديد البيانات الديموغرافية وسلوكيات نمط الحياة للمرضى المصابين بهشاشة العظام. تم تنفيذ دراسة وصفية لـ (٦٠) عينة غرضية لا احتمالية ممن يعانون من الهشاشة. وأظهرت النتائج أن متوسط العمر كان (٥٤,٢) سنة وبانحراف معياري (١١,٧) سنة، وكانت نسبة الإناث (٨٣,٣٪)، والذين يعانون من السمنة (٤٨,٣٪)، وكان التحصيل التعليمي الأساسي (٤٠٪). عكست نتائج الدراسة فيما يخص

**Lifestyle Behaviors of Patients with Osteoporosis about
Fractures Prevention**

أسلوب المعيشة أن (٩٣,٤٪) استخدموا السجاد، (٨٥٪) لم يستخدموا العكاز أثناء المشي، (٩٦,٧٪) استخدموا أحذية غير زلقة.   كما تبين أن استخدام وسائل النقل العام يمثل (٨١,٧٪)، واستخدمت جميع عينة الدراسة الاضاءة في المنازل، و(٨٣,٣٪) يشكون من الدوار. اضافة الى ان نسبة (٥٥٪) قد قيموا أنفسهم بمستوى نشاط بدني منخفض، (٧٥٪) يمارسون المشي بانتظام، (٥٥٪) لم يمارسوا أنشطة ترفيهية، (٤٠٪) يقومون بممارسة ألانشطة ثلاث مرات في الأسبوع، و(٦١,٧٪) يقضون (١-٢) ساعة لممارسة الأنشطة. وأوصت الدراسة بنشر الوعي حول هشاشة العظام، وإجراء ورش عمل مستمرة لتعزيز المعرفة والسلوكيات والممارسات، وتحسين الكشف المبكر ومعالجة هشاشة العظام ، وتنفيذ المزيد من الدراسات التداخلية.

Introduction

Osteoporosis (OP) considered one of the main and public health problem in male and females with high prevalence internationally. It affects approximately seventy five million around the world. Ten million older than 50 years affected by osteoporosis in the United States (US), 80% of them were women (Amin et al. 2017; Bilal 2017; Danish et al. 2014).

Osteoporosis is a silent skeletal system disorder (silent thief) that progressively developed and leads to fracture due to diminished bone density. Women who aged eighty years will be affected by osteoporosis at forearm, spine, or hip that can be estimated about 70% Weppner and Lo (2018). There are two types of OP; Type 1 OP (post menopause, leading to vertebral fractures), and Type 2 OP (associated with advanced age, lead to risk of hip fracture) (Naser and Khuder, 2023).

The Osteoporosis-related fractures (ORF) is a result of imbalance between the action of osteoblasts and osteoclast that leads to decreased bone mass density, OP called a whist disease because the patient didn't have any pain or symptoms usually until the fracture happen. A major burden of OP is the ORF in terms of morbidity and mortality (Chapurlat 2017; Shari 2016).

The estimation rate for people with OP was (200) million worldwide, including (1.4) million vertebral fracture, (1.6) million hip fractures, and (1.7) million forearm fractures. Besides, around

(51%) accounted for America and Europe while the other presents were from the southern Asia and western Pacific region Naser (2017: p3).

Kanis et al. (2018) reported that the WHO defined OP according to the T-score of the bone mineral density (BMD) and if the individual have prior fragile fracture. Al-Hafidh et al. (2019) reported the OP related risk factors that include: sex (female), age, ethnicity background, early menopause and late menarche, family history of OP, smoking, alcohol intake, vitamin D deficiency, low calcium and high caffeine intake, prolonged immobilization, being underweight, the diseases of endocrine, rheumatic, gastrointestinal and chronic obstruction of pulmonary, anorexia nervosa, and depressed mood. Khaleel and Atiyah (2022) recommended a changeable risk factors related to OP and provided knowledge about in health care centers.

After fifty years of age, both male and female are influenced by OP, and the prevalence of the disease is increasing as the age advanced in women that lead to increases the likelihood of bone fragility. The women with OP are have had fair to good levels of health follow-up and fair of weight control. So, the health follow-up and weight control were need to be more complied (Mohammed and Abdulwahed, 2021).

