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RESEARCH ARTICLE

ASSESSMENT OF KNOWLEDGE, ATTITUDE, AND PRACTICE TOWARDS OSTEOPOROSIS SCREENING AMONG PRIMARY HEALTH CARE PHYSICIANS IN PRIMARY HEALTH CARE CENTERS IN MAKKAH AL-MOKARRAMAH CITY, 2023. (ACROSS SECTIONAL STUDY)

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Abstract

Background: Osteoporosis, a "silent disease" characterized by decreased bone density and increased fracture risk, poses a significant public health challenge. This study aims to investigate the knowledge, attitudes, and practices of Primary Health Care (PHC) physicians in Makkah Al-Mokarramah regarding osteoporosis screening. Osteoporosis is a multifactorial skeletal disorder with increasing prevalence, especially in regions with an aging population, such as Saudi Arabia. Understanding the current state of awareness and practices among PHC physicians is essential for early detection and intervention.

Method: This study employs a cross-sectional design and targets PHC physicians in Makkah Al-Mokarramah in 2023. The sample size was calculated, and participants were selected through simple random sampling. Data was collected using a structured electronic questionnaire with sections on demographics, knowledge, attitudes, and practices related to osteoporosis screening.

Results: The study focused on PHC physicians, with a significant proportion below the age of 30 and a university-level education. The gender distribution was nearly even, with a focus on both males and females. Regarding knowledge, the majority of participants exhibited adequate knowledge (58%) of osteoporosis, while 19.2% had poor knowledge, and 22.8% had proper knowledge. There were notable knowledge gaps, especially among those with poor knowledge. Regarding attitude, most participants believed that osteoporosis is a major health concern (85.2%) and that it is preventable (83.6%). Confidence in screening and managing osteoporosis varied based on knowledge levels, with those having proper knowledge expressing the highest confidence. Regarding practice, the study revealed variations in participants' practices related to osteoporosis, including calcium and

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vitamin D supplementation, physiotherapy recommendations, participation in continuous medical education, and the use of tools like FRAX.

Conclusion: The study reveals that while there is general awareness of osteoporosis, there are significant knowledge gaps among PHC physicians. Attitudes toward prevention are positive, but these attitudes must be translated into concrete practices, such as improved dietary habits and physical activity. We recommend further research initiatives and calls for both government and non-government organizations to intensify their efforts in promoting preventive programs, particularly tailored to the needs of the population. Overall, the study contributes to the understanding of osteoporosis awareness and behaviors, offering a foundation for public health interventions in this domain.

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Introduction:-

Osteoporosis, often referred to as a "silent disease," is a condition marked by a decrease in bone density, leading to increased fracture risk, often without preceding symptoms until a fracture occurs. The World Health Organization (WHO) defines osteoporosis as a bone density that lies 2.5 standard deviations or more below the average value for young, healthy individuals(1).

Osteoporosis, a complex and multifactorial skeletal disorder, manifests through a reduction in bone density, leading to an elevated risk of fractures. The disease's categorization is based on various determinants affecting bone metabolism, segregating it into two divisions. The first, primary osteoporosis, is subdivided further into Involutional Osteoporosis Type I: Often referred to as postmenopausal osteoporosis, this subtype emerges chiefly due to a deficit in estrogen. Involutional Osteoporosis Type II: Alternatively termed senile osteoporosis, this variant stems from age-related bone mass attrition, impacting both the cortical and trabecular bone matrices. The second main category is secondary osteoporosis, which results from a diverse spectrum of external determinants. These encompass genetic anomalies such as cystic fibrosis and glycogen storage diseases, endocrine disruptions like Cushing's syndrome and both types of diabetes mellitus, and an array of medications ranging from anticoagulants to aromatase inhibitors (2).

Per the International Osteoporosis Foundation, osteoporosis affects an estimated 75 million people in Europe, the United States of America (USA), and Japan and causes more than 8.9 million fractures annually, resulting in an osteoporotic fracture every 3 seconds. Approximately 30% of all postmenopausal women have osteoporosis in the USA and Europe. At least 40% of these women and 15–30% of men will sustain one or more fragility fractures in their remaining lifetimes (3).

