A COMMUNITY BASED STUDY ON KNOWLEDGE ATTITUDES AND PRACTICES OF OSTEOPOROSIS IN WOMEN

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BACKGROUND: Osteoporosis is a disease characterized by low bone mass and micro-architectural deterioration of bone tissue, leading to enhanced bone fragility and a consequent increase in fracture risk. It is the most common metabolic bone disease and can result in devastating physical, psychosocial, and economic consequences. It is often overlooked and undertreated, however, in large part because it is so often clinically silent before manifesting in the form of fracture. METHODOLOGY: It is a cross-sectional study involving 600 subjects. The knowledge, attitude and practices (KAP) were assessed along with the risk factors which includes modifiable and non-modifiable risk factors based on OPQ questionnaire and IOF (international osteoporosis foundation) one minute risk test. The quality of life of the subjects was obtained using a IOF Quality of life questionnaire (QUALEFFO-41). Counseling was provided to the subjects regarding the disease, its risk factors and lifestyle modifications which includes diet and exercise to be followed. The subjects at risk were detected by evaluating the questionnaires. A follow up study was conducted for 153 people who are at high risk osteoporotic people to study the impact of pharmacist counseling on the modifiable risk factors and their KAP levels. RESULTS: The study involved 602 women above 25 years of age of which 100 (17%) women were having medical conditions which expose them to osteoporosis risk. Remaining 502 (83%) women were not having any medical conditions. Their knowledge, attitudes and practices towards osteoporosis was evaluated and it was found that above 85% women were at poor knowledge about the disease and its risk factors. Average modifiable risk was found to be 4.6 (1.23) and average non-modifiable risk was found to be in a range of 2-4. The study included 32 already diagnosed osteoporotic women who were on medications. IOF one minute risk was assessed for 602 women and found out that 120 members (20%) were at high risk. Quality of life was assessed for women who were osteoporotic (5.31%) and women at high risk (20%). It was observed that there was no much significant differences in the majority of the domains of quality of life. CONCLUSION: The IOF one minute risk test and OPQ questionnaire are useful tools in assessing the risk and the KAP of the subjects and predicting the subjects at high risk. By pharmacist counseling the subjects were able to improve the KAP on Osteoporosis and depreciate the modifiable risk factors and adapt life style modifications for prevention of the osteoporosis.
INTRODUCTION
OSTEOPOROSIS

As defined by the World Health Organization, "A disease characterized by low bone mass and micro-architectural
deterioration of bone tissue, leading to enhanced bone fragility and a consequent increase in fracture risk”.

There are two types of osteoporosis:

Type I osteoporosis: (postmenopausal osteoporosis) generally develops in women after menopause when the amount of
estrogen in the body greatly decreases. This process leads to an increase in the resorption of bone (the bones loses substance). Type I
osteoporosis is far more common in women than in men, and typically develops between the ages of 45 and 70. The process usually
results in a decrease in the amount of trabecular bone (the spongy bone inside of the hard cortical bone). The decrease in the overall
strength of the bone leads primarily to wrist and vertebral body (in the spine) fractures.

Type II osteoporosis: (senile osteoporosis) typically happens after the age of 70 and affects women twice as frequently as
men. Type II osteoporosis involves a thinning of both the trabecular bone (the spongy bone inside of the hard cortical bone) and the
hard cortical bone. This process often leads to hip and vertebral body fractures. There is some overlap between the two types of
osteoporosis. The type that can be significantly influenced and prevented is Type I osteoporosis (postmenopausal osteoporosis) from
estrogen deficiency.

It is important to note that osteoporosis may either be a primary problem (Type I or Type II) or may be secondary to another
problem. Approximately 20% of women and 40% of men with osteoporosis have a secondary cause of osteoporosis.[1]

Normal Bone                                            Osteoporotic Bone

Epidemiology

Osteoporosis is a global problem which is increasing in significance as the population of the world both grows and
ages. Worldwide, lifetime risk for osteoporotic fractures in women is 30-50%.

