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Knowledge, Attitude and practice towards Osteoporosis among General Practitioner doctors in primary health care centers in Jeddah, KSA

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Background: Osteoporosis is considered one of the most common metabolic disease afflicting humans especially in temperate countries as the Kingdom of Saudi Arabia. Knowledge, attitude and practice of primary care physicians is essential for proper detection and management and hence prevention of complications especially fractures. Aim: We aimed to assess knowledge, attitude and practices for osteoporosis among primary health care physicians in Jeddah, Saudi Arabia and to identify the gaps to overcome it. Methods: this study was a cross-sectional one. Self-administered questionnaire was used to identify the levels of Knowledge, Attitude and Practice. Means, standard deviations and percentages along with the 95% Confidence Interval were calculated. Results: Out of 100 physicians; 37% were female and 67% were males. About three-quarters (78%) of the study cohort was resident physicians and thought that it is significant clinical problem. Nearly third (37 %) of GP had adequate knowledge while two thirds (67 %) had inadequate knowledge. About two-thirds (67%) was unaware of the presence of any clinical guidelines for osteoporosis. The majority of participants reported that physical activity and cessation of smoking are important protective behaviors. There were good levels of knowledge, attitude, and practice regarding Dual-energy X-ray absorptiometry (DXA) scan as a diagnostic tool and bisphosphonate drug therapy. Conclusions: Treating and preventing osteoporosis is an important factor of reducing morbidity and mortality. Primary health care physicians should learn about all the aspect of this disease.

Keywords: Osteoporosis, Knowledge Attitude Practice, Primary Health Care, General practitioner, Physician

INTRODUCTION

Osteoporosis (OP) is a metabolic disease that affects bones and makes it fragile. It was defined by the

Consensus Development Conference "Osteoporosis is skeletal disease characterized by low bone and micro-architectural deterioration of bone tissue with a consequent increase in bone fragility and susceptibility to fracture" (Consensus development conference, 1991.). Although, it usually affects both genders, but it is more prevalent among females (Kanis et al.2007). As early diagnosis of OP may slow its progression. Thus keeping primary health care physicians play a crucial role in diagnosing it and preventing its consequences. Furthermore, awareness and education among primary health care physicians about OP risk factors and diagnostic modalities may help in reducing the economic and social burden of the disease (Kanis et al.2007& Wade et al.2014).

In 2013, a study was conducted in Malaysia to evaluate osteoporosis awareness among 134 primary care physicians (PHCPs) while attending rheumatology workshop. It was found that the level of awareness of OP Malaysian management guideline amongthem was 63.4%. Moreover, more experienced PHCPs (more than five years) were more likely to treat OP ($p = 0.013$) compared with those with lower experience (less than five years). According to this study, Limitation to access to bone mineral density measurement with dual-energy x-ray absorptiometry (DXA) was the main obstacles to treat OP. (Gupta et al.2013).

Locally, in 2014, a group of researchers conducted a study to assess knowledge, attitude, and practice toward OP among primary health care physician in Riyadh, Saudi Arabia. Concerning questionnaire used, knowledge section included some questions such as risk factors, signs and symptoms, diagnosis, and management of the majority of the participants agreed on three risk factors which are, female gender (92.2%), low calcium in diet (89%), and current cigarette smoking (88.5 %). On the other hand, bone pain was the most common symptom according to participants' answers (86.5%). In respect to diagnosing modality, dual-energy x-ray absorptiometry (DXA) scan was the most chosen (67.1%) (Saeedi et al.2014).