Notably, the prevalence of osteoporosis and osteopenia in the Kingdom of Saudi Arabia (KSA) is 37.8% and 28.2% in men and women above the age of 50 years. In 2015, it was estimated that the overall incidence of osteoporosis-related femoral fractures could be 7,528 (1,300,336 population 55 years of age or older) with a direct cost of SR 564.75 million (\$150.60 million). Over the next few decades, the age of the Saudi population in the 50+ segment of the total Saudi population is expected to rise steeply: 21% (2020), 26% (2025), and 30% (2030). Life expectancy will increase from 63.1 years in the 1980s to 74.5 in 2015 and is further expected to rise to 79.3 by 2050. Given the demographic shift in population over the next few decades, the Kingdom can expect a rise in osteoporosis cases (4).

There are two kinds of risk factors for osteoporosis: fixed and modifiable. Fixed risks include age, gender, family history of osteoporosis, menopause, and long-term glucocorticoid therapy. Modifiable risk factors that directly impact bone biology and result in a decrease in bone mineral density (BMD) include alcohol, smoking, and vitamin D deficiency, which remains the major risk factor for the disease in the country. Moreover, poor nutrition, insufficient exercise, low dietary calcium intake, and frequent falls can all contribute to an increased risk of osteoporosis. As populations continue to age globally, osteoporosis and its complications, such as fragility fractures, are expected to rise, causing significant morbidity and mortality (4).

The early detection and treatment of osteoporosis are vital to preventing fractures and their subsequent consequences. Primary health care (PHC) physicians often serve as the front line in recognizing and managing this condition. Their understanding and practices can significantly impact the outcome for individuals at risk. Yet, several studies have indicated a lack of adequate knowledge and a discrepancy in the attitudes and practices concerning osteoporosis screening among primary care providers (5).

Furthermore, many physicians underestimate the risk factors associated with osteoporosis, leading to missed opportunities for early intervention and prevention. This is concerning, as early identification of patients at risk and timely intervention can significantly reduce the incidence of fractures and improve patient outcomes (6,7).

In this study, we aim to determine the level of knowledge, attitude, and practice towards osteoporosis screening among PHC physicians in primary health care centers in Makkah Al-Mokarramah City, 2023. enhancing physicians' training, aiming for better patient care and outcomes in osteoporosis management.

Methodology:-

A cross-sectional descriptive study was conducted by the distribution of valid questionnaire among 431 PHC physicians working in 35 PHC centers in Makkah Al-Mokarramah city, during 2023. The sample size was calculated by Raosoft website for sample size calculation. It was 204 physicians (based on an error of 5%, a confidence interval of 95%, and a prevalence of 50%). By adding 10% (which equals 21) to compensate for non-responders and defaulters, the total sample size was estimated to be 225 physicians.

The researcher used simple random sampling techniques via the random number generator website (<https://www.random.org/>), selected physicians from the list obtained from the public health administration in Makkah health cluster.

Data Collection Tool:

The data was collected using a structured, self-administered electronic questionnaire consisting of four sections: physician's demographic data, knowledge about osteoporosis and its screening, attitudes about osteoporosis, and practice towards osteoporosis. The questionnaire was obtained from previous literature and has been assessed to ensure content reliability and face validity by a biostatistician and three consultants' validation.

Knowledge scoring:

There were 10 questions to assess physicians' knowledge about osteoporosis screening. For each correct answer, the score was "1" and "0" for the wrong answer, the total score equals 10. The scores were categorized as poor knowledge (score 0-3), adequate knowledge (score 4-7), and perfect knowledge (score 8-10) (8).

Study variables:

a) **Dependent variables:** knowledge, attitude, and practice towards osteoporosis screening.

b) **Independent variables:** age, gender, nationality, medical degree, years of experience in primary care.

Data Entry and Analysis:

Data was cleaned and managed using the statistical package for social sciences (SPSS software version 25.0). Categorical data will be presented as percentages and frequencies, while continuous data will be presented as means and standard deviations. For inferential statistics, chi-square test of independence will be used to test for the association between categorical variables and the Pearson correlation between continuous and categorical variables. 95% confidence intervals will be obtained, and a p-value of less than 0.05 will be considered statistically significant.

Results:-

Response rate:

Out of 431 physicians, 250 accepted to participate in the study representing 111% response rate, while the sample size was 225.

Table 1 provides an overview of the demographic characteristics of the participants involved in this study. Among the participants, gender distribution was nearly evenly split, with 102 individuals (40.8%) identifying as female and

148 individuals (59.2%) identifying as male. In terms of nationality, the majority of the participants were of Saudi origin, comprising 162 individuals (64.8%), while 88 participants (35.2%) were non-Saudi.