With socio-economic development in many Asian countries and rapid ageing of the Asian population, osteoporosis has
become one of the most prevalent and costly health problems in the region.[2] Unsurprisingly, Asia is the region expecting the most
dramatic increase in hip fractures during coming decades; by 2050 one out of every two hip fractures worldwide will occur in Asia.[3]

In India 1 out of 8 males and 1 out of 3 females suffers from osteoporosis, making India one of the largest affected
countries in the world. Expert groups peg the number of osteoporosis patients at approximately 26 million (2003 figures).[4]

RISK FACTORS: Include two types of factors modifiable and non-modifiable. Non-modifiable factor are genetic factors,
ageing and post-menopausal women. Whereas modifiable factor are low body weight, nutritional deficiencies, smoking, lack of
exercise and sun exposure.

DIAGNOSIS: Can be done by first undergoing the assessment of risk in the individuals with the help of the risk assessment
tools and secondly according to results can be further screened for bone mineral density (BMD) using BMD screening devices.

Several clinical predication tools help clinicians determine who should undergo BMD testing includes Osteoporosis Risk
Assessment Instrument (ORAI) decision tool for postmenopausal women with high sensitivity (93%) but low specificity (61%). The
Simple Calculated Osteoporosis Risk Estimation (SCORE) decision tool, is also for postmenopausal women with a sensitivity and
specificity similar to that of the Osteoporosis Risk Assessment Instrument. Other tools are the Osteoporosis Self-Assessment Tool,
Osteoporosis Self-Assessment Tool for Asians, and the FRACUTURE index. A fracture prediction model is being developed by the
World Health Organization (WHO) to determine which patients would benefit most from therapy, not to determine which patient
should undergo BMD testing. The WHO model used to predict an individual’s percent absolute probability of fracturing in the next 10
years.

Screening using peripheral BMD Devices - Dual-energy X-ray absorptiometry (DEXA), Peripheral dual-energy X-ray
absorptiometry (P-DEXA), Dual photon absorptiometry (DPA), Quantitative computed tomography (QCT) and Ultrasound.[5]
Laboratory testing is used to identify secondary causes of bone loss. If a preliminary investigation indicates a possible secondary cause, additional testing might be needed that is SERUM 25(OH) D TEST

TREATMENT:
The National Osteoporosis Foundation (NOF) recommends treatment of postmenopausal women with a personal history of hip or vertebral fracture, T-score of −2.5 or below, or low bone mass (T-score between −1 and −2.5) and a 10-year probability of hip fracture of at least 3 percent or any major fracture of at least 20 percent. The 10-year probability of fracture is calculated using the WHO fracture risk assessment tool (http://osteoed.org/tools.php).[6] Non-pharmacological treatment include proper calcium and vitamin intake, smoking cessation, proper exercise, fall prevention and hip protectors.

Pharmacological treatment include use of Calcium and vitamin D, Calcitonin, Bisphosphonates, estrogen replacement, Selective Estrogen Receptor Modulators and Parathyroid Hormone

ROLE OF PHARMACIST:
The best way to treat osteoporosis is to prevent its occurrence. Modification of risk factors is imperative, and Pharmacists can play a large role in this area. Pharmacists can counsel patients especially women, who are at an increased risk for osteoporosis—
- To increase their intake of foods and drinks rich in calcium and vitamin D.
- Offer strategies to quit smoking.
- Encourage 30 minutes of weight-bearing and muscle-strengthening exercise at least three times per week.
- And most importantly, recommend appropriate calcium and vitamin D supplementation and any required prescription medications for osteoporosis.
- Pharmacists can determine the best therapeutic option for patients based on efficacy, tolerable adverse effects, contraindications, and medication adherence.
- Patients require counseling on proper dosing, administration, and adverse effects to promote the safe use and monitoring of medications for osteoporosis.
- Medication adherence and monitoring of BMD by central DXA is critical to reduce fracture risk and progression of osteoporosis.[7]

Aim and objectives of the study:
- To study the knowledge, attitudes and practices of osteoporosis in women.
- To assess the risk factor for each individual pertaining to disease conditions/medications/lifestyle.
- To study the impact of Pharmacist counseling on knowledge, attitudes and practices of women at risk of osteoporosis.
- To study the impact of pharmacist counseling on quality of life of women at risk who are osteoporotic.
- To give suitable recommendations based on study findings

Study site: The study was conducted door to door in randomly selected houses of different locations of Hyderabad based on convenient sampling.

