A COMMUNITY BASED COMPARATIVE STUDY OF KNOWLEDGE, ATTITUTDE AND PREVENTIVE PRACTICE OF OSTEOPOROSIS -BEFORE AND AFTER PHARMACIST COUNSELING

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ABSTRACT

Background: Osteoporosis remains a major public health concern. A good knowledge and awareness of a disease are pre-requisites for success of preventive measures, modifications in life styles and treatment adherence. **Objective:** The current study is to assess the community population's knowledge, attitude, and preventive practices of osteoporosis and to identify the gap in the same in general population before and after providing pharmacist's counselling on osteoporosis. A Comparative cross-sectional study was conducted in South India for a period of 6 months from May 2021 to October 2021. **Method:** The study consisted of a total of 381 participants. The Knowledge, Attitude, and Preventive practice questionnaire was used to obtain respondents information. The data collected were tabulated, analyzed, and interpreted using standard statistical tool, Graph Pad Instat. The P-value less than 0.01 (<0.01) was fixed as level of statistical significance. The comparison was done using Chi-square. **Result:** According to the study, the general public's knowledge, attitude, and preventive practices toward osteoporosis have improved since pharmacist counselling when compared to before the counselling was provided. The attitude and preventive practices towards osteoporosis was only fairly increased. However practice in prevention of osteoporosis has to be improved. **Conclusion:** This study concluded that Health authorities should create awareness raising activities and community level counseling for osteoporosis, especially at the primary health care levels and community pharmacies. Improved public awareness and knowledge of osteoporosis would considerably reduce osteoporosis related fracture and overall economic effect of the disease.

Key words

Osteoporosis, knowledge, attitude, preventive practice, general population, pharmacist counseling

INTRODUCTION:

Osteoporosis is a systemic skeletal disease characterized by low bone density, bone tissue degeneration, and disturbance of bone microarchitecture: it can result in decreased bone strength and an increased risk of fracture [1].Osteoporosis is the most common bone disease in humans, representing a major public health problem. It is more common in Caucasians, women, and older people. Osteoporosis affect a large number of people of all ages and races, and its prevalence will increase as the population ages [2] . According to several research, the prevalence of osteoporosis among women in India ranges from 8 to 62 percent. This demonstrates the huge range of prevalence across India [3]. Each year, almost 200 million people worldwide develop osteoporosis [4] .According to current estimates, there are about 0.3 million hip fractures per year in the United States and 1 million hip fractures per year in the United Kingdom. Furthermore, women have a higher risk of osteoporosis than males, and older persons have a higher risk than younger adults. Recent research from North India have found that women have a higher prevalence of osteoporosis (36.4 percent of women aged 30 to 39 years and > 70 years, respectively) than men (0 to 5.6 percent for two age groups). However, by 2015, those rates had leveled off and were trending upward, with frequent reports of atypical femoral fractures in individuals using bisphosphonates and denosumab. Hip fractures are more common in women than in men, with a male-to-female ratio of 2:1 [5]. It is a "silent disease" until fractures develop, at which point it causes serious secondary health issue and even mortality [2].Bone tissue is constantly lost through resorption and regenerated through formation; bone loss occurs when the resorption rate exceeds the formation rate. From birth until adulthood, bone mass is modeled (grows and gets its final shape): bone mass reaches its peak (referred to as peak bone mass (PBM)) at puberty, and then bone mass loss begins. PBM is mostly determined by genetic factors, health during growth, nutrition, endocrine status, and physical activity. Menopause and advanced age cause an imbalance in resorption and regeneration rates (resorption becomes greater than absorption), increasing the risk of fracture. Late-stage symptoms include bone pain, bone breaking readily, and lower back pain caused by spinal bone fractures [6] .Osteoporosis can be caused by modifiable risk factors such as advanced age (>65years), female sex, family history, history of fracture, decrease mobility, low calcium intake, cigarette smoking, predisposing medical problem such as liver disease and hyperthyroidism and long-term consumption of glucocorticoids. Another modifiable risk factor for osteoporosis is weight[7,8] . According to the WHO diagnostic classification, osteoporosis is defined by bone mineral density (BMD) at the hip or lumbar spine that is less than or equal to 2.5 standard deviation below the mean BMD of a young-adult reference population [9] .Those with a bone mineral density score between 1-2standard deviations below the mean were defined as having low bone mass, or osteopenia, a condition in which bone loss is not severe enough to identify the person as an osteoporosis patient [10].The treatment of osteoporosis include bisphosphonates, calcium, estrogen agonist , estrogen and hormone therapy, anabolic agents, rank-ligand inhibitors [11].Osteoporosis prevention includes a proper diet during childhood and avoiding medications that accelerate bone loss. A healthy diet, exercise and fall prevention are all part of the effort to avoid fractured bones in people with osteoporosis [12]. Lifestyle changes that promote overall health can also help to protect against the development of osteoporosis, such as limiting alcohol consumption, avoid smoking cigarettes, consuming calcium and vitamin D rich foods (such as dairy products, kale, broccoli, tinned salmon, and sardines). Regular weight bearing exercise include walking, dancing, or climbing stairs [11]. Programs aimed to educate patient about

non-pharmacologic osteoporosis risk reduction techniques have been proven to result in long term favorable changes in patient behavior and health attitudes [13].

