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Review Article

Nurses Knowledge about Management of Osteoarthritis Patients by Education and Lifestyle modification at Azadi Teaching Hospital (Comparative study)

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Abstract

Background: Osteoarthritis is the most prevalent joint disease and a leading contributor to disability. It significantly limits patients' capacity to carry out everyday duties. Nurses play a crucial role in helping people with osteoarthritis in hospitals and health facilities. In addition to teaching patients pain management techniques and educating them about the disease

Objectives: The aim of the study is to compare Nurses knowledge toward Management of Osteoarthritis Patients by Lifestyle modification before and after education program

Methodology: The present study used a quasi-experimental(one group pretest –posttest) study design during the period between 1 of November,2025 and 10 of March 2026.A non-probability(purposive) sampling of (30)Nurses who working in Orthopedic, medical, surgical unit and consultation clinics of Rheumatology and Rehabilitation units)in the Azadi Teaching Hospital. The study instrument is composed of six main parts.

Results: The current study show that the overall assessment of nurses' knowledge about management of osteoarthritis in the pretest show that nurses demonstrating poor to moderate level of overall knowledge with mean score 17.90 and they need a specific educational program about management of osteoarthritis patients. Also, the study concludes that the nurses' overall knowledge increased to good among 70% with mean score 36.07 During the posttest and after engagement in educational program that indicates

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an effective role of educational program in enhancing nurses' overall knowledge about management of osteoarthritis.

Conclusion: The study concluded that the educational program significantly improved nurses' knowledge based on posttest with mean ranks reported higher in the posttest comparing to pretest.

Recommendation: Conducting an educational program related to osteoarthritis patients to improve nurses' knowledge who working at orthopedic unit and consultation clinics of Rheumatology and Rehabilitation units.

Keywords: Effectiveness, Educational Program, Nurses Knowledge toward Lifestyle modification, of Osteoarthritis

Introduction

The most prevalent and often impairing joint condition is Osteoarthritis, a chronic degenerative disease marked by hypertrophic bone changes and progressive cartilage damage in one or more joints that eventually results in fibrillation, fissures, and severe ulceration before the entire thickness of articular cartilage disappears causing joint pain, stiffness, and functional limitations. (Sanchez-Romero et al.,2022). The knees, hips, and small hand joints are the peripheral joints most commonly affected. Osteoarthritis is the most prevalent joint disease and a leading contributor to disability. It significantly limits patients' capacity to carry out everyday duties, mainly essential tasks. (Alaa et al., 2023).Osteoarthritis can develop as a primary idiopathic condition that is localized or generalized, or it can develop as secondary osteoarthritis that results from an underlying cause, such as trauma, inflammatory illnesses, congenital joint structure anomalies, or metabolic disorders like diabetes. According to (Gregory et al., 2019), the cause of OA is unknown. Although aging-related risk factors predominate, OA may also be caused by metabolic, genetic, chemical, and mechanical causes. Depending on which joints—the knee, hip, hands, spine, etc.—are impacted and to what extent, osteoarthritis symptoms can differ. Pain, stiffness, loss of mobility, crepitus edema, nodules, and weakness are the most typical symptoms, and they can cause several consequences that may necessitate surgery (Bartels et al., 2019).

Important outcomes may include pain, impaired function, and difficulties doing everyday activities. An individual's expectations and self-efficacy—that is, their confidence in their ability to finish activities and achieve objectives—are closely linked to pain, which is also a complicated biopsychosocial issue and it is linked to alterations in mood, sleep patterns, and coping mechanisms. There is frequently a weak correlation between osteoarthritis symptoms and changes demonstrated on X-ray. However, minor joint structural changes can happen with mild symptoms, or minor changes can be linked to a great deal of pain. OA is not brought on by aging and does not always worsen, unlike what many people think (NICE, 2018). Control of pain is essential but depends not only on analgesic treatment but also on the many other aspects of care provided by the health professional (Parvizi et al., 2019).