Regarding years of medical practice, the participants were categorized into four groups. A significant proportion of the participants had between 5 and 10 years of medical practice (29.6%), with 74 individuals falling into this category. Other categories included "Less than 5 years" with 64 participants (25.6%), "11-15 years" with 65 participants (26.0%), and "More than 15 years" with 47 participants (18.8%). Furthermore, in terms of medical degree, the majority (62.8%) held a General Practice MBBS degree, totaling 157 participants. In addition, 30.0% of participants had a familymedicine board certification or an equivalent qualification (75 participants), while 7.2% held a Family Medicine Diploma (18 participants). These demographic characteristics provide a foundation for understanding the composition of the study's sample and its potential implications for the research findings.

Table (1):- Shows the demographic of the participants:

		Count	Column N %
Gender	Female	102	40.8%
	Male	148	59.2%
Nationality	Non-Saudi	88	35.2%
	Saudi	162	64.8%
Years of medical practice	A-Less than 5 years	64	25.6%
	B-5-10 years	74	29.6%
	C-11-15 years	65	26.0%
	D-more than 15 years	47	18.8%
Medical Degree	A-family medicine board certified or equivalent	75	30.0%
	B- Family medicine diploma	18	7.2%
	C-General Practice MBBS	157	62.8%

Table 2: Displays the knowledge levels of osteoporosis among all participants. The participants were categorized into three knowledge levels: poor knowledge, with 48 participants (19.2%); adequate knowledge, representing the majority at 145 participants (58.0%); and proper knowledge, with 57 participants (22.8%). This table provides an overview of the distribution of knowledge levels among the 250 participants, which is crucial for understanding their baseline knowledge before evaluating the impact of any interventions or variables on their osteoporosis knowledge.

Table (2):- Shows the knowledge of osteoporosis acquired by all of the participants:

Knowledge		Frequency	Percent
Valid	Poor knowledge	48	19.2%
	Adequate knowledge	145	58.0%
	Proper knowledge	57	22.8%
	Total	250	100.0

Graph (1):- Shows the distribution of knowledge among the participants:

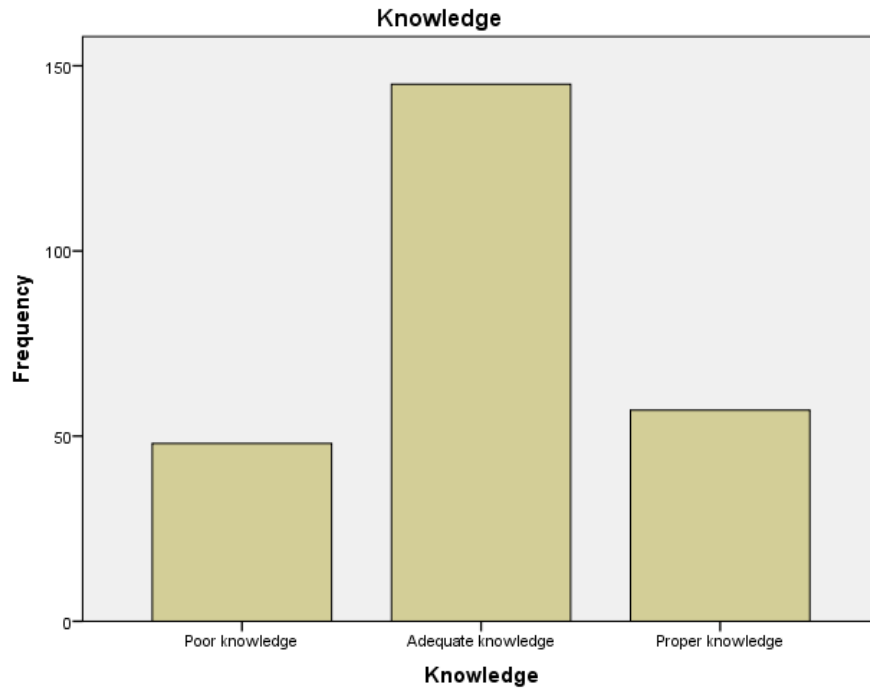


Table (3):- Shows the relationship between knowledge and different demographic variables:

		Knowledge						P-value
		Poor knowledge		Adequate knowledge		Proper knowledge		
		Count	Column N %	Count	Column N %	Count	Column N %	
Gender	Female	18	37.5%	61	42.1%	23	40.4%	0.853
	male	30	62.5%	84	57.9%	34	59.6%	
Nationality	Non-Saudi	18	37.5%	57	39.3%	13	22.8%	0.081
	Saudi	30	62.5%	88	60.7%	44	77.2%	
Years of medical practice	A-Less than 5 years	18	37.5%	33	22.8%	13	22.8%	0.064
	B-5-10 years	11	22.9%	45	31.0%	18	31.6%	
	C-11-15 years	15	31.3%	32	22.1%	18	31.6%	
	D-more than 15 years	4	8.3%	35	24.1%	8	14.0%	
Medical Degree	A-family medicine board certified or equivalent	4	8.3%	45	31.0%	26	45.6%	0.001
	B- Family medicine diploma	4	8.3%	11	7.6%	3	5.3%	
	C-General Practice MBBS	40	83.3%	89	61.4%	28	49.1%	

Table 3: Presents the relationship between participants' knowledge levels about osteoporosis and various demographic variables. The knowledge levels are categorized as "Poor knowledge," "Adequate knowledge," and "Proper knowledge." The table also includes the counts and percentages within each knowledge category, as well as the p-values indicating the statistical significance of the associations.

Regarding gender, there is no significant difference in knowledge levels between females and males, with p-value 0.853, indicating that gender does not strongly influence osteoporosis knowledge. In terms of nationality, the p-value is 0.081, suggesting a borderline association between nationality and knowledge levels. Saudi participants

seem to have a slightly higher level of "Proper knowledge" compared to non-Saudi participants. Years of medical practice show a p-value of 0.064, indicating a marginally significant association with knowledge levels. Participants with more than 15 years of medical practice tend to have a lower level of "Proper knowledge."

Significant differences are observed when examining medical degrees, with a p-value of 0.001. Participants with a "Family Medicine Board Certified or Equivalent" degree have more "Proper knowledge" than other medical degrees.

Table (4):- Shows the practice of the participants toward osteoporosis.

		Count	N %
1-How frequently do you screen patients at risk for osteoporosis?	Always	34	13.6%
	Often	64	25.6%
	Sometimes	101	40.4%
	Rarely	42	16.8%
	Never	9	3.6%
2-Do you recommend calcium and vitamin D supplementation to patients diagnosed with or at risk for osteoporosis?	Always	154	61.6%
	Often	47	18.8%
	Sometimes	34	13.6%
	Rarely	10	4.0%
	Never	5	2.0%
3-For osteoporosis patients, do you refer them for physiotherapy or physical activity recommendations?	Always	76	30.4%
	Often	60	24.0%
	Sometimes	96	38.4%
	Rarely	11	4.4%
	Never	7	2.8%
4-How often do you participate in continuous medical education or training related to osteoporosis?	Always	97	38.8%
	Often	102	40.8%
	Sometimes	34	13.6%
	Rarely	17	6.8%
	Never	0	0.0%
5-How often do you use FRAX or a similar tool to evaluate fracture risk in osteoporosis patients?	Always	32	12.8%
	Often	39	15.6%
	Sometimes	65	26.0%
	Rarely	64	25.6%
	Never	50	20.0%

Table 4:Provides insights into the osteoporosis-related practices of the participants. Notably, 39.2% always or often screen patients at risk for osteoporosis, 80.4% recommend calcium and vitamin D supplementation, 54.4% refer osteoporosis patients for physiotherapy or physical activity recommendations, 79.6% engage in continuous medical education related to osteoporosis, and the use of tools like FRAX is less frequent, with 39.6% rarely or never utilizing them. These findings emphasize the varying clinical practices among participants, indicating areas where intervention or further education may be beneficial in osteoporosis management.

Table (5):- Shows the attitude of participants toward osteoporosis:

		Count	N %
1-Do you believe that osteoporosis is a major health concern?	Strongly Agree	143	57.2%
	Agree	70	28.0%
	Neutral	25	10.0%
	Disagree	7	2.8%
	Strongly disagree	5	2.0%
2-Do you believe that osteoporosis is preventable?	Strongly Agree	53	21.2%
	Agree	156	62.4%
	Neutral	24	9.6%
	Disagree	10	4.0%