OBJECTIVE

- To assess the knowledge, attitude, and practice of general population in osteoporosis.
- To provide knowledge and awareness about osteoporosis and its prevention.
- To determine the gap in knowledge, attitude and preventive practices of osteoporosis in general population.
- To assess the preventive practices of general population of osteoporosis.
- To compare the KAP of general population before and after providing knowledge and awareness about osteoporosis and its prevention

MATERIALS AND METHODS

An observational prospective study was conducted in South India, through Google forms to evaluate knowledge, attitude and practices regarding osteoporosis. The sample size was determined by using Roasoft's Sample Size Calculator with a margin of error 5%, Confidence Interval 95%, the estimated sample size is 377. We conducted the study from May 2021 to October 2021 on 381 participants, including men and women aged from 18-60 years using a validated questionaire. The inclusion criteria include people who is aged between 18-60 years, post-menopausal for ≥ 12 months, and willingness to participate in the study, ability to read informed consent form. The exclusion criteria include minor below 18 years and above 60 years, mentally retarded**,** people with immuno-compromised and other co morbidities.

STUDY PROCEDURE

- A self -designed questionnaire on KAP of osteoporosis was prepared and send through Google platforms. This study was approved by Institutional Ethics Committee, JKKMMRF's Annai JKK Sampoorani Ammal College of Pharmacy, Kumarapalayam.
- The first part was concerned of the socio-demographic background of participants. It included 7 questions regarding demographic, social, educational and medical status.
- The second part consisted of 13 questions regarding knowledge of the community population in osteoporosis.
- Third part consisted of 6 questions about their attitude towards osteoporosis and preventive measures.
- The fourth part of the questionnaire was about their intention and practices to protect themselves from osteoporosis, which included 9 questions.
- The study is organized through an online Google form. The link which proceeds to the questionnaire is prepared and shared through various social media like WhatsApp, Email, Telegram, etc., and the email id of the participants after informing the objectives and confidentiality to the participants. The informed consent is obtained from the individuals who marked the Yes option for the section detailing the consent.

- After filling the form at the end of the study, the pre-prepared patient information leaflet was distributed to the concerning email id of the participants to create awareness of osteoporosis among general population.

STATISTICAL ANALYSIS

A study population aged from 18 - 60 years was surveyed on knowledge, attitude and practice on osteoporosis. The survey was divided into pre KAP and post KAP based on before the counseling was provided and after the counseling was provided. The gap in knowledge, attitude and practice in community population was evaluated. They were described in respect of their demographics and KAP. The comparison of pre KAP and post KAP was done using chi square. The above statistical procedure was undertaken with the help of statistical package Graph Pad Instat. The P-value less than 0.01 (<0.01) was fixed as level of statistical significance.

RESULT AND DISCUSSION

A total of 381 participants, people aged from 18-60 years was surveyed. The survey was divided into pre KAP and post KAP based on before the counseling was provided and after the counseling was provided to evaluate gap in knowledge, attitude and practice in community population.

TABLE 1: SOCIODEMOGRAPHIC CHARACTERISTIC OF THE RESPONDENTS UNDER STUDY

Characteristic	Category	Frequency	Percentage (%)
Gender	Male	86	22.6
	Female	295	7.4
Age	18- 25	240	63
	26-33	77	20.2
	34-41	7	1.8
	42-49	42	11
	Above 50	15	3.9
Marital status	Married	129	33.9
	Unmarried	252	66.1
Education	Illiterate	5	1.3
	Intermediate	17	4.5
	High school graduate	168	44.1
	University graduate	191	50.1
Working status	Student	207	54.3
	Working	114	29.9
	Not working	60	15.7

Table 2 Distribution of menopausal status of study subjects

Post-Menopausal	Frequency (n=295)	Percentage (%)
Yes	36	12.2
No	259	87.8

Table 2 shows that, Out of 295 women 36 were post-menopausal and 259 were not post-menopausal.