By 2020, Osteoarthritis was the fourth most common cause of disability, according to data from the World Health Organization. It has a major adverse effect on the economy and global health (World Health Organization,2020). OA significantly lowers quality of life and is one of the most common chronic diseases affecting older persons in wealthy countries (London, 2021). More recent research by (Li cs et al., 2020) shows that OA is the most prevalent musculoskeletal condition affecting those 65 and older. It causes 80% of cases of decreased mobility and 25% of cases of performance impairment, making it difficult to carry out daily tasks. OA affects 9.6% of men and 18% of women over 60, which makes

it one of the top 10 most dangerous diseases in wealthy countries (Phillips et al, 2020). Globally, Osteoarthritis affected 303 million people in 2017 (James et al., 2018). The most recent global disease burden study indicates that the number of common cases of OA has doubled globally, from 247 million in 1990 to 528 million in 2019. In addition, the medical expenses associated with OA have placed a significant financial strain on healthcare systems, accounting for an estimated 2% of the country's economic output (Long H et al.,2022). The prevalence of OA is high in Iraq, especially among the aged and obese. Obesity and physical labor were found to be major risk factors for knee osteoarthritis in Iraqi patients, according to studies done in Al-Mosul (Omar et al., 2021).

Nurses play a crucial role in helping people with osteoarthritis in hospitals and health facilities, In addition to teaching patients pain management techniques and educating them about the disease, they also motivate patients to adhere to their treatment regimens and maintain an active lifestyle. Nonetheless, numerous studies have demonstrated that nurses frequently lack the Knowledge and skills necessary to provide these patients with care.(Holden et al., 2022), for instance, discovered that many medical personnel were uncertain about how to counsel patients with osteoarthritis regarding pain management, exercise, and long-term self-care. Successful pain management in OA requires careful assessment to clarify possible underlying causes and the impact of the pain is having on the patient's life. The management of Osteoarthritis patients presents a significant challenge in healthcare, particularly for nurses, who are at the frontline of patient care. (Bourne et al., 2021).

Subject (Material and Methods)

This study employed a quasi-experimental(one group pretest –posttest) study design and was conducted at the Azadi Teaching Hospital in (Orthopedic, medical, surgical unit and consultation clinics of Rheumatology and Rehabilitation unit) from the period of 1 November 2025 and 10 March 2026. A non-probability, purposive sampling of Nurses working at hospital units was chosen to collect representative data in Azadi teaching hospital, data were collected through pre- test and post-test. The Nurses are exposed to the nursing educational program. the total number was (30)nurses that were participant in the study. A content validity was established for the present study tools through a panel of (10) experts, the experts were asked to review the study tools and their content as it is sufficient and clear to meet the objectives of the study. The internal consistency and test- retest methods were used to determine the reliability of questionnaire in current study; internal consistency reliability measures the consistency between different items of the instrument. The internal consistency between items was determined by using Cronbach`s alpha coefficient. The Statistical Package for Social Science Program (IBM SPSS) version 26.0 was applied to calculate the two methods of reliability; a sample of 10 participants was selected for the purpose of reliability. A questionnaire was created for the study utilizing the self-report approach after the conduction thorough examination of the pertinent literature and identified material in accordance with the goals of scientific research. The questionnaire has (56) items total, divided into (6) parts. Which are: Part one: Nurses' Socio-demographic Characteristics .part tow: General Knowledge about Osteoarthritis. Part three: Nurses knowledge toward Risk Factors of OA. Part four: Nurse knowledge toward Diagnosis of OA. Part five: Nurse knowledge toward management of OA. Part six: Nurse knowledge toward management of OA by Patient Education & Lifestyle.

Results

Table (4-1): Description of Socio-demographic Variables (SDVs) of Nurses (N= 30)

List	SDVs		No	%
1	**Age (Year)**	18 – 27	19	63.3
		28 – 37	11	36.7
2	**Sex**	Male	7	23.3
		Female	23	76.7
3	**Level of education**	Nursing Diploma	11	36.7
		B.Sc. Nursing	15	50
		M.Sc. Nursing +	4	13.3
4	**Years of experience**	<1 year	22	73.3
		1–5 years	8	26.7
5	**Ward/Unit**	Orthopedic	2	6.7
		Medical	12	40
		Surgical	8	26.7
		Consultation Clinics	8	26.7
6	**Training courses about osteoarthritis**	Yes	10	33.3
		No	20	66.7

No: Number, %: Percentage

The findings in table (4-1) provide description of sociodemographic variables of nurses participated in this study (N=30); the finding reveals that 63.3% of nurses were within age group of 18 – 27 years and 36.7% within age group of 28 – 37 years reflecting that nurses are still young.