Osteoporosis's consequences can lead to fractures, disability, and poor life quality. The ORF are determined by the site of fracture and revealed that the types of fracture that are not usually related to OP. Vertebral compression and other fragility fractures are resulting from a reduced bone strength, which frequently happen due to low-energy trauma, for example fall from standing height. In low bone mineral density (BMD) females, the fragility fractures at vertebra, forearm, or humerus lead to a considerable disability (Sahib 2018; Lorentzon and Cummings, 2015; Fink et al. 2003).

In the primary care centers, OP continues to be under diagnosed due to many causes like poor availability of Dual Energy X-ray Absorptiometry scan (DEXA). The prediction of 10-year risk

for developing of a major ORF like hip by using fracture risk assessment tool (FRAX) which is an online web-based tool, easily available, inexpensive, does not need much more technical expertise, and used by the health care worker and physician to identify the risk of ORF (Cherian et al. 2019).

The disease's burden can be decreased through primary prevention and early detection. Enhancing the awareness, attitude, and practices of people with OP can contribute significantly to prevent and/or detect the disease early (Amin et al. 2017; International Osteoporosis Foundation [IOF], 2016). The impact of health belief, preventive behaviors, and biochemical levels should be assessed about OP (Abdul-Hameed and Mohammed 2012).

Many studies focus on enhancing this silent disease risks knowledge, preventive behaviors, and the importance of early diagnosis that result in a good preventive programs and prevalence declining (Alrashidy 2021). Al-Mayahi et al. (2023) reported that the healthy lifestyle behaviors encouragement should be suggested to prevent chronic diseases.

Increasing awareness of patients is important and it can be spread through brochures, illustrative posters, audio-visual means, and performing a health programs, to keep a healthy life as possible as (Hussein and Atiyah 2016). The patient education is effective and necessary to change behavior, but it is not sufficient. Many studies reported the lifestyle behaviors adaptation to prevent ORF, these behaviors include: physical activity engagement, calcium and vit. D supplements intake, alcohol consumption reduction, and maintaining a normal body weight (Beaudart et al. 2022).

Ahmed et al. (2023) stated that an education program about OP prevention revealed a significant impact to enhance health behaviors especially in postmenopausal females. The promotion and education the patients on keeping healthy lifestyle behaviors are the responsibility of nurses and other health care professionals, by providing opportunities for visiting the hospital and office, community-based activities, and health fairs (Imbeah 2020).

Lifestyle Behaviors of Patients with Osteoporosis about Fractures Prevention

1. Methods

1.1. Research Design

A descriptive study design was applied to achieve the study aims.

1.2. Administered Arrangement

In order to conduct the study, the researcher first got the consent of the council of Nursing College. An official permission has been obtained from the Ministry of Planning/ Central Statistical Organization, to ensure the accuracy and applicability of the study questionnaire.

1.3. Ethical Considerations

The scientific research ethical committee, in College of Nursing, University of Baghdad has been agreed prior to conduct the study. The consent form was presented for the participants prior to data collection to get their agreement and signature for continuing the study.

1.4. Study Setting

The study has been carried out at DEXA department in Baghdad teaching hospital, to obtain a valid and comprehensive data from the patients. This departments received patients who were referred to confirm if they had normal bone, osteopenia, or OP according to the T-score results.

1.5. Sample and Sampling

A 60 non-probability purposive sample has been selected to obtain representative and accurate data.

1.6. Instrumentation Construction

The questionnaire had been constructed by reviewing the clinical background, the previous and related literature, and the experts' suggestions to achieve the study objectives. It consists of patients' demographic characteristics, and living style behaviors. The first part include (8) items: age, sex, BMI, educational attainment, marital status, occupation, monthly income, and

residential area. The second part contains the living style and physical activity (11) items.

1.7. The Study Validity

The content validity of the instrument was investigated by a panel of (14) experts to review the instrument. The experts had at least (11) years of experience with mean of (M = 21.42) years. They were investigate clarify, relevancy, and the adequacy of the instruments.

1.8. Pilot Study

The reliability of the instrument was determined through a purposive sample of (10) patients with OP, those ten patients had the same criteria as the sample of the original study. The result showed that the questionnaire items were clear, and the required time for each patient's was from (15-20) minute.