TABLE 3 Distribution of family history of osteoporosis among the study subjects

Family history	Frequency(N=381)	Percentage (%)
Yes	58	15.2
No	323	84.8

Table 3 shows that out of 381 respondents, 58 participants had family history of osteoporosis and 323 participants did not have any family history of osteoporosis.

COMPARISON OF KNOWLEDGE IN OSTEOPOROSIS.

A total of 13 questions were used for assessing knowledge among the general population before and after counseling.

TABLE 4 COMPARISON OF RESPONSES SHOWING ABOUT THOSE WHO HAVE HEARD ABOUT OSTEOPOROSIS.

1.Have you ever heard about osteoporosis	Before counselling N (381)	After counselling N (381)	Chi square	value
Yes	132(34.6%)	300(78.9%)	150.86	<0.0001*
No	249(65.4%)	81 (21.2%)		

Table 4 shows, out of 381 responses before counseling, 132 reported with 'Yes' and 249 reported with 'No'. After counseling, 300 respondents reported with 'Yes' and 81 responded with 'No'. The row and column variables are significantly associated.

TABLE 5 COMPARISON OF RESPONSES SHOWING WHAT THEY KNOW ABOUT OSTEOPOROSIS

2. What do you know about osteoporosis?	Before counselling N (381)	After counselling N (381)	Chi square	P value
Bone mass becomes weaker than normal	130(34.1%)	94 (24.7%)		
Breakdown of the tissue	78 (20.5%)	43(11.2%)	83.36	<0.0001*
Loss of bone mass	80 (21.0%)	199(52.4%)		
Softening of the bone	93 (24.4%)	45(11.8%)		

Table 5 shows that before counselling 80 participants reported the right answer, 'Loss of bone mass', followed by 130 of response to 'Bone mass becomes weaker', 93 respondents reported 'Softening of bone' and 78 respondents reported, 'breakdown of tissue'. After counseling, 199 responded the right answer, 'Loss of bone mass', followed by 94 response as 'Bone mass becomes weaker', 45 responded 'Softening of the bone' and 43 responded as 'Breakdown of the tissue'. The row and column variables are significantly associated.

TABLE 6 COMPARISONS OF RESPONSES SHOWING WHETHER OSTEOPOROSIS IS A SERIOUS DISEASE.

3. Is osteoporosis a serious disease as heart disease and breast cancer?	Before counselling N(381)	After counselling N(381)	Chi square	P value
Yes	128(33.6%)	191(50.3%)	21.401	<0.0001*
No	253(66.4%)	190(49.8%)		

Table 6 shows that before counseling, 128 reported the right answer 'Yes' and 253 reported the wrong answer 'No'. After counseling 191 reported the right answer 'Yes' and 190 reported the wrong answer 'No'. The row and column variables were significantly associated.

TABLE 7 COMPARISON OF RESPONSES OF WHEATHER OSTEOPOROSIS CAUSES SYMPTOMS BEFORE FRACTURE OCCUR

4. Osteoporosis usually causes symptoms before fracture occurs	Before counselling N(381)	After counselling N(381)	Chi square	P value
Yes	220 (57.7%)	127 (33.3%)	45.766	<0.0001*
No	161 (42.3%)	254 (66.8%)		

Table 7 shows that among 381 participants, before counseling, 161 participants responded with the right answer, 'No' and 220 participants responded with wrong answer 'Yes'. After counseling 254 participants responded with the right answer 'No' and 127 participants responded with the wrong answer 'Yes'. The row and column are significantly associated.

TABLE 8 COMPARISON OF RESPONSE SHOWING PREVELANCE OF OSTEOPOROSIS AMONG GENERAL POPULATION.

5.Osteoporosis is more common in men	Before counselling N(381)	After counselling N(381)	Chi square	P value
Yes	164 (43.0%)	99 (25.9%)	24.532	<0.0001*
No	217 (57.0%)	282 (74.4%)		

Table 8 shows that, before counselling, 217 respondents reported the right answer 'No' and 164 reported the wrong answer 'Yes'. After counselling 282 of them reported the right answer 'No' and 99 reported the wrong answer 'Yes'. The row and column variables were significantly associated

TABLE 9 COMPARISON OF RESPONSES OF LOSS OF HIEGHT AS AN OSTEOPROSIS SIGN AND SYMPTOM

6. Loss of height is an osteoporosis sign and symptom	Before counselling N(381)	After counselling N(381)	Chi square	P value
Yes	164(43.0%)	247(65.0%)	36.388	0.0001*
No	217(57.0%)	134(35.1%)		

Table 9 shows that before counseling, 164 participants reported the right answer 'Yes' and 217 reported the wrong answer ' No'. After counselling, 247 reported the right answer 'Yes' and 134 reported the wrong answer 'No'. The row and column variables are significantly associated.

