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OSTEOPOROSIS KAP IN KARACHI: A QUANTITATIVE CROSS-SECTIONAL STUDY

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Abstract
The primary objective of this study was to comprehensively assess the knowledge, attitudes, and practices (KAP) regarding Osteoporosis among the general population of Karachi, thereby contributing to a deeper understanding of public awareness and behaviour related to this prevalent bone health condition. The researchers conducted a cross-sectional study with a validated questionnaire initially through a pilot study, achieving a reliability score of 0.827. The study includes a sample of 510 participants, surpassing the required 439, with a 95% confidence interval. The study revealed that a substantial 70% of participants demonstrated a commendable level of knowledge regarding Osteoporosis, with a notable prevalence among female university students and individuals within the healthcare profession. Furthermore, an impressive 89% of participants exhibited positive attitudes toward the condition, while 60% showcased commendable practices in managing and preventing Osteoporosis. Through binary logistic regression analysis, we identified robust associations between knowledge levels and educational background, particularly noting the significance of medical education in influencing Osteoporosis-related knowledge and awareness. These findings shed light on the factors influencing Osteoporosis-related KAP within our study population. It can be concluded that a rigorous exercise to reduce the occurrence of disease on a national level is required to decrease the economic burden and to improve the health standard of the population.

Keywords: KAP, Osteoporosis, Pakistan, Bone Health, Metabolic disease, Karachi

INTRODUCTION:

Osteoporosis is a common metabolic disease that is characterized by low bone mineral density which increases bone fragility. Hence, the risk of fracture also increases. Approximately 8.9 million fracture

occurs due to osteoporosis annually [1]. In Pakistan, 7.2 million women out of 9.9 million people suffer from this disease. It is estimated that this prevalence will gradually rise to 12.9 million by the year 2050 [2] Hence, It is important for individuals to take measures to prevent and detect osteoporosis early to maintain healthy bones and enhance their quality of life. In addition to using Bone Mass Density (BMD) to diagnose osteoporosis, several clinical risk factors have been recognized as important predictors of osteoporotic fractures. These risk factors include age, gender (commonly seen in females), premature menopause, and smoking [1] Knowledge, attitude and practice (KAP) Surveys may examine communication processes and sources, which are important in establishing effective preventive and control measures. KAP studies may be used to assess needs, difficulties, and challenges in healthcare programs, as well as ideas to improve service quality and accessibility [3] Aim of the current study is to determine the knowledge, attitude and practice of the general population of Karachi metropolis towards osteoporosis. Major literature shows surveys on women and about how well or ill-informed they are regarding the disease. We have focused on both genders to know their perspective and to compare and see what they think.

Methodology

Study Design:

The study employed a cross-sectional study design, executed through the utilization of Google Forms as the primary data collection tool. To ensure comprehensive representation, we employed a Snowball sampling method. For participants who were aged, technologically uninformed, or faced difficulties with reading, we conducted face-to-face interviews using standardized questionnaires. Data collection efforts extended across the entire Karachi metropolis, encompassing diverse geographical areas and ethnic groups. The study was carried out over four months, commencing on the 21st of October 2022 and concluding on the 25th of February 2023. This approach allowed for a robust and inclusive exploration of Osteoporosis KAP within the Karachi population.

Instrument Design:

We developed a structured questionnaire through an extensive review of the existing literature. This questionnaire was organized into two distinct categories of inquiries: Demographics and Knowledge, Attitude, and Practice (KAP) Objective-based Questions. The Demographics section encompassed essential demographic information, including gender, age, marital status, education level, educational background, occupation, ethnicity, and monthly income. The second section of the questionnaire was dedicated to assessing Osteoporosis-related KAP. It included nine knowledge-related questions, five questions focused on gauging participants' attitudes, and ten questions aimed at evaluating their daily life practices concerning Osteoporosis awareness and management. To ensure the questionnaire's reliability and validity, we conducted a pilot study involving 30 participants. Subsequently, the data collected were analyzed using SPSS-25. The internal consistency of the questionnaire was assessed using Cronbach's alpha coefficient, which demonstrated a high level of reliability with a value of 0.827. This robust psychometric evaluation confirmed the questionnaire's authenticity and suitability for our research purposes.