	Strongly disagree	7	2.8%
3-Do you feel confident in screening & managing a patient with osteoporosis?	Strongly Agree	38	15.2%
	Agree	96	38.4%
	Neutral	54	21.6%
	Disagree	47	18.8%
	Strongly disagree	15	6.0%
4-Do you feel there is a need for more training courses on osteoporosis management?	Strongly Agree	78	31.2%
	Agree	101	40.4%
	Neutral	42	16.8%
	Disagree	22	8.8%
	Strongly disagree	7	2.8%
5-Do you think osteoporosis should be diagnosed and follow up by primary health care physicians?	Strongly Agree	30	12.0%
	Agree	37	14.8%
	Neutral	52	20.8%
	Disagree	97	38.8%
	Strongly disagree	34	13.6%

Table 5: Presents the attitudes of participants towards osteoporosis. The data indicates that a substantial majority (85.2%) strongly agree or agree that osteoporosis is a major health concern, and a similar trend is observed regarding its preventability (83.6%). Participants expressed varying levels of confidence in screening and managing osteoporosis patients, with 53.6% in agreement. A majority (71.6%) believe that more training courses on osteoporosis management are needed. However, there is a division of opinion on whether osteoporosis should be primarily diagnosed and followed up by primary healthcare physicians, with 47.6% in disagreement. These findings underscore the importance of considering participants' attitudes in developing effective osteoporosis awareness and management strategies.

Table (6):- Shows the relationship between gender and attitude of participants toward osteoporosis:

		Gender				
		Female		male		
		Count	Column N %	Count	Column N %	
1-Do you believe that osteoporosis is a major health concern?	Strongly Agree	60	42.0%	83	58.0%	0.986
	Agree	28	40.0%	42	60.0%	
	Neutral	9	36.0%	16	64.0%	
	Disagree	3	42.9%	4	57.1%	
	Strongly disagree	2	40.0%	3	60.0%	
2-Do you believe that osteoporosis is preventable?	Strongly Agree	18	34.0%	35	66.0%	0.743
	Agree	66	42.3%	90	57.7%	
	Neutral	10	41.7%	14	58.3%	
	Disagree	4	40.0%	6	60.0%	
	Strongly disagree	4	57.1%	3	42.9%	
3-Do you feel confident in screening & managing a patient with osteoporosis?	Strongly Agree	19	50.0%	19	50.0%	0.583
	Agree	37	38.5%	59	61.5%	
	Neutral	23	42.6%	31	57.4%	
	Disagree	19	40.4%	28	59.6%	
	Strongly disagree	4	26.7%	11	73.3%	

4-Do you feel there is a need for more training courses on osteoporosis management?	Strongly Agree	37	47.4%	41	52.6%	0.170
	Agree	44	43.6%	57	56.4%	
	Neutral	14	33.3%	28	66.7%	
	Disagree	6	27.3%	16	72.7%	
	Strongly disagree	1	14.3%	6	85.7%	
5-Do you think osteoporosis should be diagnosed and follow up by primary health care physicians?	Strongly Agree	17	56.7%	13	43.3%	0.093
	Agree	15	40.5%	22	59.5%	
	Neutral	16	30.8%	36	69.2%	
	Disagree	44	45.4%	53	54.6%	
	Strongly disagree	10	29.4%	24	70.6%	

Table 6: Explores the relationship between gender and the attitudes of participants toward osteoporosis. The data reveals that gender has no significant influence on most of the attitudes. For the belief that osteoporosis is a major health concern, both females and males exhibit similar distributions of responses (p-value = 0.986). Similarly, the perception of osteoporosis preventability shows no significant gender-related difference (p-value = 0.743). Confidence in screening and managing patients with osteoporosis (p-value = 0.583), the need for more training courses on osteoporosis management (p-value = 0.170), and the belief in the role of primary healthcare physicians in osteoporosis diagnosis and follow-up (p-value = 0.093) also do not exhibit significant gender-based distinctions. These findings indicate that gender does not play a major role in shaping the attitudes of participants toward osteoporosis.