As for management, 16.3% of participants were awaring of any guidelines for treatment of OP in Saudi Arabia In the attitude section, participants were asked about the impact of OP among other diseases, and it came as the fourth disease (83.2%) after diabetes mellitus 93.2%, coronary heart disease 91.2%, and cerebrovascular disease 88.5%. Regarding prevention of OP, 81.4 % of the participants think OP is preventable disease. Especially by recommended calcium rich diet in most of participants' answers (91.8%).Moreover 68.3% of them think OP should be managed by primary health care physician. In the last section, participants were asked about their practice toward OP. only 30.5% of them were following guidelines in treating OP. Regarding looking for signs and symptoms of OP, most frequent asked question was back pain 74.6%, then current cigarette smoking 72.1%, and finally daily calcium intake 64.3%. on the other hand, while examining patients more than half of the participants were looking for low body weight 65.8%, kyphosis 61.9%, and loss of height 59.7%. regarding accessibility to investigations tolls for diagnosing OP, minority of them has access to bone mineral density and biochemical marking testing, 12.8%, 20.1% respectively (Saeedi et al.2014).

Although there was an increase in the number of research on the KAP of PHC and other physicians worldwide in the last decade (Skedros et al.2006,

Harada et al.2004,Al-Musa et al.2012,Beshyah et al.2013and Barzanji et al.2013), gap in knowledge was observed in the last few years. Moreover, and despite the consistent evidence of the increased OP incidence and prevalence (El-Desouki M, 1995.Al-Maatouq et al.2004,Al-Elq and Sadat-Ali M, 2006,Albogami et al.2004, Akkus et al.2005, Ismail et al.2012), there still is shortage in the available data on KAP of physicians regarding prevention and treatment of OP.

In conclusion, Primary health care physicians should learn about all the aspect of early treating and preventing OP to reducing morbidity and mortality. In this study, we tried to assess knowledge, practice and attitude toward osteoporosis among general practitioner in primary health care center in Jeddah, Saudi Arabia in order to catch the knowledge gap in managing OP among PHCPs and shed the light on it.

Aim

The current study aimed to assess the knowledge, practice and attitude toward osteoporosis among PHC physician to know important gaps to overcome it

MATERIALS AND METHODS

Study design & site:

Cross sectional study was conducted among primary health care physicians in primary health care centers at Jeddah, Saudi Arabia.

Study Population:

the study population was the general practitioner currently working in primary health care centers at Jeddah, Saudi Arabia, from both sexes and had Saudi Nationality. In Jeddah city, there is Forty PHC centers, distributed in four geographical sectors.

Sample size was calculated using the formula presented by the WHO for descriptive studies: $(N = Z2 * p (100 - p)/ e^2)$ where; "N" is the required sample size, "Z" is a value corresponding to the significance level, "P" is the expected percentage of people with adequate knowledge and attitude and "e" is the level of precision (WHO 1994).

Based upon the Riyadh paper; it is expected that 50-90% of Saudis would have adequate knowledge and hence the minimum required sample (according to the above formula) was 90 and this was increased to include 100 participants to assure more statistical robustness.
Knowledge was assessed by score of different questions, each one had answers “yes”, “No” & “uncertain”, yes was given score 1 , while “No” or “uncertain” were scored zero, with Cronbach’s alpha 0.602. knowledge score above Median (> 17) considered adequate knowledge, while low than or equal to 17 (≤ 17) considered inadequate knowledge.

Study Procedure:
Non-probability convenience sampling technique was applied, data was collected using a self-administered questionnaire divided into four sections; socio-demographic and professional questions (age, sex, nationality and qualification data); knowledge (what people know); attitude (how they feel) and practice (what they do). Full information about the study along with a copy of the questionnaire were distributed to the PHC physicians at their areas via e-mail/mail/by hand. Data collection period was from April 2017 to April 2018. Multiple reminders were sent to the GPs to boost the response rate. It took about 5-10 minutes to be completed.

Statistical analysis:
Data were verified, recoded, and analyzed using SPSS version 24 software **(**IBM Corp. Released 2016). Descriptive statistics: means, standard deviations and percentages along with their 95% CI were calculated. We have used the entire sample for the final analysis as the missing data did not exceed 10% in any of the questions. The chi-square test used for comparing independent categorical variables while Mann Whitney for multiple groups for quantitative data as it was not normally distributed. The P-value set at 0.05.