Sample size calculation

The sample size was calculated using OpenEpi online epidemiologic software [4] using an average 37.01% prevalence of osteoporosis in Pakistan [5, 6]. Power was 80% and on 95% confidence interval the sample size was calculated to be 359 and on 97% confidence interval it was calculated to be 439. To obtain the maximum accuracy, a validate of 510 participants is presented in the study. < 10% of incomplete data was discarded

Ethical Approval:

The protocol was approved by ethical committee of Faculty of Pharmacy-Hamdard University vide letter no. ERC-FoP-2022-004.

Inclusion Criteria
Participants of both genders aged 18 years or above were eligible for inclusion in the survey.

Exclusion Criteria
The following criteria were applied for exclusion from the study:
1. Individuals below the age of 18 were excluded.
2. Participants who did not voluntarily consent to participate in the survey were excluded.
3. Questionnaires that were incomplete or improperly filled out were excluded from the analysis to ensure data quality.
4. Individuals who self-reported as suffering from Osteoporosis or a related condition were excluded to maintain a focus on the general population's knowledge, attitudes, and practices related to Osteoporosis.

Measurement
We evaluated participants' knowledge of Osteoporosis using a set of nine questions, each offering response options of "yes," "no," or "don't know." Correct answers were scored as 1 point, while incorrect responses and "don't know" received 0 points. The resulting scores ranged from 0 to 9, with a knowledge level of ≥ 5 considered satisfactory. Participants' attitudes toward Osteoporosis were assessed by categorizing their responses as positive (1) or negative (0). Attitude scores ranged from 0 to 5. To assess participants' practices related to Osteoporosis, we categorized responses as good (2), moderate (1), or bad (0) practices, resulting in scores ranging from 0 to 3 (bad), 4 to 6 (moderate), and >7 (good).

Statistical analysis:
The questionnaire's validation was assessed using Cronbach's alpha. Demographic data were analyzed with frequency distributions and goodness-of-fit tests in SPSS 25. For the evaluation of knowledge, attitude, and practice, Likert scales were employed, and Pearson's chi-square test of correlation was applied, with gender as a key variable. The data were presented as frequencies and percentages. Notably, rigorous data quality control was implemented, and it was determined the missing values in the dataset, as confirmed through comprehensive analysis using SPSS 25. To investigate the correlation of practice with various factors, binary logistic regression analysis was conducted, treating practice as a dichotomous variable. The analysis assessed its dependence on age, gender, type of education, marital status, knowledge, and attitude. Statistical significance was determined with a p-value threshold of <0.05.

Results:
Stringent data quality control procedures were diligently applied throughout the study, resulting in the absence of missing values within the dataset, as confirmed through comprehensive analysis using SPSS 25. A total of 510 valid responses were collected by sharing the Google Forms survey link within work and family groups and on various social media platforms. The data distribution was assessed using the Kolmogorov-Smirnov test, which indicated a non-normal distribution. Table 1 summarizes the demographic characteristics of the study participants. The gender distribution was approximately equal, with 46% male participants ($\chi2 = 3.49$, NS). Notably, the largest age cohort consisted of individuals aged 18 to 30 years, accounting for an average of 65% of the study participants ($\chi2 = 695$, $p < 0.001$). The majority of participants were single, comprising 61% of the sample ($\chi2 = 24.59$, $p < 0.001$). Regarding education levels, 43.5% of the study population had attained a level of education equivalent to graduation or higher, while 42.9% were actively pursuing higher education ($\chi2 = 90.04$, $p < 0.001$). The distribution of participants with medical (48%) and non-medical (52%) backgrounds was nearly equal ($\chi2 = 0.78$, NS). In terms of occupation, students represented the largest proportion at 46% (n = 355), followed by 36% (n = 182) in private jobs ($\chi2 = 397.9$, $p < 0.001$).

Among the 510 participants, 70% (n = 358) demonstrated satisfactory knowledge. Gender exhibited a significant association with knowledge ($\chi2 = 9.98$, $p = 0.002$), with males displaying a predominance of poor knowledge and an equal distribution of satisfactory knowledge. The educational level also correlated with knowledge ($\chi2 = 13.64$, $p = 0.001$), revealing that university students exhibited superior knowledge compared to their counterparts with lower educational backgrounds. Furthermore, a distinct demarcation in knowledge was observed based on the type of education ($\chi2 = 97.7$, $p < 0.001$), as individuals with medical and allied backgrounds displayed satisfactory knowledge compared to those with non-medical backgrounds. Table 2 provides a detailed overview of participant responses regarding their knowledge of osteoporosis.