Concerning sex, more of nurses (76.7%) were females and 23.3% of them were males.

The level of education refers that half of nurses (50%) were graduated with Bachelor's degree in nursing, 36.7% having nursing Diploma, and only 13.3% were postgraduate with master degree in nursing.

The years of experience indicates that more of nurses (73.3%) are still beginner and neophyte nurses with less than one years of experience, 26.7% of them having 1 – 5 years of experience.

Regarding workplace, nurses were distributed across various ward and units; the higher proportion were working in medical wards, an equal proportion (26.7%) were seen in surgical and outpatients clinics, only 6.7% of nurses were working in orthopedic ward and units.

About participation in training courses about osteoarthritis, only 33.3% reported they have participated in such courses, while 66.7% reported no participation.

Table (4-2): Mean Score and Assessments of Knowledge Items about Management of Osteoarthritis by Patient Education and Lifestyle among Nurses (Pre and Posttest) (N=30)

List	\ Knowledge about Patient Education Scale		Pretest f(%)	Mean	Assess	Posttest f(%)	Mean	Assess	Variance test F	P-value	C.S
1	Ideal exercise for OA is swimming	Incorrect	23(76.7)	.23	**Poor**	6(20)	.80	**Good**	27.479	.000	**H.S**
		Correct	7(23.3)			24(80)					
2	Climbing stairs frequently activity worsens OA	Incorrect	14(46.7)	.53	**Moderate**	9(30)	.70	**Good**	1.755	.190	N.S
		Correct	16(53.3)			21(70)					
3	Balanced Diet advice for patient with OA	Incorrect	10(33.3)	.67	**Moderate**	2(6.7)	.93	**Good**	7.250	.010	**S**
		Correct	20(66.7)			28(93.3)					
4	Regular balanced diet and activity are Best weight management strategy	Incorrect	16(53.3)	.47	**Moderate**	4(13.3)	.87	**Good**	12.732	.001	**H.S**
		Correct	14(46.7)			26(86.7)					
5	Use of cane or walker Reduces joint stress	Incorrect	22(73.3)	.27	**Poor**	6(20)	.80	**Good**	23.200	.000	**H.S**
		Correct	8(26.7)			24(80)					
6	Rest in OA should be Short periods between activity	Incorrect	25(83.3)	.17	**Poor**	12(40)	.60	**Moderate**	14.372	.000	**H.S**
		Correct	5(16.7)			18(60)					
7	Flat, cushioned shoes footwear is recommended	Incorrect	9(30)	.70	**Good**	2(6.7)	.93	**Good**	5.800	.020	**S**
		Correct	21(70)			28(93.3)					
8	Teaching patients to divide tasks into intervals is Energy conservation	Incorrect	30(100)	.00	**Poor**	13(43.3)	.57	**Moderate**	1.464	.231	N.S
		Correct	0(0)			17(56.7)					
9	Cold therapy is used to reduce acute inflammation	Incorrect	24(80)	.20	**Poor**	8(26.7)	.73	**Good**	23.200	.000	**H.S**
		Correct	6(20)			22(73.3)					
10	Lifestyle modification is Essential for management	Incorrect	26(86.7)	.13	**Poor**	12(40)	.60	**Moderate**	17.762	.000	**H.S**
		Correct	4(13.3)			18(60)					

No: Number, %: Percentage, M: Mean of total score, SD: Standard deviation, F: F-statistics, P: Probability, C.S: Comparison significant

Poor= 0.00 – 0.33, Moderate= 0.34 – 0.67, Good= 0.68 – 1.00

Table (4-2) presents the mean scores of items related to nurses' knowledge about management of lifestyle and patient's education; the findings during the pretest show disparity in level of knowledge from poor to moderate in most of items, the mean scores ranging from 0.00 to 0.67 except item 7 that show high mean score. During the posttest and after engagement in an educational program, nurses demonstrating "good" level of knowledge among most of items indicating improvement of their knowledge with mean score reaching to 0.93.