RESULTS
The current research adopted an observational cross-sectional design to determine the level of KAP of PHC physicians regarding osteoporosis. A total 100 completed questionnaires were included for the final analysis. The mean participants’ age was about 36, ranged between 25 and 63 years. The female/male ratio was about 1:2 (37/63%). Only 17% had degree in family medicine and the median experience years was 7 (1-30 years). For the MOH classification, only one-fourth (22%) of the sample was classified as specialists/consultants. Moreover, the preponderance of the respondents (84%) reported that they do not have specialized OP program at their workplace and about half of them had active internet access at work (52%) (Table 1).

Table 1: Socio-demographic and professional characteristics of the participating physicians

Variable	Category	n = 100
Age in years	**Mean ± SD**	35.98 ± 7.4
	Median (Range)	34 (25 - 63)
Sex	**Male**	63 (63%)
	Female	37 (37%)
Professional Qualification	**MBChB**	83 (83%)
	SBFM	17 (17%)
Years of Experience	**Mean ± SD**	8.36 ± 5.9
	Median (Range)	7 (1 - 30)
Professional Grade	**Resident**	78 (78%)
	Specialist	17 (17%)
	Consultant	5 (5%)
Specialty	**FM**	44 (44%)
	GP	56 (56%)
Presence of OP Program	**Yes**	16 (16%)
Internet Access	**Yes**	52 (52%)

Table 2 illustrated the participants’ KAP about OP risk factors and diagnostic procedures. The awareness that the T-score cut-off for OP screening was < 2.5 standard deviation (SD) as recommended by the WHO was reported in 85% of the studied cohort about. Regarding OP risk factors, knowledge of physicians ranged between 21.3% and 79.8%. The highest percentages were low dietary calcium (80%) and current cigarette smoking (77%) while the lowest scores (below 50%) were low diet salt (21%) and female gender (23%).

The following results recorded 37 % of GP had adequate knowledge, and 67 % had inadequate knowledge. As regards OP signs and symptoms; about 76% of the participants were aware that bone pain is an important symptom of OP (Table 2). Moreover, about two-thirds were aware that kyphosis, loss of height and fatigue are known to be signs of OP, respectively. With respect to the radiological methods for OP screening and diagnosis; about 56% of the sample acknowledged that plain x-ray can be used; of those the highest percentage (89%) reported that it is useful for fracture prediction, 59% found it inaccurate for BMD determination and only 39% acquainted that it can be used for OP diagnosis (Fig. 1). Also, only 40% of the cohort identified CT as a diagnostic tool for OP, entails, 38% found it as the most sensitive diagnostic tool, half of them said that it had higher risk of radiation compared with DXA and only 36% reported that it is cheaper in comparison with DXA (Fig. 2). Furthermore, 68% were aware that DXA scan is an

important diagnostic method, the majority of them knew that it is the best diagnostic tool (86%), it can predict fracture risk and it accurately determine the BMD (83%) and only 32% reported that it needs long time (Fig. 3).

In relation to the use of bisphosphonates for treatment, only 60% were aware that it is the most commonly used drug for treatment of OP; of those, about three-quarters were aware that bisphosphonates is the 1st line treatment, 71% believed that it is already approved by the FDA and only 32% thought that it can reduce the fracture risk (Fig. 4). Surprisingly, only 16% of the participants reported the presence of any OP clinical guidelines in the KSA (Table 2).

Neither sociodemographic characteristics, Professional Qualification, Years of experience, Professional grade nor internet access showed any significance differences between GP with adequate knowledge versus GP with inadequate knowledge (Table 3).