Notably, 455 participants exhibited positive attitudes, characterized by their agreement to abstain from addictive substances, engage in sunlight exposure, and maintain regular milk consumption. Gender ($\chi2 = 1.86$, NS) and educational level ($\chi2 = 0.1$, NS) did not display significant correlations with attitudes. However, attitudes were notably associated with the type of education ($\chi2 = 7.25$, $p = 0.007$), with non-medical backgrounds demonstrating a higher prevalence of negative attitudes (69%), while positive attitudes were equally distributed between both groups. Table 3 presents participant responses related to their attitudes towards osteoporosis.

A total of 312 participants (61%) exhibited moderate practices, while 168 (33%) demonstrated good practices ($\chi2 = 233.9$, $p < 0.001$). Gender ($\chi2 = 2.84$, NS) and educational level ($\chi2 = 3.57$, NS) displayed no significant correlations with practices. Nevertheless, a substantial correlation was identified based on the type of education ($\chi2 = 8.9$, $p < 0.001$), revealing that medical professionals exhibited better practical measures towards osteoporosis, with 56% displaying moderate practices and 39% demonstrating good practices, in contrast to non-medical participants, where 66% exhibited moderate practices and 27% demonstrated good practices. Table 4 provides insights into participants' practices concerning osteoporosis.

Discussion:

Osteoporosis is a global health problem which is characterized by reduced bone mineral density of about ≥ 2.5 SD below normal. It is the major contributing factor in pathological fractures thereby contributing to social, economic and medical burden [7]. According to some studies,>200 million people suffer from osteoporosis per year [8] and it is estimated to cause 9 million fractures a year [9] According to a meta-analysis of 86 studies the worldwide prevalence of osteoporosis among people of 15 – 105 years age groups is 18.3% where 23.1% prevalence was found in women and 11.7% in men [7]. African population showed a 36.9% prevalence which was followed by the Central Mediterranean region which showed a 24.4% distribution. Osteoporosis is showing a rising trend which could become an even bigger problem in the future [10]. According to another study, vertebral fractures due to osteoporosis were seen 26% in Scandinavia, 24% in Japan, 20% in the Middle East, 18% in Eastern Europe and 11 -19% in America. It was found that there is a fold high risk of developing osteoporosis in white people [11]. It is recommended that people who come with complaints of fractures should be assessed for osteoporosis as it is seen that patients are not treated for osteoporosis when they are being treated for fractures or repeated fractures [12].

Osteoporosis is mainly characterized by very vague symptoms initially like brittle nails and loss of grip which cannot be pinpointed with osteoporosis. There are certain risk factors like positive family history, old age, low sun exposure [8] menopause and smoking [5] presence of which should urge the necessity for regular checkups for Vit D and Ca^{+2} levels [13]. Assessment of blood markers of bone turnover like β-CTx levels [14] and dexa scan (BMD) or broadband ultrasound attenuation (BUA) [6] can be of help in early diagnosis and timely treatment. Chronic diseases like asthma or rheumatoid arthritis can be very important cofounders of this disease.

It is very important for a person to have good or satisfactory knowledge about certain medical conditions as good knowledge leads to taking preventive measures that can prevent the disease or delay the process [15]. The current study was focused towards osteoporosis knowledge. Many studies focused on the knowledge of women about the disease. It was found that in some studies knowledge of women attending OPDs was not satisfactory [2] or showed good knowledge of inappropriate

lifestyle [16]. In some cases, knowledge level was dependent on the level of education [17]. The current study was conducted on university students pursuing health-related fields and knowledge level was found satisfactory in 41% female students and 29% male students. This was consistent with the findings of Khan et al [18] who showed that university-going female students are more aware of osteoporosis than male students

Lack of education, less awareness about the disease and negative attitude are positively correlated with bad practices [19]. The current study showed that positive attitude was significantly correlated with type of education. People with a health education background as they had knowledge, mainly displayed a positive attitude but there was no difference in gender or level of education which shows a kind of ignorant behaviour of the society where people do not tend to be aware of their health and well-being.

Abnormal diet patterns, lack of balanced diet, inadequate morning sunlight exposure and abnormal lifestyle can be the major contributing factors for osteoporosis [6] but according to a recent study by Cheng et al [20] women above 18 years in Malaysia do not have a good practice against osteoporosis which was dependent upon race, education level, occupation and income of participants. Logistic regression analysis of Practice taken as a dichotomous variable in the current study shows that good practice depends upon the type of education (χ^2 = 9.46, p = 0.002) where students of health professionals were displaying satisfactory practices. Good practice in the current study was also found significantly dependent on the knowledge of the participants (χ^2 = 4.06, p = 0.044) thereby proving the fact that good knowledge about osteoporosis facilitates better practice and prevention [21].