1.9. Reliability of the Questionnaire

The reliability was determined through the computation of Cronbach's Alpha. The reliability is done for consistency and dependability of the study tool, the internal consistency of the questionnaire was determined through a period of four weeks.

1.10. Methods of Data Collection

Before the study starting, the consent form from each patient was taken to accept the participation. The data collection was held up by self-report approach and using a structured questionnaire, each participants took about (15-25) minutes.

1.11. Statistical Analysis

The statistical data analysis were done by the utilization of Statistical Package of the Social Science (SPSS) version (23). The descriptive data analysis were used through Frequencies (F), Percentage (%), Mean (M), and Standard Deviation (SD).

2. Results

Table -1- Demographical Data Distribution of the Study Sample (N= 60)

Variables	Characteristics	F.	%
1. Age Group (year)	25 - 31	4	6.67
	32 - 38	3	5
	39 - 45	6	10
	46 – 52	6	10
	53 – 59	22	36.67
	60 – 66	11	18.33
	67 – 73	7	11.67
	≥ 74	1	1.66
	Mean ± SD 54.2 ± 11.7		
2. Sex	Male	10	16.7
	Female	50	83.3
3. Body Mass Index (BMI)	Under weight	1	1.7
	Normal weight	12	20
	Overweight	18	30
	Obese	29	48.3
4. Educational Level	Read and write	16	26.6
	Primary school graduate	24	40
	Intermediate school graduate	9	15
	Preparatory school graduate	4	6.7
	Bachelor's degree	5	8.3
	Higher degree	1	1.7
	Diploma degree	1	1.7
5. Marital Status	Single	4	6.66
	Married	52	86.67
	Separate	3	5
	Widowed	1	1.67
	5-8	21	35
	9 and more	6	10
6. Job	Employee	6	10
	Housewife	46	76.66
	Free work	3	5
	Retired	4	6.67
	Not work	1	1.67
7. Monthly Income	Sufficient	15	25
	Not sufficient	20	33.3

	Barely sufficient	25	41.7
8. Residence	**Urban**	58	96.7
	Rural	2	3.3

(F) Frequency, (%) Percentage

The results of table (1) show that the dominant age group was (53-59) years and the mean age of the study sample was (54.2) years old with standard deviation (11.7) years old. In addition, results revealed that the highest percent of the study sample were female who accounted for (83.3).

The highest percent of the study sample (48.3) were obese, and (40) percent of the sample were primary school graduated. Moreover, (86.67) of the sample were married, and (76.66) of the sample were housewives.

Results about monthly income presented that (41.7) percent of the sample were barely sufficient income. The last demographic variable revealed that most of the study sample were lived in urban area (96.7) percent of the sample.

Table -2- The Living Style Distribution of Study Sample (N= 60)

Variables	Characteristics	F.	%
1. Carpet Using	**Yes**	56	93.4
	No	4	6.6
2. Cane Using	**Yes**	9	15
	No	51	85
3. Using Slipless Shoes	**Yes**	58	96.7
	No	2	3.3
4. Transport Type	**General Transportation Cars**	49	81.7
	Personal Car	11	18.3
5. Lightening at Home	**Yes**	60	100
	No	0	0
6. Feeling of Dizziness	**Yes**	50	83.3
	No	10	16.7
7. Self-evaluation of Physical Activity	**High**	9	15
	Moderate	18	30

	Low	33	55
8. Walking	Yes	45	75
	No	15	25
9. Recreation	Yes	27	45
	No	33	55
10. Activity Performance	Everyday	12	20
	3 times a week	24	40
	More than three times a week	6	10
	A long-time interval	18	30
11. Duration of Activity	Less than 1 hour	17	28.3
	1 – 2 hours	37	61.7
	More than 2 hours	6	10

(F) Frequency, (%) Percentage

Table (2) reflected that (93.4) percent of the sample were used carpet to prevent intense injury during fall accident. In addition, (85) percent weren't using cane during walking, in which (96.7) percent were used slipless shoes to prevent fall.

Using of general transportation methods represent (81.7) percent, all of the sample were used lightening at homes, and (83.3) percent of them complaining from dizziness.

Also this table presents that (55) percent of the study sample evaluate themselves with low physical activity level. In addition, (75) percent of the sample were using regular walking, and (55) percent didn't have recreational activities.