The variance test indicates high significant differences in most items of knowledge between pretest and posttest with p-value ranging from 0.010 to 0.000 indicating effectiveness of

educational program in enhancing nurses' knowledge. However, there some differences in mean scores of some items (2 and 8), there are no significant differences between pretest and posttest

Table (4-3): Assessment of Total Nurses' Knowledge about Management of Osteoarthritis by Patient Education and Lifestyle (Pre and Posttest)

Knowledge	Scores	Pretest				Posttest			
		No	%	M	SD	No	%	M	SD
Knowledge about Management of Lifestyle and Patient Education	Poor	15	50	**3.37**	**1.921**	0	0	**7.53**	**1.634**
	Moderate	13	43.3			8	26.7		
	Good	2	6.7			22	73.3		
	Total	***30***	***100***			***30***	***100***		

No: Number, %: Percentage, M: Mean of total score, SD: Standard deviation
Poor= 0.00 – 3.33, Moderate= 3.34 – 6.67, Good= 6.68 – 10.00

Table (4 – 3) exhibits the assessment of total nurses' knowledge about management of lifestyle and patient's education; the findings in the pretest reveals that half of nurses (50%) demonstrating poor and 43.3% showing moderate level of knowledge with mean score 3.37 (±1.921) fell within poor level. During the posttest and after application of educational program, the level of knowledge increased to good level among 73.3% with mean score 7.53 (±1.634), and only 26.7% still within moderate level.

This figure presents the total nurses' knowledge about management of life style and education for patients with osteoarthritis; the mean score of knowledge is clearly increased from pretest to posttest (3.37 – 7.53) indicating the effectiveness of educational program on nurses knowledge regarding this aspect.

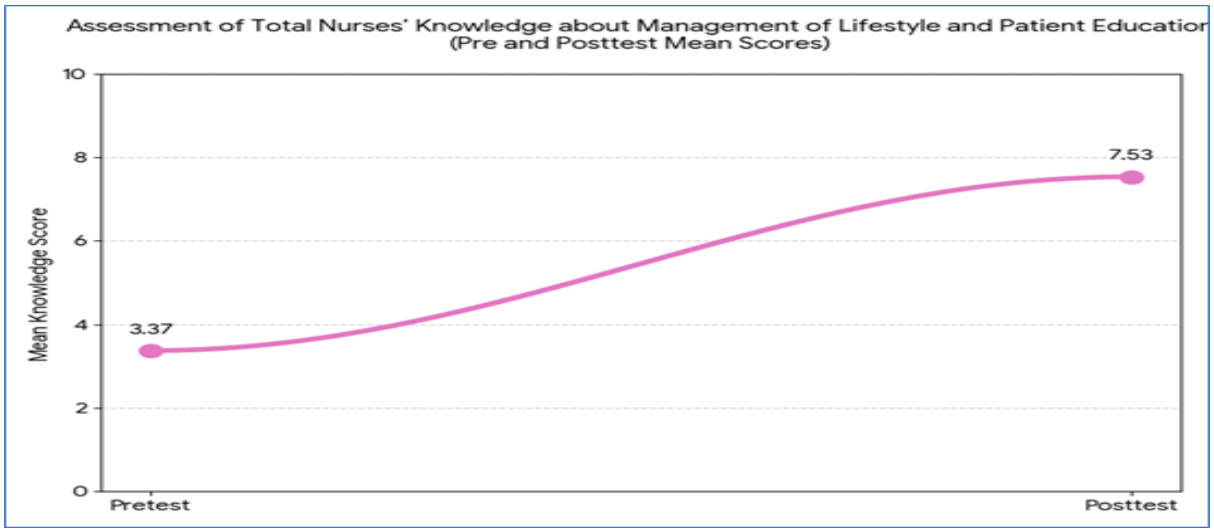

Figure (4-1): Total Nurses' Knowledge about Management of Lifestyle and Patient Education (Pre and Posttest)

Table (4-4): Overall Assessment of Nurses' Knowledge about Management of Osteoarthritis Patients (Pre and Posttest)