Conclusion

As osteoporosis is identified as a major public health problem increasing the incidences of pathological fractures and contributing to economic burden, a population-wide intervention program should be launched to increase knowledge, improve attitude and facilitate best practices to avoid morbidity and complications.

Conflict of Interest Statement

The authors of this manuscript, titled "Osteoporosis KAP in Karachi: A Quantitative Cross-Sectional Study" hereby declare that they have no conflicts of interest to disclose that could potentially influence the interpretation of the data presented in this study.

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Table 1: Demographic characteristics of Study population

Variables	Options	Frequency	percentage	Chi square/ P-Value
Age	18-30	333	65.3	χ^2= 695.039 P=0.000
	31-40	86	16.9	
	41-50	62	12.2	
	50 above	28	5.5	
Gender	Male	234	45.9	χ^2=3.459 P=0.063
	Female	276	54.1	
Marital status	Married	199	39.0	χ^2=24.596 P=0.000
	Single	311	61.0	
Education	No formal education	19	3.7	χ^2=702.925 P=0.000
	Primary school (1-5)	3	0.6	
	Middle school (6-8)	10	2.0	
	Secondary school (9-12)	37	7.3	
	University	219	42.9	
	Graduated	158	31.0	
	Post graduated	48	9.4	
	PHD	16	3.1	
Educational background	Medical Education	245	48.0	χ^2=0.784 P=0.376
	Non-medical education	265	52.0	
Monthly Income	<25,000	50	9.8	χ^2=272.141 P=0.000
	25,000-50,000	68	13.3	
	50,000-75,000	73	14.3	
	75,000-100,000	44	8.6	
	> 100,000	53	10.4	
	None	222	43.5	
Occupation	Government job	36	7.1	χ^2=387.863 P=0.000
	Private job	182	35.7	
	Unemployed	16	3.1	
	Housewife	41	8.0	
	Student	235	46.1	
Ethnicity	Punjabi	86	16.9	χ^2=816.376 P=0.000
	Balochi	16	3.1	
	Sindhi	55	10.8	
	Urdu speaking	290	56.9	
	Gilgit	3	0.6	
	Pathan	35	6.9	
	Kashmiri	25	4.9	

Table 2: Assessment of Knowledge Towards Osteoporosis

KNOWLEDGE				
Variables	Options	Frequency	percentage	Chi square/ P-Value
Are you aware of metabolic bone disease osteoporosis)	Yes	342	67.1	χ^2=262.212 P=0.000
	No	94	18.4	
	Don't know	74	14.5	
Osteoporosis occurs due to a deficiency of vitamin D3.	Yes	351	68.8	χ^2=321.494 P=0.000
	No	27	5.3	
	Don't know	132	25.9	
Morning sunlight exposure produces vitamin D3 in the body.	Yes	441	86.5	χ^2=652.482 P=0.000
	No	15	2.9	
	Don't know	54	10.6	
Osteoporosis increases the risk of fracture.	Yes	388	76.1	χ^2=445.318 P=0.000
	No	14	2.7	
	Don't know	108	21.2	
Estrogen deficiency causes osteoporosis in postmenopausal women.	Yes	274	53.7	χ^2=199.388 P=0.000
	No	24	4.7	
	Don't know	212	41.6	
	Yes	193	37.8	χ^2=71.729 P=0.000
	No	83	16.3	

Chronic illness and kidney dysfunction lead to osteoporosis.	Don't know	234	45.9	
Diabetes is a secondary cause of osteoporosis?	Yes	221	43.3	χ^2=79.776 P=0.000
	No	75	14.7	
	Don't know	214	42.0	
Gastrointestinal disease and malnutrition cause vitamin D deficiency.	Yes	262	51.4	χ^2=127.494 P=0.000
	No	57	11.2	
	Don't know	191	37.5	
Frequency of osteoporosis increase with age?	Yes	409	80.2	χ^2=523.306 P=0.000
	No	10	2.0	
	Don't know	91	17.8	