TABLE 10 COMPARISON OF RESPONSE OF CURVED SPINE AS AN OSTEOPOROSIS SIGN AND SYMPTOM

7. Curved spine is an osteoporosis sign and symptom	Before counselling N(381)	After counselling N(381)	Chi square	P value
Yes	245(64.3%)	293(77.3%)	14.568	<0.0001*
No	136(35.7%)	88(23.0%)		

Table 10 shows that before counseling 245 participants reported the right answer 'Yes' and 136 participants reported the wrong answer 'No'. After counseling 293 participants reported the right answer 'Yes' and 88 reported the wrong answer 'No'. The row and column were significantly associated.

TABLE 11 COMPARISON OF RESPONSES SHOWING BONE LOSS SPEEDS AFTER MENOPAUSE AS A RISK FACTOR OF OSTEOPOROSIS.

8. Bone loss speeds after menopause	Before counselling N(381)	After counselling N(381)	Chi square	P value
Yes	238(62.5%)	281(73.9%)	11.178	<0.0008*
No	143(37.5%)	100(26.2%)		

Table 11 shows that before counseling 238 participants responded the right answer 'Yes' and 143 responded the wrong answer 'No'. After counseling 281 participants responded 'Yes' and 100 participants responded 'No'. The row and column variables were significantly associated.

TABLE 12 COMPARISON OF RESPONSES SHOWING OLDER PEOPLE AS A RISK FACTORS FOR OSTEOPOROSIS

9.Osteoporosis primarily affect older people	Before counselling N(381)	After counselling N(381)	Chi square	P value
Yes	276(72.4%)	322(84.7%)	16.441	<0.0001*
No	105(27.6%)	59(15.4%)		

Table 12 shows that before counseling 276 participants responded the right answer 'Yes' and 105 participants responded the wrong answer 'No'. After counseling 322 participants responded with the right answer 'Yes' and 59 participants responded with the wrong answer 'No'. The row and column variables were significantly associated.

TABLE 13 COMPARISON OF RESPONSES SHOWING CIGARETTE SMOKING CONTRIBUTING TO RISK FACTORS OF OSTEOPOROSIS.

10. Cigarette smoking can contribute to osteoporosis	Before counselling N(381)	After counselling N(381)	Chi square	P value
Yes	160(42.0%)	236(62.1%)	30.367	<0.0001*
No	221(58.0%)	145(38.08%)		

Table 13 shows that before counseling 160 participants responded with the right answer 'Yes' and 221 responded with the wrong answer 'No'. After counseling 236 participants responded with 'Yes' and 145 responded with 'No'. The row and column variables are significantly associated.

TABLE 14 COMPARISON OF RESPONSES SHOWING FAMILY HISTORY OF OSTEOPOROSIS AS A RISK FACTOR OF OSTEOPOROSIS.

11.Family history of osteoporosis strongly predisposes a person to osteoporosis	Before counselling N(381)	After counselling N(381)	Chi square	P value
Yes	231(60.6%)	292(76.8%)	22.684	<0.0001*
No	150(39.4%)	89(23.3%)		

Table 14 shows that before counseling 231 participants responded with the right answer 'Yes' and 150 participants responded with the wrong answer 'No'. After counseling 292 participants responded with 'Yes' and 89 responded with 'No'. The row and column variables are significantly associated.

TABLE 15 COMPARISON OF RESPONSES SHOWING LOW CALCIUM INTAKE AS A RISK FACTORS OF OSTEOPOROSIS.

12. Low calcium intake is an osteoporosis risk factor		Before counselling N(381)	After counselling N(381)	Chi square	P value
	Yes	279(73.2%)	337(88.7%)	28.502	<0.0001*
	No	102(26.8%)	44(11.5%)		

Table 15 shows that before counseling 279 participants responded with the right answer 'Yes' and 102 participants responded with the wrong answer 'No'. After counseling 337 participants responded with 'Yes' and 44 responded with 'No'. The row and column variables are significantly associated.

TABLE 16 COMPARISON OF RESPONSES SHOWING HORMONE REPLACEMENT THERAPY AS A PREVENTION OF OSTEOPOROSIS.

13.Hormone replacement therapy prevents further bone loss at any age after menopause		Before counselling N(381)	After counselling N(381)	Chi square	P value
	Yes	171(44.9%)	307(80.8%)	103.82	<0.0001*
	No	210(55.1%)	74(19.4%)		

Table 16 shows that Before counseling only 171 participants responded with the right answer 'Yes' and 210 responded with the wrong answer 'No'. After counseling, the knowledge has improved and 307 participants responded with 'Yes' and 74 responded with 'No'. The row and column variables are significantly associated.