Forty percent of the study sample have performed activities three times a week, and (61.7) percent have (1 – 2) hours duration of activities.

3. Discussion of the Results

3.1. Discussion of the Demographical Data Distribution of the Study Sample (N=60) (Table-1):

It's appeared that the age groups were from (53– 59) years formed the highest percent (36.67) with a mean of (54.2) years, this means that the most age groups affected by OP usually from

adulthood. The study of Naser and Atiyah (2017) was similar to this study result that reported the dominant age group was (50-59) represented (40%). While the result of Abdelrahman et al. (2024) showed that a percent (39.7) of the sample aged from (40-50) years with mean age of (51.09).

The present study revealed that the females were represented the major percent (83.3) of the sample that means and according to the mean age mentioned previously, the female were affected by primary OP due to menopause. To support the finding of this study, Wang et al. (2016) stated that the women more than men as a highest percent [females: males, 297 (68.2%):139 (31.8) %)].

The study results show that the sample have an obesity with a highest percent (48.3), that indicates the patients with a high body mass index (BMI)may have a role in getting OP. The study findings of Chan et al. (2022) is disagree with this study outcomes, who recorded that both men and women were underweight (low BMI) as percepts of (46.3; 45.2) respectively. The study results of Mohammed and Abdulwahed (2021) reported that their participants diagnosed with OP and they have had fair level of weight control as a percent of (74.29). In addition to, the results of Naser (2023: p28) noted that the low body weight is considered one of an independent risk factor for OP.

The highest percent (40) of the study sample were graduated from primary school, this means that the patients need to join in the education program in order to increase their knowledge about OP. To support this outcomes, Park et al. (2017) reported that the patients had a major percent (81.5) of elementary educational level.

The married patients formed a major percent of (86.67), which reveals that the married patients have OP more than not married one. This result corresponded with the study of Abdelrahman et al. (2024) who reported that the highest percent (65.1) of the patients were married.

In relation to the patients work, the results shows that the more than three quarters (76.66) percent of the patients were housewives, which correlate with the results that revealed the majority of the

sample were females. This indicates that the females patient get OP more than males. The study of Park et al. (2017) found out an opposite results that revealed the farmer job represented a highest percent (79.9) of the sample.

Regarding the monthly income, it seems that barely sufficient income formed a (41.7) percent of the study sample, it may revealed that low income status has an effect on health condition and not taking the sufficient nutrients for a healthy bone, and make the patients liable to OP. This result in disagreement with Elesawy et al. (2021) who stated that somewhat more than half percent (55.1) of the participants had sufficient monthly income.

The study results demonstrate that the major percent (96.7) living in urban regions. It suggested that the OP is more public in urban rather than rural area, which may be due to the unhealthy life style followed by the patients. The study of Ameen, and Ali (2016) whom results revealed that the study sample were lived in urban area as a percent of (52.2). While the study of Abdelrahman et al. (2024) was in contrast with this study results, who stated that the participants were from rural areas rather than urban area as a half percent of (50.8).

3.2. Discussion of the Living Style and Physical Activity Distribution of Study Sample (N= 60):

Table (2) represented the arrangements of the house that were done by the patients with OP to prevent falling on the floor and fracture, as the following results:

In relation to the using of carpet, the major percent (93.4) of the patients were used of the carpet nearby the wet places like toilet and bathroom, this give a role in preventing falls and further fractures.

Regarding the using of cane, the major percent (85) of the participants in this study didn't use cane during walking, which revealed that their ages from middle adulthood and not need for walking devices.

Concerning using of slipless shoes, the percent of (96.7) represent that the study sample used a slipless and suitable shoes that reduce the chance of falling.

In regard to the transportation type, using of general transportation cars rather than the personal cars represented the major percent (81.7) of the patients that make the transportation difficult and predisposing them to accidents, this might be due to they have had a barely sufficient income.

In relation to the feeling of dizziness, which is a manifestation that lead to fall and may cause fracture for patients with OP. This study results showed that the major percent (83.3) of the participants not feeling with dizziness that give a rise of not fearing for the patient to have fracture. For supporting these outcomes, Pinheiro et al. (2003) revealed in their study results that the percent (59.6, 14.7, 36.8, 78.9, and 56.6) represented the sample's responses regarding the living style at home which include; used scattered rug, cane, wore leather shoes, public transportation, and complained of dizziness, respectively.