Table 2: OP related Knowledge among PHC physicians

	Percentage (95% CI) *
WHO criteria define osteoporosis as T score less than 2.5 SD	85% (72%-93%)
Risk Factors	
• **Current cigarette smoking**	77.2% (59.8%-85.4%)
• **Low salt diet**	21.3% (16.9%-26.3%)
• **Low body weight**	67.6% (57.1%-74.4%)
• **Early menopause**	64.5% (54.4%-69.8%)
• **Bilateral Ovariectomy**	51.4% (49.5%-61.2%)
• **Low calcium in diet**	79.8% (68.2%-86.3%)
• **Old age**	66.1% (60.5%-79.8%)
• **Female gender**	23.2% (18.2%-31.5%)
• **Family history of osteoporosis**	56.5% (49.1%-68.1%)
Signs or symptoms	
• **Bone pain**	76.1% (62.1%-85.4%)
• **Kyphosis**	63.5% (55.6%-69.6%)
• **Loss of height**	63.9% (57.5%-71.4%)
• **Fatigue**	64.4% (60.2%-77.2%)
Knowledge regarding plain radiography	55.8% (44.8%-63.1%)
Knowledge regarding qualitative CT scan imaging	41.3% (37.2%-50.4%)
Knowledge regarding DXA scan	67.5% (55.9%-70.8%)
Knowledge regarding bisphosphonates	59.7% (52.4%-64.8%)
Awareness of any guideline for treatment of OP in the KSA	32.4% (26.2%-37.1%)
Knowledge score	
Mean ± SD	16.73 ± 3.76
Median (IQR)	17 (5.75)
Adequate > 17	37 (37%)
Inadequate ≤ 17	63 (63%)

***95% CI=95% Confidence Interval**

Table 3: Differences of Sociodemographic, Occupational & Presence of OP Program Differences between Adequate & Inadequate knowledge

Variable	Frequency (%)	Adequate knowledgeN=37	Inadequate Knowledge N=63	P-value
Age in years				
Median (IQR)		35(10)	34(10)	0.53*
Sex				
Male	63 (63%)	24 (64.9%)	39 (61.9%)	0.76
Female	37 (37%)	13 (35.1%)	24 (38.1%)	
Professional Qualification				
MBChB	83 (83%)	29 (78.4%)	54 (85.7%)	0.34
SBFM	17 (17%)	8 (21.6%)	9 (14.3%)	
Years of Experience				
Median (IQR)		7(3.5)	7(5)	0.28*
Professional Grade				
Resident	78 (78%)	29 (78.4%)	49 (77.8%)	0.69
Specialist	17 (17%)	7 (18.9%)	10 (15.9 %)	
Consultant	5 (5%)	1 (2.7%)	4 (6.3%)	
Specialty				
FM	44 (44%)	15 (40.5%)	29 (46.0%)	0.59
GP	56 (56%)	22(59.5%)	34 (54%)	
Presence of OP Program	16(16%)	7 (18.9%)	9 (14.4%)	0.54
Internet Access	52 (52%)	20(54.1%)	32(50.8%)	0.75

***Mann Whitney test

Table 4: Attitude towards OP among PHC physicians

	Percentage (95% CI) *
Impact of the following diseases on health of the community and individuals?	
Coronary heart disease	95.2% (90.1%-97.4%)
Diabetes mellitus	100% (97%-100%)
Cerebrovascular diseases	96.1% (90.5%-98.1%)
Osteoarthritis	96.5% (90.6%-98.4%)
Osteoporosis	100% (95%-100%)
Risk factors with a major influence on osteoporosis?	
Family history of osteoporosis	90.6% (84.8%-96.3%)
Old age	91.9% (88.5%-97.1%)
Female Sex	91.7% (86.9%-96.5%)
Oestrogen deficiency	89.4% (84.5%-93.9%)
Lack of physical exercise	92.5% (86.4%-95.1%)
Poor calcium diet	93.3% (87.1%-96.2%)
Vitamin D deficiency	95.8% (91.6%-96.8%)
High alcohol consumption	91.0% (86.2%-94.1%)
Cigarette smoking	91.7% (84.3%-96.5%)
Low body weight	91.3% (85.8%-95.6%)
Effectiveness of various tools regarding osteoporosis prevention?	
Regular physical exercise	94.3% (87.2%-96.5%)
Calcium rich diet	92.1% (82.5%-94.3%)
Hormone replacement	88.7% (81.6%-92.9%)
Calcium supplementation	94.4% (85.8%-97.9%)
Vitamin D supplementation	93.8% (84.1%-97.0%)
Avoiding underweight	94.7% (86.2%-97.3%)
OP should be diagnosed and followed up by PHC physician?	69.2% (64.9%-74.1%)
OP is preventable disease?	89.4% (80.6%-93.2%)
Your patients are aware of osteoporosis?	33.6% (28.5%-36.7%)