Table 3: Assessment of Attitude for Osteoporosis

ATTITUDE				
Variables	**Options**	**Frequency**	**percentage**	**Chi square/ P-Value**
Do you think smoking contributes to osteoporosis?	Disagree	248	48.6	χ^2=0.384 P=0.535
	Agree	262	51.4	
Do you think physical activity is useful for osteoporosis?	Disagree	73	14.3	χ^2=643.847 P=0.000
	Agree	437	85.7	
Do you think energy drinks are the cause of osteoporosis?	Disagree	126	24.7	χ^2=130.518 P=0.000
	Agree	384	75.3	
Do you think soaking in the sun daily helps prevent osteoporosis?	Disagree	62	12.2	χ^2=292.149 P=0.000
	Agree	448	87.8	
Do you think drinking a cup of milk daily helps prevent osteoporosis?	Disagree	59	11.6	χ^2=705.612 P=0.000
	Agree	451	88.4	

Table 4: Assessment of Practice towards Osteoporosis

PRACTICE				
Variables	**Options**	**Frequency**	**percentage**	**Chi square/ P-Value**
Do you often feel lethargic?	No	217	42.5	χ^2=11.325 P=0.001
	Yes	293	57.5	
Do you feel pain in your bones and joints?	Never	89	17.5	χ^2=277.094 P=0.000
	Sometimes	347	68.0	
	Daily	74	14.5	
Do you soak yourself in the sun early in the morning?	Never	98	19.2	χ^2=185.518 P=0.000
	Sometimes	315	61.8	
	Daily	97	19.0	
Have you ever got a fractured bone?	Yes	103	20.2	χ^2=181.208 P=0.000
	No	407	79.8	
What are your therapy preferences commonly in the condition of bones and joint pain?	Allopathic	261	51.2	χ^2=226.486 P=0.000
	Homeopathic	80	15.7	
	Dietary supplements	135	26.5	
	Hikmat	34	6.7	
Have you ever been to the doctor complaining about pain in your bones?	Yes	211	41.4	χ^2=15.184 P=0.000
	No	299	58.6	

Do you take vitamin D and calcium as food supplements?	Never	118	23.1	χ^2=174.082 P=0.000
	Sometimes	83	16.3	
	Daily	309	60.6	
If "Yes" what did the doctor prescribe?	NSAID	34	6.7	χ2=447.961 P=0.000
	Vitamin D supplement	159	31.2	
	Bisphosphonates (Fosamax)	9	1.8	
	Other Medication	45	8.8	
	Never went to the doctor	263	51.6	
Knowledge	Poor (0 – 4)	152	29.8	χ^2= 83.21 P < 0.001
	Satisfactory (>5)	358	70.2	
Attitude	Negative (0 – 2)	55	10.7	χ^2= 313.7 P < 0.001
	Positive (>2)	455	89.3	
Practice	Bad (< 5)	204	40%	χ^2= 20.4 P < 0.001
	Good (≥ 5)	306	60%	

Table 5: Pearson's chi-squared test of correlation between groups. A; Knowledge, B; Attitude, C; Practice

A. Variable		**Knowledge**		**Chi square/ P-Value**
		Poor (0 – 4)	**Satisfactory (> 5)**	
Gender	Male	86	148	χ^2= 9.98 P = 0.002
	Female	66	210	
Education level	Inter/ Below	28	41	χ^2= 13.64 P = 0.001
	University Student	47	172	
	Graduate & above	77	145	
Type of education	Medical & allied	22	223	χ^2= 97.73 P < 0.001
	Non-medical education	130	135	
B. Variable		**Attitude**		**Chi square/ P-Value**
		Negative (0 – 2)	**Positive (>2)**	
Gender	Male	30	204	χ^2= 1.86 NS
	Female	25	251	
Education level	Inter/ Below	7	62	χ^2= 0.1 NS
	University Student	23	196	
	Graduate & above	25	197	
Type of education	Medical & allied	17	228	χ^2= 7.25 P < 0.001
	Non-medical education	38	227	
C. Variable		**Practice**		**χ^2 value / p-value**
		Bad (< 5)	**Good (≥ 5)**	
Gender	Male	90	144	χ^2 = 0.426 NS
	Female	114	162	
Education level	Inter/ Below	23	46	χ^2 = 5.95 p < 0.05
	University Student	79	140	
	Graduate & above	102	120	
Type of education	Medical & allied	81	164	χ^2 = 9.46 p = 0.002 OR = 0.87
	Non-medical education	123	142	