Provision of home lightening, the sample responses were reported the full percent (100) of them have no problems with lightening in their home that revealed they had a reduced risk for falls especially at night. In relation to these outcomes, the study results of Aydin et al. (2021) stated that the percent (63.3) of the participants weren't make any preparations to prevent falls in the home for patients with OP.

Table (2) also showed the results related to the self-evaluation of physical activity, which revealed that more than half percent (55) have low level of self- evaluation during the day due to disease effect. As well, the most percent (75) of the patients weren't able to walk due to the disease, and more than half percent (55) were represented the patients who didn't able to recreate as before as the OP occur. These results may be due to the participants were tired from work, lack of self-control, and the commitment of their families. The study of Ayoub and Sayed (2018) revealed that (44) percent of the study subjects were perform exercises.

Also, the patients' responses were supported by Mikkilä et al. (2019) who concluded that the level of physical activity was represent a highest percent of moderate level for both males and females.

The highest percent (40) of the participants were performed the activities three times weekly (such as walking, recreation and other ADLs) with complaining from pain at back and joints. In regard to the duration of activity performance, the patients spent a time from (1-2) hours during perform these actions as a highest percent as (61.7). The study of Mikkilä et al. (2019) reported that the highest percent patients spent a (30- 60) minutes of physical activity duration. As well, the study of Abdul-Hameed and Mohammed (2012) showed that the participants had been walked daily at least half an hour always as a percent of (31), and perform exercise some times as a percent of (34). The study of Abdown and Hussein (2022) stated that the adaption efforts should be made to reach the highest compatibility level with physical health.

Based on the results, it's obvious that the disease make an alteration in daily life activities for patients with OP, the researchers give emphasis to the importance of the education program for the patients' knowledge.

4. Conclusions

In relation tom the study results, it's concluded that the mean age was (54.2) years and the majority were females that indicates the patients may have primary OP. The obese patients represented the highest percent, which may lead to increase the risk of OP incidence.

The primary educational attainment formed the highest percent that revealed the need to educate the patients about modifying the living style to prevent fractures. There're an alterations in performing the daily living activities due to complaining of OP related symptoms such as back and joints pain. Also, the living style for the patients need to be modified in relation to the use of general transportation cars and feeling of dizziness to prevent falls and further fractures.

٥. Recommendations

It's recommended to disseminate the awareness about OP and its consequences. Perform a continuous workshops for elderly people to enhance the knowledge, behaviors, and practices concerning the prevention of osteoporosis related fracture.

Improving early detection and management of OP are necessary, and implementing further interventional studies to modify the lifestyle that improve the quality of life and reduce the risk of fracture in high risk people.

6. References

Abdelrahman BM, Abdel-Mordy MA and Saad AM. (2024). **Educational Program Based on Theory of Planned Behavior for Female Teachers regarding Osteoporosis Prevention**. Journal of Nursing Science- Benha University, Vol. (5) No. (1).

Abdown, S. N., & Hussein, H. A. (2022). **Lifestyle behavior and mental health among nursing collegians at Baghdad University**. International Journal of Health Sciences, 6(S2), 15209–15216. https://doi.org/10.53730/ijhs.v6nS2.8853.

Abdul-Hameed, H. & Mohammed, F. (2012). **Effectiveness of Osteoporosis Prevention Instruction Program on Nursing College Students' Knowledge at Baghdad University**. Iraqi National Journal of Nursing Specialties, Vol.25, Special Issue.

Ahmed, M.S., Mohammed, Z.J., Kareem, R.F. (2023). **Efficacy of Health Belief Model-Based Intervention for Enhancing Nursing Staff Beliefs Regarding Osteoporosis Prevention at Primary Health Care Centers**. Pakistan Heart Journal, Vol. 56 No. 2. Available at: https://www.pkheartjournal.com/index.php/journal/article/view/1381

Al-Hafidh, A,H, Gorial, FI, Al-Ani GT. (2019). **Prevalence of Osteoporosis and Osteopenia in Iraqi Premenopausal and Postmenopausal Subjects among a Sample of Patients Attending Baghdad Teaching Hospital**. Journal of Global Pharma Technology; 10 (11), (Suppl.): |27-32. ISSN: 0975-8542. Available at: https://www.researchgate.net/publication/334317213.