Knowledge Scores		Pretest				Posttest			
		No	%	M	SD	No	%	M	SD
Overall, Knowledge	Poor	14	46.6	17.90	6.784	0	0	36.07	6.777
	Moderate	16	51.4			9	30		
	Good	0	0			21	70		
	Total	***30***	***100***			***30***	***100***		

No: Number, %: Percentage, M: Mean of total score, SD: Standard deviation
Poor= 0.00 – 16.66, Moderate= 16.67 – 33.33, Good= 33.34 – 50.00

Table (4 – 4) exhibits the overall assessment of nurses' knowledge about management of osteoarthritis; the findings in the pretest show that nurses demonstrating poor (46.6) to moderate (51.4%) level of overall knowledge with mean score 17.90 (±6.784) fell within moderate level. During the posttest and after engagement in educational program, nurses' overall knowledge increased to good among 70% with mean score 36.07 (±6.777), and only 30% still within moderate level. This finding indicates an effective role of educational program in enhancing nurses overall knowledge about management of osteoarthritis.

Discussion

The present finding related to the data analysis distribution of demographic variable table(1), that the percentage distribution of participants with reference to age groups reveal that the majority(n=23; 76,7) of the study sample respectively were female, also reveals the highest percentage(n=19; 63.3%) of nurses were within age group of 18 – 27 years and (n=11;36.7%) within age group of 28 – 37 years .These results are inconsistent with study conducted in Zigzag University Hospitals' outpatient rheumatology and rehabilitation clinic in Egypt by(Karima et al.,2018) To assess how introducing an osteoarthritis prevention and management training program affected nurses' knowledge and practice, who reported the majority of participant were male and the majority of them with in the age group(51-60). While, this result consistent with a study conducted by(Shog et al.,2023) aimed to evaluate the general population's awareness levels, knowledge gaps, and misconceptions regarding OA and its risk factors in Hail, Saudi Arabia. That reveals the majority of participants (604, 66.7%) were female. Concerning the years of experience in nursing services, the result of the current study reported that the highest percentage(n=22; 73.3%) of participants had less than one years of experience. This results inconsistent with a study conducted in Zigzag University Hospitals' outpatient rheumatology and rehabilitation clinic in Egypt by(Karima et al.,2018) ,to assess how introducing an osteoarthritis prevention and management training program affected nurses' knowledge and practice, who reported the majority of participants had more than ten years of experience in nursing. Also, this result inconsistent with a cross, sectional study conducted by(Aseel et al.,2017) in Baghdad, AL-Rusafa, to evaluate the knowledge, attitudes, and practices of Iraqi doctors, with relation to managing patients with osteoarthritis and how they relate to sociodemographic information, that reported that the high percentage(47.5%) of participants had less than ten years of experience. With regard to participation in Training courses about management of osteoarthritis, the results of the current study reveal the majority(n=20;66.7%) of participants had no training course regarding

osteoarthritis, this result indicated the lack of training regarding management of osteoarthritis that result in deficit nurses knowledge concerning management of osteoarthritis ,that negatively affect patient on outcomes therefore, training course concerning management of osteoarthritis should be increased .This result consistent with a study conducted by(Karima et al.,2018) , in Zigzag University Hospitals' outpatient rheumatology and rehabilitation clinic in Egypt to assess how introducing an osteoarthritis prevention and management training program affected nurses' knowledge and practice, who reported the highest percentage (65.7%) of participants were not received training course concerning management of osteoarthritis patients.

The data analysis of the sixth part of nurse's knowledge regarding Management of Lifestyle and Patient Education among Nurses about osteoarthritis of (10) question(Table 4-2); the findings during the pretest show disparity in level of knowledge from poor to moderate in most of items, the mean scores ranging from 0.00 to 0.67 except item 7 that show high mean score. During the posttest and after engagement in an educational program, nurses demonstrating "good" level of knowledge among most of items indicating improvement of their knowledge with mean score reaching to 0.93.