COMPARISON OF ATTIUDE TOWARDS OSTEOPOROSIS.

There are total 6 questions in this section to evaluate the attitude towards osteoporosis in general population.

TABLE 17 COMPARISON OF RESPONSES SHOWING ATTITUDE TOWARDS IMPORTANCE OF PROTECTING FROM OSTEOPOROSIS

1. It is important to protect yourself from osteoporosis		Before counselling N (381)	After counselling N (381)	Chi square	P value
	Agree	142(37.3%)	316(83.2%)	181.01	<0.0001*
	Disagree	88 (23.1%)	4 (0.1%)		
	Neutral	151(39.6%)	61 (16.1%)		

Table 17 shows that before counseling, 142 participants responded with the right answer 'Agree', followed 88 participants responded with 'Disagree' and 151 participants responded with 'Neutral' options. After counseling, 316 participants responded with

'Agree', 4 with 'Disagree' and 61 participants responded with 'Neutral' options. The row and column variables were significantly associated.

TABLE 18 COPMARISON OF RESPONSES SHOWING ATTITUDE TOWARDS REGULAR EXERCISE AS A PREVENTIVE PRACTICE OF OSTETOPOROSIS

2. Regular exercise can help prevent problems with osteoporosis	Before counselling N (381)	After counselling N (381)	Chi square	P value
Agree	184(48.3%)	318(83.7%)	113.66	0.0001*
Disagree	58(15.32%)	5 (1.3%)		
Neutral	139(36.5%)	58 (15.3%)		

Table 18 shows that before counseling, 184 participants responded with the right answer 'Agree', followed by 58 response with 'Disagree' and 139 responded with 'Neutral'. After counseling 318 participants responded with 'Agree', 5 responded with 'Disagree' and 58 with 'Neutral'. The row and column variables were significantly associated.

Table 19 COMPARISON OF RESPONSES SHOWING ATTITUDE TOWARDS HORMONE REPLACEMENT THERAPY TO PREVENT OSTEOPOROSIS

3.Taking hormone replacement therapy prevents osteoporosis	Before counselling N (381)	After counselling N (381)	Chi square	P value
Agree	108(28.3%)	236(62.1%)	97.837	<0.0001*
Disagree	62 (16.3%)	13 (3.4%)		
Neutral	211(55.4%)	132(34.7%)		

Table 19 shows that before counseling 108 participants responded with 'Agree', followed by 62 responded with 'Disagree' and 211 responded with 'Neutral'. After counseling 236 participants responded with 'Agree', 13 responded with 'Disagree' and 132 responded with 'Neutral'. The row and column variables were significantly.

TABLE 20 COMPARISON OF RESPONSES SHOWING ATTITUDE TOWARDS CALCIUM INTAKE AS A PREVENTION OF OSTEEOPORSOSIS

4.Taking enough calcium helps prevent problems with osteoporosis	Before counselling N (381)	After counselling N (381)	Chi square	P value
Agree	218(57%)	312(82%)	67.072	<0.0001*
Disagree	39(10.2%)	2 (0.5%)		
Neutral	124(32%)	67(17.6%)		

Table 20 shows that before counseling, 218 participants responded with 'Agree', followed by 39 participants with 'Disagree' and 124 with 'Neutral'. After counseling 312 participants responded with 'Agree', 2 responded with 'Disagree' and 67 responded with 'Neutral'. The row and column variables were significantly associated.

TABLE 21 COMPARION OF RESPONSES SHOWING ATTITUDE TOWARDS GETTING SUFFICIENT AMOUNT OF SUN EXPOSURE FOR PREVENTION OF OSTEOPOROSIS

5. Getting sufficient amount of sun exposure prevents osteoporosis	Before counselling N (381)	After counselling N (381)	Chi square	P value
Agree	189(49.6%)	250 (62.1%)	30.639	<0.0001*
Disagree	55 (14.4%)	17 (4.4%)		
Neutral	137(36.0%)	114 (34.7%)		

Table 21 shows that before counseling, 189 participants responded with the right answer 'Agree', followed by 55 response with 'Disagree' and 137 participants responded with 'Neutral'. After counseling, 250 participants responded with 'Agree', 17 with 'Disagree' and 114 responded with 'Neutral'. The row and column variables are significantly associated.