Lifestyle Behaviors of Patients with Osteoporosis about Fractures Prevention

Al-Mayahi, AM, Al-Jubouri, MB, Jaafar, SA. (2023). **Healthy lifestyle behaviors and risk of cardiovascular diseases among nursing faculty during COVID-19 Pandemic**. Rev Bras Enferm; 76 (Suppl 1): e20220372. https://doi.org/10.1590/0034-7167-2022-0372.

Alrashidy, RI. (2021). **Evaluation of knowledge about osteoporosis risk factors among adults above 40 years of age in Hafar Al-Batin Region, SaudiArabia**. Journal of Family Medicine and Primary Care, 10:8, 3089-93.

Ameen, W., & Ali, R. (2016). **Dietary Behaviors among Women with Osteoprosis at Merjan Teaching Hospital in Hilla City**. Iraqi National Journal of Nursing Specialties, Vol.29 (2):9.

Amin, S, Mukti, NA. (2017). **Assessment of Knowledge Level on Osteoporosis among a Private University Students in Malaysia**. Imperial Journal of Interdisciplinary Research; 3(3):141-5.

Aydin, S., Kurcer, M., Erddogan, Z. (2021). **Development of the Protection against Osteoporotic Fractures scale**. Turk J Osteoporos; 27: 1-7. DOI: 10.4274/tod.galenos.2020.42103.

Ayoub, N., & Sayed, H. (2018). **Assessment of Awareness Regarding Osteoporosis among Elderly at Makkah Al-Mukarama**. J Nurs Health Sci., 7(3), 54-62.

Beaudart, C, Boonen, A, Li, N, Bours, S, Goemaere, S, Reginster, J, et al. (2022). **Patient preferences for lifestyle behaviors in osteoporotic fracture prevention: a cross-European discrete choice experiment**. Osteoporosis International, 33:1335–1346 https://doi.org/10.1007/s00198-022-06310-4).

Bilal, M, Haseeb, A, Merchant, AZ, et al. (2017). **Knowledge, beliefs and practices regarding osteoporosis among female medical school entrants in Pakistan**. Asia Pacific family medicine; 16(1):2-7.

Chan, C.Y., Subramaniam, S., Chin, K.-Y., Ima-Nirwana, S., Muhammad,N., Fairus, A., Ng, P.Y., Aini, J.N., Aziz, N.A., Mohamed, N. (2022). **Effect of a Screening and Education Programme on Knowledge, Beliefs, and Practices Regarding Osteoporosis among Malaysians**. Int. J. Environ. Res. Public Health, 19, 6072. https://doi.org/10.3390/ ijerph19106072.

Chapurlat, R. (2017). **Osteoporosis- Clinical Key. In: Endocrinology: Adult and Pediatric**. Available at: https://www.clinicalkey.com/-!/content/book/3-s2.0

Cherian, K, Kapoor, N, Paul, T. (2019). **Utility of FRAX (fracture risk assessment tool) in primary care and family practice setting in India**. Journal of Family Medicine and Primary Care. 8 (6). DOI: 10.4103/jfmpc.jfmpc_385_19.

Danish, SH, Ahmad, F, Hassan, F, et al. (2014). **Osteoporosis and its associated factors revisited: control study**. Pakistan Journal of Medicine and Dentistry; 3(2):13-20.

Elesawy, FM, Elsaud, SF, Ahmed, ShH. (2021). **Effect of Educational Program regarding Prevention of Osteoporosis among Employees Women at South Valley University**. Egyptian Journal of Health Care, 2021 EJH Vol. 12 No. 3

Fink, HA, Ensrud, KE, Nelson, DB et al. (2003). **Disability after clinical fracture in postmenopausal women with low bone density: the fracture intervention trial (FIT)**. Osteoporos Int; 14: 69–76.

Hussein, SM. & Atiyah, HH. (2016). **Effectiveness of an Instructional Program on Knowledge for Patients with Lumbar Disk Prolapse at Baghdad Teaching Hospitals**. IOSR Journal of Nursing and Health Science (IOSR-JNHS), Volume 5, Issue 4 Ver. IV: 37-45. DOI: 10.9790/1959-0504043745.