***95% CI=95% Confidence Interval**

Table 5: Practice of PHC physicians regarding OP management

	Percentage (95% CI) *
Following any guideline for treatment of osteoporosis?	45.9% (38.1%-62.4%)
Having any subscription in any medical journal or website?	42.6% (37.9%-44.7%)
How often do you ask about the following?	
• **Back pain**	88.9% (82.7%-94.9%)
• **History of fracture**	81.9% (77.5%-89.1%)
• **Family history of osteoporosis**	78.6% (71.9%-86.2%)
• **Current cigarette smoking**	86.5% (79.7%-91.2%)
• **Daily calcium intake in diet**	82.4% (75.1%-85.4%)
How do you often look for the following in your examination?	
• **Kyphosis**	68.4% (60.1%-75.4%)
• **Loss of height**	70.6% (66.9%-76.2%)
• **Low body weight**	80.8% (74.3%-87.6%)
Do you have accessibility to perform BMD?	34.1% (28.1%-40.7%)
Do you have accessibility to Biochemical Marker Testing?	44.6% (39.3%-52.6%)

***95% CI=95% Confidence Interval**

The level of attitude towards OP prevention and control was illustrated in Table 4. All participants affirmed that DM and OP are among the main serious diseases that have major impact on the general health of individuals as well as the community and about 95% of them found that CHD (95.2%), CVD (96.1%) and OA (95.5%) are among these serious diseases. Referring to the factors with major impact on OP; all the risk factors asked for were identified by most (ranged between 96% and 89%) of the studied physicians as bearing major influence on OP. Likewise, all the preventive measures investigated were identified by most (ranged between 95% and 89%) of the studied physicians as bearing effective. Furthermore, about two thirds (69%) believed that OP should be diagnosed and followed up by PHC physician. Additionally, about 90% thought that OP is a preventable disease. Notwithstanding, about one-third (34%) of the participants believed that their patients were unaware about OP (Table 4).

Tables 5 showed the participants' responses in respect to their practices of OP management. It was found that less than half the sample (46%) had followed any clinical guidelines for diagnosis/treatment. As well, only about 43% have access or subscribed to any medical journal or website that provide evidence-based knowledge. About the history taking practices, inquiring about back pain, current cigarette smoking, daily calcium intake, history of fracture and family history of OP was revealed by 89%, 87%, 82% and 79%, respectively. Regarding practice of validated examination maneuvers for cases; the highest percentage of participants (81%) examine their patients for weight loss, followed by loss of height (67%) and kyphosis (68%). Referring to the main tools of OP investigations; only about one-third (34%) declared that they have access to perform BMD. Likewise, only about 45% admitted that they can request for biochemical marking testing for their clients. Not in a shell, only 12% and 27% of those reported practicing BMD and BMT investigation requests, do this either often or always. As well, 41% and 33%, use it infrequently or sometimes (Fig. 5).

DISCUSSION

Osteoporosis is believed o to be one of the most common metabolic disease afflicting humans (Consensus development conference, 1991.) in particular in temperate countries as the Kingdom of Saudi Arabia (Beshyah et al.2013, Barzanji et al.2013,Saeedi et al.2014 ,Gupta et al.2013). Knowledge, attitude, and practice of primary care physicians is essential for proper detection and management and hence prevention of complications especially fractures (Mahdaviazad et al.2018). The current study was conducted to evaluate the knowledge and attitude toward osteoporosis among PHC physician and to assess their KAP correlates. A cross sectional design of 100 PHC physicians currently working in PHC units in Jeddah, KSA in the period between April 2017 and 2018. A convenience sampling technique was used to recruit participants and self-administered questionnaire was used for data collection via mail/e-mail/by hand.