TABLE 22 COMPARISON OF RESPONSES SHOWING ATTITUDE TOWARDS IMPORTANCE OF REGULAR BONE HEALTH CHECK –UPS FOR PREVENTION OF OSTEOPOROSIS

6.It is important to get your bone health checked	Before counselling N (381)	After counselling N (381)	Chi square	P value
Agree	135 (35.4%)	315 (62.1%)	187.08	<0.0001*
Disagree	76 (19.9%)	4 (1.0%)		
Neutral	170 (44.6%)	62 (34.7%)		

Table 22 shows that before counseling 135 participants responded with the right answer 'Agree', followed by 76 participants responding with 'Disagree' and 170 responded with 'Neutral'. After counseling, 315 participants responded with 'Agree', 4 responded with 'Disagree' and 62 responded with 'Neutral. The row and column variables are significantly associated.

COMPARISON OF RESPONSES SHOWING PREVENTIVE PRACTICES OF OSTEOPOROSIS.

There are total 9 questions in this section to evaluate the preventive practices of osteoporosis in General population.

TABLE 22 DISTRIBUTION BY DIAGNOSIS STATUS

1. Have you ever been diagnosed with osteoporosis?	Before counseling N(381)	After counseling N(381)
Yes	29(7.6%)	29(7.6%)
No	352(92.3%)	352(92.3%)

Table 22 shows that among 381 participants 29 participants were diagnosed with osteoporosis and 352 participants were not diagnosed with osteoporosis before and after counseling

Table 23 DISTRIBUTION OF REGULAR BONE DENSITY CHECK UP

2. Do you get your bone density tested regularly?	Before counseling N(381)	After counseling N (381)
Yes	22(5.7%)	22(5.7%)
No	359(94.2%)	359(94.2%)

Table 23 shows that, among 381 participants only 22 participants get their bone density checked regularly, and 359 do not get their bone density checked regularly before and after counseling.

TABLE 24 DISTRIBUTION OF KNOWING THE AVAILABLE TREATMENT OPTION AT THE TIME OF DIAGNOSIS

3. Have you ever been told about the available treatment options at the time of diagnosis	After counseling N (381)	Before counseling N(381)
Yes	30(7.8%)	30(7.8%)
No	351(91.8%)	351(91.8%)

Table 24 shows that among 381 participants 30 participants have responded with ‘Yes’ and 350 responded with ‘No’ to the question of being told about the available treatment during the diagnosis.

TABLE 25 DISTRIBUTION OF PRACTICING CORRECT USE OF MEDICATION A PRESCRIBED BY THE PRESCRIBER

4. Do you take your osteoporosis medicines as prescribed by the physicians?(only for osteoporosis patients)	Before counseling N (381)	After counseling N(381)
No	49(12.8%)	49(12.8%)
Not applicable	304(79.7%)	304(79.7%)
Yes	28(7.3%)	28(7.3%)

Table 25 shows that, among 381 participants, 28 participants have responded with 'Yes' (osteoporosis patients), 49 patients has answered with 'No' and 304 participants have responded with 'Not applicable' before and after counseling.

TABLE 26 DISTRIBUTION OF REASON FOR NOT TAKING THE OSTEOPOROSIS MEDICINES REGULARLY.

5. If you answered No to the above question. WHY?	Before counseling N(381)	After counseling N(381)
Cost of the medicine	13(3.4%)	13(3.4%)
Other	355(93.2%)	355(93.2%)
Side effect of medicine	13(3.4%)	13(3.4%)

Table 26 shows that among 381 participants, 355 responded with 'Other', 13 responded with 'Cost of medicine' and another 13 participants responded with 'Side effects of medicine' before and after counseling.

TABLE 27 DISTRIBUTION OF KNOWING EXPOSURE TO SUN BEFORE 10 AM AS A PREVENTION

6 .Do you expose yourself to sun before 10am as a prevention?	Before counseling N(381)	After counseling N(381)	Chi square	P value
Yes	115(30.2%)	151(39.7%)	7.485	0.0062
No	266(69.2%)	230(60.3%)		

Table 27 shows that among 381 participants before counseling, 115 participants responded with the right answer 'Yes' followed by 266 participants responding the wrong answer 'No'. After counseling, 151 participants responded with the right answer 'Yes' and 230 participants responded with 'No'. The row and column variables are significantly associated.

TABLE 28 COMPARISON OF RESPONSE SHOWING PRACTICE OF DAILY INTAKE OF CALCIUM AND VITAMINE AS PREVENTION OF OSTEOPOROSIS

7. Do you make sure to get sufficient intake of calcium and vitamin daily	Before counselling N(381)	After counselling N (381)	Chi square	P value
Yes	202 (52.8%)	223 (39.7%)	2.346	0.1155
No	179 (47.2%)	158(41.46%)		

Table 28 shows that among 381 participants, 202 participants responded with the right answer 'Yes' and 179 participants responded with the wrong answer 'No'. After counseling 223 participants responded with 'Yes' and 158 responded with 'No'. The row and column variables were not significantly associated.