Table (7):- Shows the relationship between gender and practice of participants toward osteoporosis:

		Gender				P-value
		Female		male		
		Count	Row N %	Count	Row N %	
1-How frequently do you screen patients at risk for osteoporosis?	Always	19	55.9%	15	44.1%	0.127
	Often	25	39.1%	39	60.9%	
	Sometimes	43	42.6%	58	57.4%	
	Rarely	11	26.2%	31	73.8%	
	Never	4	44.4%	5	55.6%	
2-Do you recommend calcium and vitamin D supplementation to patients diagnosed with or at risk for osteoporosis?	Always	62	40.3%	92	59.7%	0.469
	Often	24	51.1%	23	48.9%	
	Sometimes	11	32.4%	23	67.6%	
	Rarely	3	30.0%	7	70.0%	
	Never	2	40.0%	3	60.0%	
3-For osteoporosis patients, do you refer them for physiotherapy or physical activity recommendations?	Always	32	42.1%	44	57.9%	0.564
	Often	22	36.7%	38	63.3%	
	Sometimes	42	43.8%	54	56.3%	
	Rarely	5	45.5%	6	54.5%	
	Never	1	14.3%	6	85.7%	
4-How often do you participate in continuous medical education or training related to osteoporosis?	Always	41	42.3%	56	57.7%	0.647
	Often	40	39.2%	62	60.8%	
	Sometimes	16	47.1%	18	52.9%	
	Rarely	5	29.4%	12	70.6%	
	Never	0	0.0%	0	0.0%	
5-How often do you use FRAX or a similar tool to evaluate fracture risk in osteoporosis patients?	Always	11	34.4%	21	65.6%	0.632
	Often	18	46.2%	21	53.8%	
	Sometimes	24	36.9%	41	63.1%	
	Rarely	25	39.1%	39	60.9%	
	Never	24	48.0%	26	52.0%	

Table 7: Investigates the relationship between gender and the practices of participants concerning osteoporosis. The data reveals that there are no statistically significant differences between females and males in their practices across all aspects related to osteoporosis. This includes the frequency of screening patients at risk for osteoporosis (p-value = 0.127), recommending calcium and vitamin D supplementation (p-value = 0.469), referring patients for physiotherapy or physical activity recommendations (p-value = 0.564), participating in continuous medical education related to osteoporosis (p-value = 0.647), and using tools like FRAX to evaluate fracture risk in osteoporosis patients (p-value = 0.632). These findings suggest that gender does not significantly impact the practice behaviors of participants about osteoporosis.

Table (8):- Shows the relationship between knowledge and the attitude toward osteoporosis:

		Knowledge						P-value
		Poor knowledge		Adequate knowledge		Proper knowledge		
		Count	Row N %	Count	Row N %	Count	Row N %	
1-Do you believe that osteoporosis is a major health concern?	Strongly Agree	23	16.1%	87	60.8%	33	23.1%	0.621
	Agree	13	18.6%	40	57.1%	17	24.3%	
	Neutral	7	28.0%	13	52.0%	5	20.0%	
	Disagree	3	42.9%	3	42.9%	1	14.3%	
	Strongly disagree	2	40.0%	2	40.0%	1	20.0%	
2-Do you believe that osteoporosis is preventable?	Strongly Agree	9	17.0%	30	56.6%	14	26.4%	0.290
	Agree	26	16.7%	95	60.9%	35	22.4%	
	Neutral	7	29.2%	10	41.7%	7	29.2%	
	Disagree	3	30.0%	7	70.0%	0	0.0%	
	Strongly disagree	3	42.9%	3	42.9%	1	14.3%	
3-Do you feel confident in screening & managing a patient with osteoporosis?	Strongly Agree	1	2.6%	14	36.8%	23	60.5%	0.001
	Agree	19	19.8%	64	66.7%	13	13.5%	
	Neutral	10	18.5%	34	63.0%	10	18.5%	
	Disagree	12	25.5%	26	55.3%	9	19.1%	
	Strongly disagree	6	40.0%	7	46.7%	2	13.3%	
4-Do you feel there is a need for more training courses on osteoporosis management?	Strongly Agree	17	21.8%	45	57.7%	16	20.5%	0.137
	Agree	17	16.8%	55	54.5%	29	28.7%	
	Neutral	6	14.3%	30	71.4%	6	14.3%	
	Disagree	5	22.7%	14	63.6%	3	13.6%	
	Strongly disagree	3	42.9%	1	14.3%	3	42.9%	
5-Do you think osteoporosis should be diagnosed and follow up by primary health care physicians?	Strongly Agree	3	10.0%	21	70.0%	6	20.0%	0.281
	Agree	5	13.5%	23	62.2%	9	24.3%	
	Neutral	14	26.9%	22	42.3%	16	30.8%	
	Disagree	21	21.6%	58	59.8%	18	18.6%	
	Strongly disagree	5	14.7%	21	61.8%	8	23.5%	

Table 8: Shows that participants with proper knowledge had the highest confidence in screening and managing osteoporosis patients, with 60.5% strongly agreeing, compared to 2.6% for those with poor knowledge and 36.8% with adequate knowledge. Knowledge levels didn't significantly affect other attitudes.