Concerning OP knowledge among respondents, only 37 % had good knowledge, with variation of the percentage of each question concerning knowledge among physicians ranged between 21.3% and 79.8%. A study by Saeedi, et al., in different regions of the KSA found approximately similar results (knowledge levels ranged between 37% and 92%). The higher percentage in the latter study could be attributed to the inclusion of non-Saudis who required to have certain qualifications for recruitment in the Saudi MOH (Saeedi et al.2014). This was also consistent with a study in Abha, KSA in 2013 which found similar results with an average level of knowledge of 67% (Al-Musa et al. 2012). In line with the

findings of this study, a study on PHC German physician awareness about OP and Knowledge of the 2007 National Guidelines concluded that 83% had good knowledge regarding OP (Chenot et al.2007).

In respect to the radiological maneuvers for OP screening and diagnosis; about 56% of the sample reported that plain x-ray was useful diagnostic tool. Also, 41% identified CT as a good OP diagnostic tool. Also, 68% were knowledgeable that DXA scan is an important diagnostic method, most of them were aware that it is the best diagnostic tool, and it can predict fracture risk and accurately determine the BMD. This come to an agreement with Saeedi, et al., who reported that about 68% and 51% acknowledged the diagnostic importance of plain X-ray and CT, respectively. DXA scan was identified as an important diagnostic method in 67% of the study cohort (Saeedi et al.2014). This was also consistent with a Malaysian study, concluding only one third of the studied sample were aware about screening tools or clinical decision rules (Khan et al. 2013).

Knowledge about bisphosphonates as treatment agent was reported in 59.7%. This was in agreement with Saeedi et al., who found similar results (Saeedi et al.2014). This was inconsistent with a study in Kuwait in 2011 that found better knowledge levels of the physicians about the use of hormonal replacement therapy in prevention of osteoporosis (87.3%) (Al-Eassa et al. 2012). The higher knowledge levels in the latter study could be explained by that the majority of respondents (82%) were non-Kuwaiti and had at least a master's degree (63%) (Al-Eassa et al. 2012).

Although that KAS MOH issued the KSA clinical guidelines for OP in 2015 (Al-Saleh et al.2015), it was found that there was poor knowledge about the presence of such guidelines (32.5%). This was better compared with Saeedi et al., who found that only 16% had the knowledge that there are any clinical guidelines for OP in the KSA. This was in accordance with Chenot, et al., who found that about half of the sample was knowledgeable about the presence of local OP guideline (Chenot et al. 2007). Likewise, a study in the UAE in 2013 reported that about three-quarters of the studied sample were unaware of the presence of regional guidelines on OP (Beshyah et al. 2013).

Considering the level of attitude toward OP prevention and management, almost all participants believed that the main serious diseases (i.e. CHD, DM and CVD) have major impact on the health of individuals as well as the community with higher percentage for osteoarthritis and OP (95.6% & 100%, respectively). This was in agreement with Beshyah et al., who claimed that that the majority of the respondents thought that OP was an important clinical problem, and appreciated the fact that women in the Middle East are at an increased risk of OP (Beshyah et al. 2013). Likewise, a German study declared that only 11.2% did not consider osteoporosis an important problem (Chenot et al. 2007).

On the other hand, Saeedi et al. 2014 reported that osteoarthritis and OP were considered as important health problems that had major impact on health by lower portions of the sample (76% & 83%, respectively). This may be due to the effort provided by the Saudi MOH in developing and implementing the KSA guidelines (Al-Saleh et al. 2015). Pertaining to the major correlates of OP; participants with good attitude represented the majority of the sample (89.5-96%). This was consonant with Saeedi et al. who found that more than four-fifth of the participants had good attitude for OP risk factors. Similar results were reported by El-Eassa et al., in Abha, KSA (Al-Eassa et al.2012). Again, previous studies in UAE and Belgium assessing OP KAP among GPs found compatible results (Beshyah et al. 2013 and Bruyère et al. 2013).