TABLE 29 COMPARISON OF RESPONSE SHOWING PRACTICE OF TAKING ESTROGEN PILLS AS A PREVENTION OF OSTEOPOROSIS

8. Do you take estrogen pills as a preventive measure?	Before counselling N (381)	After counselling N (380)	Chi square	P value
Yes	20 (5.2%)	22 (5.7%)	0.1008	0.7509
No	361(94.8%)	359(94.3%)		

Table 29 shows that, among 381 participants before counseling, 20 participants responded with the right answer 'Yes' followed by 361 participants responding with the wrong answer 'No' . After counseling 22 participants responded with 'Yes' and 359 participants responded with 'No' to the options. The row and column are not significantly associated.

TABLE 30 COMPARISON OF RESPONSE SHOWING PRACTICE OF DOING ENOUGH PHYSICAL ACTIVITY TO PREVENT OSTEOPOROSIS

9. Do you make sure to do enough physical activity in order to prevent Osteoporosis?	Before counselling N (381)	After counselling N (381)	Chi square	P value
Yes	139 (36.5%)	222(58.4%)	26.3	<0.0001*
No	242 (63.5%)	159(41.7%)		

Table 30 shows that among 381 participants before counseling ,139 responded with right answer, 'Yes' followed by 242 participants responding with the wrong answer 'No'. After counseling, and 222 participants responded with 'Yes' and 159 participants responded with 'No'. The row and column variables are significantly associated

OVERALL COMPARISON OF KNOWLEDGE ATTITUDE AND PRACTICE OF OSTEOPOROSIS BEFORE AND AFTER COUNSELING IN GENERAL POPULATION.

FIGURE 31 OVERALL COMPARISON OF KNOWLEDEGE OF OSTEOPOROSIS IN GENERAL POPULATION BEFORE COUNSELING AND AFTER COUNSELING

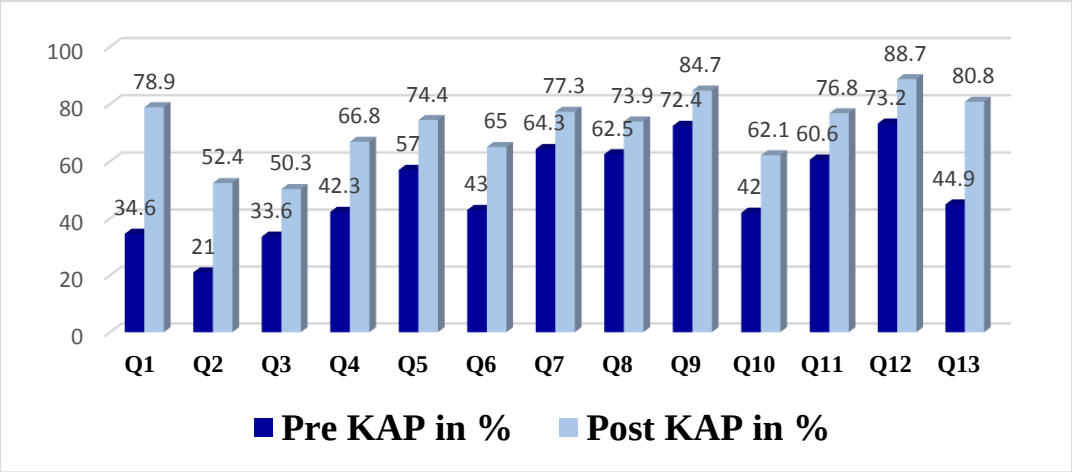

Figure 31 shows that, the knowledge of osteoporosis in community population is higher after counseling (Post KAP) when compared to the knowledge of osteoporosis in community population before counseling (Pre KAP).

FIGURE 32 SHOWS THAT THE POSITIVE ATTITUDE TOWARDS PREVENTION OF OSTEOPOROSIS IN COMMUNITY POPULATION IS HIGHER AFTER COUNSELING (POST KAP), WHEN COMPARED TO THE ATTITUDE TOWARDS PREVENTION OF OSTEOPOROSIS BEFORE COUNSELING (PRE KAP).