According to Table (4 – 3) that shows the assessment of total nurses' knowledge about management of Lifestyle and Patient Education among Nurses about osteoarthritis; the findings in the pretest reveals that half of nurses (50%) demonstrating poor and 43.3% showing moderate level of knowledge with mean score 3.37 (±1.921) fell within poor level. During the posttest and after application of educational program, the level of knowledge increased to good level among 73.3% with mean score 7.53 (±1.634), and only 26.7% still within moderate level. This result consistent with study conducted by(Eman et al.,2017), the study was carried out in Zagazig University's outpatient orthopedic and rheumatology clinics in Egypt to assess the impact of a lifestyle modification intervention program on persons with knee osteoarthritis. The results of this study show that nearly all of the patients had poor knowledge about life style such as difficulties participating in sports and leisure activities prior to intervention of program, and that these difficulties subsided after the intervention of the program. This outcome is anticipated since exercise improves osteoarthritis (OA) and inactivity is one of the risk factors for the condition. Also, another study conducted by(Shog et al.,2023) aimed to evaluate the general population's awareness levels, knowledge gaps, and misconceptions regarding OA and its risk factors in Hail, Saudi Arabia. That indicated that the majority of participants had inadequate knowledge about life style such as appropriate exercise and healthy diet. Also , this study is consistent with the current study. Additionally ,to another study that consistent with the current study that conducted in Shubra Elkheima City in Egypt by(Alaa et al.,2023).To evaluate patients' attitudes and behaviors regarding osteoarthritis. Who reported that the majority of participants(, 63.60% .33.30% and 66.70%) had inadequate knowledge about life style that related to driving, occupational working, standing and computer using.

According to Table (4 – 4) that shows the overall assessment of nurses' knowledge about management of osteoarthritis; the findings in the pretest show that nurses demonstrating poor (46.6) to moderate (51.4%) level of overall knowledge with mean score 17.90 (±6.784) fell within moderate level. During the posttest and after engagement in educational program, nurses' overall knowledge increased to good among 70% with mean score 36.07 (±6.777), and only 30% still within moderate level. This finding indicates an effective role of educational program in enhancing nurses' overall knowledge about management of osteoarthritis. This result has consistent with an observational cross-sectional approach study conducted by(Shog et al.,2023) aimed to evaluate the general population's awareness levels, knowledge gaps, and

misconceptions regarding OA and its risk factors in Hail, Saudi Arabia .Who reveals the overall levels of participant knowledge and awareness regarding OA, that the majority of participants 535 (59.1%) demonstrated a poor level of knowledge. while (371, 40.9%) study participants showed a good knowledge level regarding OA. Another, study also, consistent with the current study that conducted in Shubra Elkheima City in Egypt by(Alaa et al.,2023).To evaluate patients' attitudes and behaviors regarding osteoarthritis. that show(90.10%) of participants had un adequate level of total knowledge regarding osteoarthritis disease.

Additionally, this result has consistent with a study conducted by (Nadia et al.,2019) at Fayoum University Hospital's, Egypt, orthopedic unit and outpatient clinics, the study performed to assess, plan, implement, and evaluate the impact of a nursing education program on knowledge, uncertainty, mastery, pain, and quality of life for patients with knee osteoarthritis. That reveals the majority of participants had poor level of total knowledge about osteoarthritis before the nursing education ,while the majority of them had good level of total knowledge after implementation of the nursing education program.

Conclusion

Based on the results the study concluded that the overall assessment of nurses 'knowledge about management of osteoarthritis in the pretest show that nurses demonstrating poor (46.6%) to moderate (51.4%) level of overall knowledge with mean score 17.90 and they need a specific educational program about management of osteoarthritis patients. Also, the study concluded that the nurses' overall knowledge increased to good among 70% with mean score 36.07 During the posttest and after engagement in educational program that indicates an effective role of educational program in enhancing nurses' overall knowledge about management of osteoarthritis.

Recommendation

Based on the results of the current study the following suggestion were recommended.

-Conducting an educational program periodically and regularly related to management of osteoarthritis patients to improve nurses' knowledge who working in (the Orthopedic unit and consultation clinics of Rheumatology and Rehabilitation unit, or for large sample of nurses who working in this units.

-Also, the Orthopedic ,Rheumatology and Rehabilitation unit should have Booklet contain all information about osteoarthritis, causes, management in Arabic language that provide all the information needed for nursing operations pertaining to osteoarthritis patients.