Respondents attitude regarding the principle preventive strategies was positive for most of the OP preventive measures (89-95%). This was in line with Saeedi et al., with more than 85% believed in most of the OP preventive measures. The Abha study supported the current findings with about 88% of the sample had positive attitude for the main preventive tools (Al-Eassa et al. 2012). Chenot et al., reported similar results (i.e. 83% were competent in prevention and control measures (Chenot et al. 2007). It was concluded that about 69% believed that PHC physician should be qualified for managing OP cases. Also, the majority of sample (89.4%) believe that OP is a preventable disease. However, only one-third thought that their patients were unaware of OP. These findings were congruent with many previous studies investigated the KAP of OP among PHC physicians (Al-Eassa et al. 2012, Chenot et al. 2007, Beshyah et al. 2013).

For practice level of OP among the studied cohort, about 46% reported following clinical guidelines. In agreement with the current results, Chenot et al., found that about 40% of the German PHC physicians follow the available clinical guidelines (Chenot et al. 2007). Saeedi et al. in 2014 found that only 30% of the sample follow clinical guidelines (Saeedi et al. 2014). This may be a result of the issuing of the KSA guidelines in 2015 along with the effort of the Saudi MOH in the provision of training and awareness programs (Al-Saleh et al. 2015). Although there was improvement in this perspective, it is still considered poor practice as less than half of the sample abide with available clinical guidelines. This could be referred to that about 43% have active subscription in any medical journal or website that allow them to update their knowledge and improve their practices. As well, this could be accounted for by the lower level of awareness about the existence of OP clinical guidelines in the KSA. It was noticed that there was minor improvement in this point as

Saeedi et al. 2014 reported that about 40% have access to authentic medical knowledge provider (Saeedi et al.2014).

For the history taking practices, positive practice was recorded by most of the sample (79-89%). Also, in case examination practices, higher percentage of the participants had positive practice (69-81%). About 34% declared that they have access to perform BMD and about 45% can ask for biochemical marking testing for their clients. These figures were better than Saeedi et al., in 2014 who found that about 75% asked about back pain and current cigarette smoking, about 67% asked about daily calcium intake. Again, only 50% investigated history of fracture and family history of OP. Likewise; about 60% of the respondents reported that they examine their patients for kyphosis, loss of height and loss of weight. For the main tools of investigations, only 13% declared that they have access to perform BMD and only 20% can ask for biochemical marking testing for their clients (Saeedi et al. 2014). Again, the undeniable effort of the Saudi MOH in developing and implementing the KSA guidelines in 2015 played important role in such little improvements, but still need more due to low total knowledge scores among cohort GP (Al-Saleh et al. 2015).

Strengths and Limitations

To our knowledge, this is the first KAP study for OP among GPs in the KSA, since 2014. This could examine the impact of applying the National OP KSA clinical guidelines that was issued in 2015. Especially that osteoporosis is a global public health issue that burden the economics of countries, that give more attention to such problem for early diagnosis & prevention by primary health care doctors

Several limitations were reported, firstly: the cross-sectional design of the study that may endanger the evidence power of the study & threaten its external validity and lacks causal effect. Applying convenience sampling technique jeopardize the generalization of the findings, Also, lack validity & reliability of questionnaire used, thus give new idea for further research