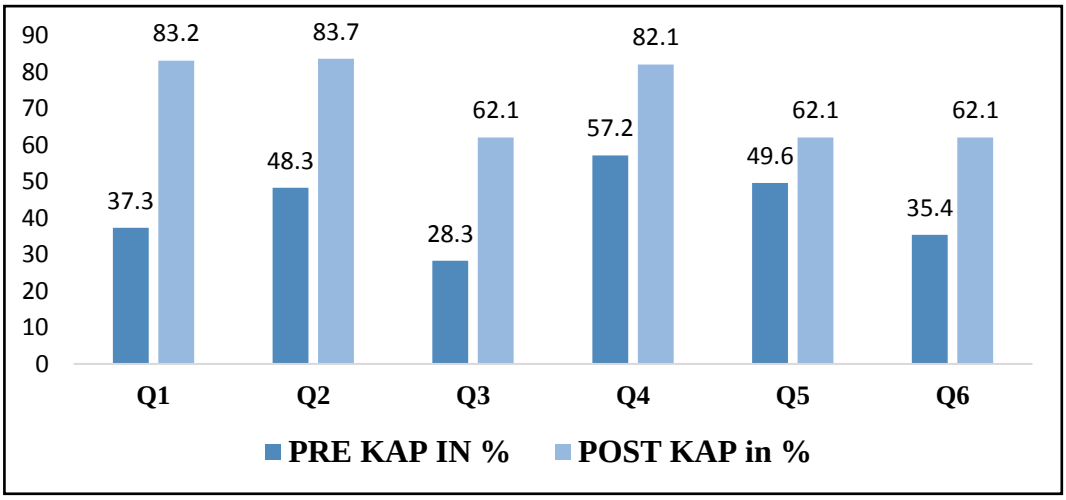

Figure 32 shows that, the knowledge of osteoporosis in community population is higher after counseling (Post kap) when compared to the knowledge of osteoporosis in community population before counseling (Pre kap).

FIGURE 33 OVERALL COMPARISON OF PREVENTIVE PRACTICE OF OSTEOPOROSIS IN GENERAL POPULATION BEFORE COUNSELING

AND AFTER COUNSELING.

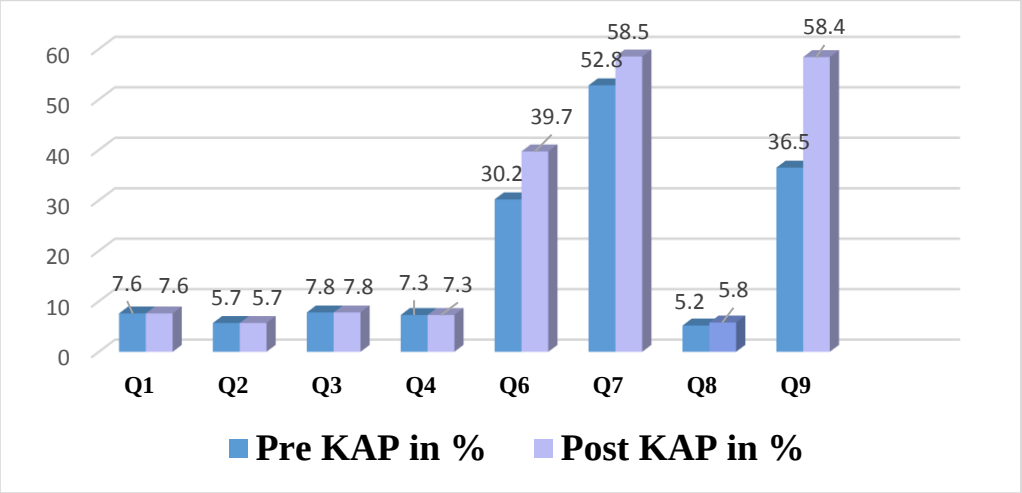

Figure 33 shows that the preventive practice of osteoporosis among community population after counseling (Post KAP) is slightly higher when compared to the preventive practices of osteoporosis before counseling (Pre KAP)

CONCLUSION

Comparison of osteoporosis knowledge, attitude and preventive practice pre and post counseling was done and the results of the study was analyzed and compared following completion of the final KAP study, and positive results emerged. This study reports that, before counselling there was poor knowledge, attitude and preventive practices of osteoporosis in the general population. Lack of knowledge and preventive practice of osteoporosis can lead to many life threatening situations, including serious and painful fractures. The percentage of respondents opting the correct answers in knowledge of osteoporosis was increased after counselling. The attitude towards the seriousness of osteoporosis and practices to prevent osteoporosis was also fairly positive after counseling, but practice in prevention of osteoporosis should be improved. This study reveals that, a good knowledge and awareness of disease are pre-requisite for success of preventive measures modification in lifestyles and treatment adherence. This study concluded that Health authorities should create awareness raising activities and community level counseling for osteoporosis, especially at the primary health care levels and community pharmacies. Improved public awareness and knowledge of osteoporosis would considerably reduce osteoporosis related fracture and overall economic effect of the disease.

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