Imbeah, C. (2020). **Effect of a Lifestyle Modification Education Program among an Inner-City Church Adults' Overall Health**. Department of Nursing, Bradley University. Dissertation. P.: 4.

International Osteoporosis Foundation (IOF). (2016). Retrieved from: https://www.iofbonehealth.org/facts-statistcs

Kanis, J., Cooper, C., Rizzoli, R., & Reginster, J. (2018). **Review of the Guildeline of the American College of Physicians on the Treatment of Osteoprosis**. Osteoprosis International, 29 (7), 1505-1510. doi: 10.1007/s00198-018-4505-y.

Khaleel, EE, Atiyah HH (2022). **Effectiveness of an Instructional Program on Knowledge of Diabetic Patients about**

Osteoporosis at Teaching Hospitals in Duhok City. Teikyo Medical Journal, Volume 45, Issue 02.

Lorentzon, M. & Cummings, S. (2015). **Osteoporosis: the evolution of a diagnosis (Key Symposium)**. J Intern Med, 277: 650–661.

Mikkilä, S, Calogiuri G, Emaus N and Morseth B. (2019). **A cross-sectional and 6-year follow-up study of associations between leisure time physical activity and vertebral fracture in adults**. BMC Musculoskeletal Disorders, 20:435. Retrieved from: https://doi.org/10.1186/s12891-019-2821-8

Mohammed, M Y., Abdulwahed, H S. (2021). **Assessment of Health Follow up and Weight Control for Women with Osteoprosis in Baghdad City**. Iraqi National Journal of Nursing Specialities, Vol. 34(2), p.90.

Naser, AA and Atiyah, HH. (2017). **Effectiveness of Instructional Program upon Osteoporotic Patients Knowledge Concerning Prevention of Fractures in Al-Musaib General Hospital**. International Journal of Science and Research (IJSR), ISSN (Online): 2319-7064,

Naser, A. (2017). **Effectiveness of Instructional Program upon Osteoporotic Patients Knowledge Concerning Prevention of Fractures in Al-Musaib General Hospital**, **MSC Thesis**, College of Nursing, University of Baghdad. Pp:٣ ,7-9.

Naser, A. (2023). **Effectiveness of Instructional Program on Osteoporosis Geriatric Performance about Prevention of Fall, PhD Dissertation**, College of Nursing, University of Baghdad. Pp: 28.

Naser, AR, Kheder, Kh M, and Khshain, WH. (2023). **Effectiveness of Instructional Program in Improving Balance Level among Seniors with Osteoporosis**. Central Asian Journal of Medical and Natural Sciences, Volume:04 Issue:06. ISSN: 2660-4159. Avilable at: *http://cajmns.centralasianstudies.org*

Park, K, Yoo J, Kim, H, Jang, S, Park, Y and Ha, Y. (2017). **Education and exercise program improves osteoporosis knowledge and changes calcium and vitamin D dietary intake in community**

dwelling elderly. BMC Public Health (2017) 17:966. DOI
10.1186/s12889-017-4966-4

Pinheiro, M M, Castro, Ch H, Junior, AF, and Szejnfeld, VL.
(2003). **Lifestyle Changes after Osteoprosic Fracture in Elderly
Women**. Rev Bras Reumatol, v.43, n. 5, p. 279-86.

Sahib, MN. (2018). **Validation and Assessment of Osteoporosis
Self-Efficacy among Iraqi General Population**. The Open Nursing
Journal, 2018, 12, 76-85. DOI: 10.2174/1874434601812010076

Shari, F. (2016). **Effect of Atrovastatin on Bone Biochemical
Markers in Dyslipidemic Patients, Basra, Iraq**. Iraqi National Journal
of Nursing Specialties, Vol. 29 (1).

Wang, L, Xu, X, Zhang, Y, Hao, H, Chen, L, Su, T, et al. (2016).
**A model of health education and management for osteoporosis
prevention.** Exper Med; 12(6):3797.

Weppner, D. & Lo, P. (2018). **Osteoporosis- Clinical Key. In:
Ferri's Clinical Advisor**. Available from:
https://www.clinicalkey.com/-!/content/book/3-s2.0.