Figure Legends

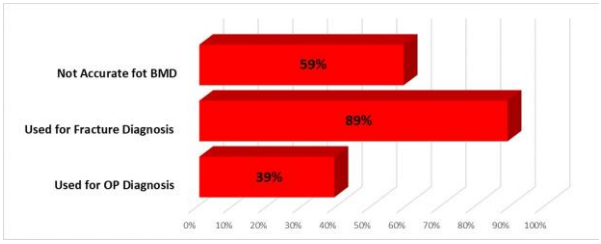

Figure 1: Knowledge regarding Plain Radiography

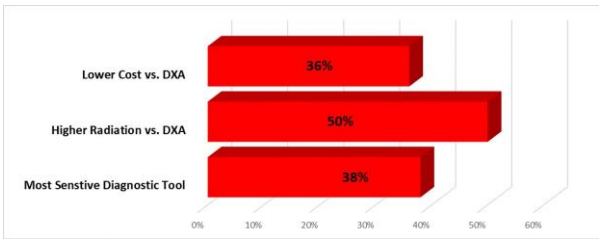

Figure 2: Knowledge regarding Qualitative CT scan imaging

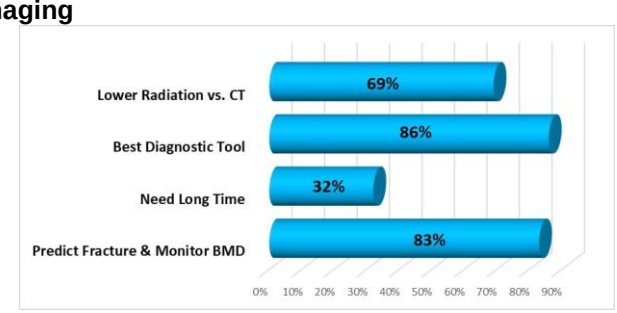

Figure 3: Knowledge regarding DXA Scan

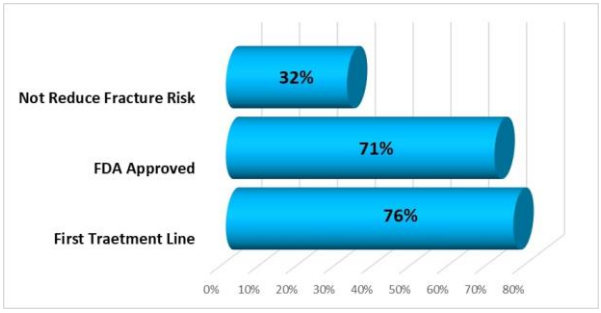

Figure 4: Knowledge regarding Bisphosphonates for Treatment

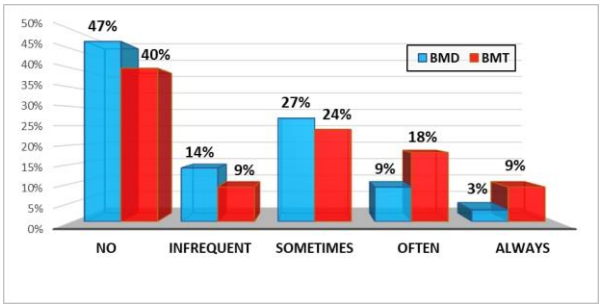

Figure 5: Frequency of Utilizing Diagnostic Tools (Practice)

CONCLUSION

To date this is the first study to evaluate the level of knowledge, attitude, and practice of PHC physicians regarding OP prevention and control in the KSA after issuing the national guidelines in 2015. The results of the current study provided evidence on the positive impact of the provision of national guidelines for PHC physicians all

over the kingdom. However, the level of awareness about presence of KSA national guidelines is still poor (32.5%) and less than half of the sample practice these guidelines. So more efforts needed to enhance GP knowledge & practice toward osteoporosis, as early prevention of osteoporosis is an important factor of reducing morbidity and mortality. Primary health care physicians should learn about all the aspect of this disease.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

KAB; conception, design of the work and substantively revised, HAA, conception, design of the work, acquisition, approved the submitted version and drafted the work, AMA, AAA, SFA, SSA, AMA, HMA, AHF, NAS, LAF, MRE and HOA; design of the work, acquisition, approved the submitted version and drafted the work; AKI; acquisition, analysis, interpretation of data, MRE & AKI: drafted the work, substantively revised it.

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