Table (9):- Shows the relationship between knowledge and the practice toward osteoporosis:

		Knowledge						p-value
		Poor knowledge		Adequate knowledge		Proper knowledge		
		Count	Row N %	Count	Row N %	Count	Row N %	
1-How frequently do you screen patients at risk for osteoporosis?	Always	4	11.8%	23	67.6%	7	20.6%	0.177
	Often	12	18.8%	33	51.6%	19	29.7%	
	Sometimes	17	16.8%	63	62.4%	21	20.8%	
	Rarely	13	31.0%	23	54.8%	6	14.3%	
	Never	2	22.2%	3	33.3%	4	44.4%	
2-Do you recommend calcium and vitamin D supplementation to patients diagnosed with or at risk for osteoporosis?	Always	32	20.8%	87	56.5%	35	22.7%	0.631
	Often	7	14.9%	30	63.8%	10	21.3%	
	Sometimes	4	11.8%	22	64.7%	8	23.5%	
	Rarely	4	40.0%	3	30.0%	3	30.0%	
	Never	1	20.0%	3	60.0%	1	20.0%	
3-For osteoporosis patients, do you refer them for physiotherapy or physical activity recommendations?	Always	17	22.4%	48	63.2%	11	14.5%	0.116
	Often	6	10.0%	37	61.7%	17	28.3%	
	Sometimes	18	18.8%	53	55.2%	25	26.0%	
	Rarely	5	45.5%	4	36.4%	2	18.2%	
	Never	2	28.6%	3	42.9%	2	28.6%	
4-How often do you participate in continuous medical education or training related to osteoporosis?	Always	16	16.5%	59	60.8%	22	22.7%	0.103
	Often	19	18.6%	64	62.7%	19	18.6%	
	Sometimes	6	17.6%	16	47.1%	12	35.3%	
	Rarely	7	41.2%	6	35.3%	4	23.5%	
	Never	0	0.0%	0	0.0%	0	0.0%	
5-How often do you use FRAX or a similar tool to evaluate fracture risk in osteoporosis patients?	Always	4	12.5%	17	53.1%	11	34.4%	0.810
	Often	6	15.4%	25	64.1%	8	20.5%	
	Sometimes	14	21.5%	37	56.9%	14	21.5%	
	Rarely	12	18.8%	38	59.4%	14	21.9%	
	Never	12	24.0%	28	56.0%	10	20.0%	

Table 9:Examines the relationship between participants' knowledge levels and their practices concerning osteoporosis. The data reveals the following key findings. Knowledge levels do not significantly influence the frequency of screening patients at risk for osteoporosis (p-value = 0.177). Participants with adequate knowledge (67.6%) and proper knowledge (20.6%) demonstrate varying screening frequencies, but there is no strong correlation between knowledge and screening practices. Similarly, the recommendation of calcium and vitamin D supplementation to patients diagnosed with or at risk for osteoporosis is not significantly affected by knowledge levels (p-value = 0.631). Participants with different knowledge levels exhibit similar patterns in their recommendations. Moreover, Knowledge levels do not significantly impact the practice of referring osteoporosis patients for physiotherapy or physical activity recommendations (p-value = 0.116). There is no strong association between knowledge and the frequency of such referrals. Additionally, the frequency of participating in continuous medical education or training related to osteoporosis is not significantly influenced by knowledge levels (p-value = 0.103). Participants with various knowledge levels demonstrate similar engagement in educational activities. Finally, the use of tools like FRAX or similar tools for evaluating fracture risk in osteoporosis patients is not significantly associated with knowledge levels (p-value = 0.810). The utilization of these tools is comparable among participants with different knowledge levels.

Discussion:-

The demographic of our study comprised PHC physicians. Males constituted a significant portion of our participants, and the most common level of education was a bachelor's degree. in our study noted that the majority of participants were young adults, below the age of 30, and had a university-level education. This is consistent with

studies that have identified the importance of targeting young adults for osteoporosis education and preventive measures (9).