References

1. Alaa Mohamed Elsayed, Hanaa Abdelhakim Ahmed, & Hala Mohamed. (2023). Patients' knowledge and practices toward osteoarthritis disease. Egyptian Journal of Health Care, 14(4), 347–360. https://doi.org/10.21608/ejhc.2023.326712
2. Asel Kareem Tawfeeq, Tamara Abdel Wahab Rasheed, & Bekir Abdul Wahab Rasheed. (2017). Knowledge, attitude and practice regarding osteoarthritis management among physicians of primary health care centers of primary health care centers; Al-Rusafa/Baghdad.
3. Bartels, M., Juhl, B., Christensen, R., and Hagen, B., (2019):Aquatic exercise for the treatment of knee and hip osteoarthritis. Cochrane Database of Systematic Reviews, (3) .
4. Bourne RB, Chesworth BM, Davis AM, et al. Patient satisfaction after total knee arthroplasty: Who is satisfied and who is not? Clin Orthop Relat Res 2021;468:57-63.
5. Gregory PJ, Sperry M, and Wilson AF. (2019); Dietary supplements for

osteoarthritis, American Family Physician, Vol. 77 Issue 2,p177-184. 9. Hairon N., NICE (2019); New guidance on

6. Holden, M. A., Nicholls, E. E., Young, J., Hay, E. M., & Foster, N. E. (2022). UK-based physical therapists' attitudes and beliefs towards exercise and knee osteoarthritis: Findings from a mixed-methods study. Arthritis Care & Research, 64(10), 1601–1612. https://doi.org/10.1002/acr.21700
7. Karima Fouad Elshamy, Hala Mohamed Abdelhamed, & Samera Sadon Sadawy. (2018). Impact of implementing prevention and management osteoarthritis training program on improving nurses' knowledge and practice. Journal of American Science, 14(10).
8. Li CS, Karlsson J, Winemaker M, et al. Orthopedic surgeons feel that there is a treatment gap in the management of early OA: international survey. Knee Surg Sports Traumatol Arthrosc 2020;22:363-78.
9. London NJ, Miller LE, Block JE. Clinical and economic consequences of the treatment gap in knee osteoarthritis management. Med Hypotheses 2021;76:887-92.
10. Long H, Liu Q, Yin H, Wang K, Diao N, Zhang Y, et al. Prevalence Trends of Site-Specific Osteoarthritis From 1990 to 2019: Findings From the Global Burden of Disease Study 2019. Arthritis Rheumatol 2022; 74: 1172-1183.
11. National Institute for Health and Care Excellence. Osteoarthritis: care and management. NICE guideline CG177. 2018. https://www.nice.org.uk/guidance/cg177 (accessed 21 September 2020)
12. Omar, D. M., Raheem, A. Q., & Hassan, T. Y. (2021). Risk factors of knee osteoarthritis in patients attending rheumatology clinic in Mosul. Journal of the Faculty of Medicine Baghdad, 63(4), Article 6341. https://doi.org/10.32007/jfacmedbaghdad.6341
13. Parvizi J, Nunley RM, Berend KR, et al. High level of residual symptoms in young patients after total knee arthroplasty. Clin Orthop Relat Res 2019;472:133-7.
14. Phillips S, Silvia Li C, Phillips M, et al. Treatment of osteoarthritis of the knee with bracing: a scoping review. Orthop Rev (Pavia) 2020;8:6256.
15. sánchez-Romero, A., Pecos-Martín, D., Calvo-Lobo, C., and Fernández-Carnero, J., (2022): Effects of dry needling in an exercise program for older adults with knee osteoarthritis: A pilot clinical trial. Medicine, 97(26).
16. Shog K. Alahmed, Ahmed M. Mohieldin, Areeb Alshammari, Ziyad F. Alshammari, Ruba A. Alahmdi, S. Luqman A. Alghashan, Hamad F. Alshammari, Fahad F. Alshammary, Ashwaq H. Alshammari, & Mutah S. Alahmdi. (2023). Knowledge and awareness regarding osteoarthritis and its factors in Hail region, Saudi Arabia. Cureus, 15(3), e36557. https://doi.org/10.7759/cureus.36557
17. World Health Organization. (2020). World report on ageing and health. Geneva: World Health Organization. Retrieved from https://www.who.int/publications/i/item/9789241565042