In contrast to a similar study done in Saudi Arabia in 2019 (10), where only 62% of older females had heard about osteoporosis, our study found that 98% of all respondents, regardless of gender, were aware of the disease. This disparity could be attributed to differences in age and educational levels. Knowledge levels about osteoporosis in our young adult population were relatively low, with only 45.5% exhibiting a high level of knowledge. This contrasts with the cited study, where 64.4% of older women had high knowledge. The variance in knowledge could be attributed to the higher prevalence of the disease among older women, making them more informed about osteoporosis (10).

Our study found that knowledge levels about osteoporosis were relatively low, with only 45.5% of participants exhibiting a high level of knowledge. These findings are in line with previous research that has shown knowledge gaps and misconceptions among the general population regarding osteoporosis. These gaps in knowledge underscore the need for effective educational interventions to improve public awareness (11).

In terms of attitudes, a significant majority of participants in our study believed that osteoporosis is a major health concern and is preventable. This positive attitude toward prevention is encouraging and aligns with the goals of osteoporosis awareness campaigns (6,12). Nonetheless, we found variations in attitudes related to confidence in screening and managing patients with osteoporosis. Participants with proper knowledge exhibited the highest confidence in this regard. These findings underline the potential benefits of enhancing knowledge levels among healthcare professionals to improve their confidence in osteoporosis management(3).

Our study shares methodological similarities with the cited research paper, particularly in the demographic characteristics of the study population. Both investigations predominantly involved young adults, with a significant proportion below the age of 30 and possessing a university-level education. Additionally, both studies explored knowledge and attitudes related to a specific health concern, highlighting gender-based differences in disease awareness. Knowledge gaps were identified in both studies, including misconceptions regarding vitamin D sources and influencing factors (13,14). Furthermore, both investigations probed participants' practices in risk reduction, such as seeking direct sun exposure. However, the paper emphasized the need to consider unexplored factors affecting vitamin D synthesis, while our study did not delve into these aspects. These parallel findings collectively contribute to a comprehensive understanding of health awareness and behaviors, underscoring the importance of addressing knowledge gaps and translating positive attitudes into beneficial practices, particularly among young adults (5,15,16).

Moreover, it's worth emphasizing the broader implications of our study and the importance of addressing knowledge gaps and promoting preventive behaviors in young adults. Osteoporosis, often referred to as a "silent disease," can remain asymptomatic until fractures occur, which are associated with significant morbidity and mortality. This silent progression underscores the critical role of awareness and knowledge in early detection and prevention. Our findings support the idea that even in a demographic where awareness is relatively high, there remains a substantial gap in understanding the disease's intricacies, risk factors, and preventive measures (17). Moreover, it is crucial to underscore that osteoporosis is not limited to the elderly; young adults are also at risk. Bone development and peak bone mass are achieved during early adulthood, making it a pivotal period for establishing a solid foundation for bone health. This emphasizes the significance of educational interventions specifically tailored to young adults, equipping them with the knowledge and tools needed to make informed decisions about their bone health (18).

In addition, our study's parallels with the cited research from Saudi Arabia highlight the global relevance of addressing osteoporosis awareness and knowledge gaps. It underscores the need for international collaboration and sharing of best practices in public health campaigns, targeting both the general population and healthcare professionals (10). Additionally, this research further emphasizes that age, gender, and education play a significant role in shaping osteoporosis awareness and attitudes. It underscores the need for personalized interventions, educational campaigns, and the inclusion of healthcare professionals to bridge knowledge gaps, instill a proactive attitude toward prevention, and ultimately reduce the burden of osteoporosis. This approach will contribute to building a stronger foundation for better bone health throughout the lifespan.

Conclusion:-

In conclusion, our study investigated the knowledge, attitudes, and practices related to osteoporosis screening, shedding light on crucial aspects of this health concern. While our study uncovered gaps in knowledge and a noticeable divergence between positive attitudes and actual practices, particularly about calcium intake and exercise. The influence of gender and age on health awareness and behaviors emerged as consistent themes in our findings. By aligning with the broader scientific discourse, our study contributes to the growing body of knowledge surrounding osteoporosis, ultimately advocating for the development of preventive initiatives that cater to the specific needs of the population.

Recommendations:-

Given the knowledge gaps and misconceptions about osteoporosis among healthcare providers, it is imperative to develop targeted educational campaigns. These campaigns should utilize age-appropriate messaging and digital platforms, engaging PHC physicians in interactive and informative ways to raise awareness about osteoporosis and its risk factors. Moreover, conducting broader-scope research initiatives and calls on both governmental and non-governmental organizations to intensify their efforts in promoting preventive programs for osteoporosis.

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