Study period: The study was conducted for a period of 6 months (February 2014 – July 2014)
Study sample: Minimum sample size: The sample was calculated based on the report by WHO, which says that prevalence of osteoporosis is 40%.[8]
The following formula\textsuperscript{[9]} was used for calculating the sample size:

\[ N = \frac{4pq}{L^2} \]

Where, \( N \) = Sample size
\( P \) = prevalence = 40\% = 0.4
\( q \) = (1-p) = 0.6
\( L \) = allowable error = 10\% = 0.04

By substituting these values in the above formula i.e.,

\[ N = \frac{4(0.4*0.6)/ (0.04)^2}{} = 600 \]

We got the sample size as 600.

Study design: It is a cross sectional study.

**Study criteria:**

- Inclusion criteria: All the women of age 25 years and above were included in the study.

**Exclusion criteria:**

Bed-ridden patients
Those who are not willing to participate in the study
Patient consent: Women were explained regarding the study and their consent was taken.

Methodology: The present study was conducted in conveniently selected houses where women were selected depending on the inclusion criteria.

- The study was explained to the women, written consent was obtained and confidentiality of data was assured to them.
- Necessary history was taken with the help of a data collection form.
- Women were assessed for their level of risk at osteoporosis by a questionnaire (one minute risk test by IOF).\textsuperscript{[10]}
- Women were assessed for their knowledge, attitude towards osteoporosis with the help of a questionnaire (OPQ questionnaire).\textsuperscript{[11]}
- Modifiable risk pertaining to diet and exercise and non-modifiable risk like age, family history, estrogen use, and disease conditions were identified.
- Quality Of Life (QOL) questionnaire was filled by women who are at risk of osteoporosis.\textsuperscript{[12]}
- Patient counseling was given to all women with low, high and moderate risk with the help of necessary tools like power point presentations and patient information leafletsto increase their knowledge, attitude, practice towards osteoporosis.
- Women at risk were reassessed after 2 months to evaluate the current KAP status, and modifiable risk factors with subsequent improvement in QOL.
- The detail regarding the results obtained from study was evaluated.

**METHODS AND MATERIAL:**

The materials used were;

1. **Informed consent form:**
With the help of informed consent form subjects were included in the study. This includes the title of the study and details of the study. Study was explained to the subjects and their consent was taken.

2. **Data collection form:**
With the help of this form woman demographic details like age, weight, and height were taken into consideration and their past history of fractures was captured.

3. **Osteoporosis questionnaire (OPQ):** This questionnaire contains 45 questions in which 20 questions are based on the knowledge, it tells us how much knowledge the women has towards osteoporosis.\textsuperscript{16} 16 questions are based on modifiable and non-modifiable risk factors and the other 9 questions tells us about the risk factors might be able to change.

4. **International osteoporosis foundation (IOF) one minute osteoporosis risk test questionnaire:**
The IOF risk questionnaire contains 18 questions by which the risk of getting osteoporosis can be known. The questions are based on both modifiable and non-modifiable risk factors. Depending on this women at risk were identified.

5. **International osteoporosis foundation (IOF) Quality of life (QUALEFFO-41) questionnaire for osteoporosis:**
This questionnaire includes domains like pain, activities of daily living, jobs around the house, mobility, leisure, social activities, general health perception and mental function and a total domain scoring is present. These are given in percentages indicating lesser percentage as good quality of life and higher percentage as poor quality of life but the domain mental function is evaluated as lesser percentage indicate poor quality of life and higher percentage indicate good quality of life. Individual Domain score is calculated using formula \{(average score-least possible score)*100\}/4. Total domain score is calculated using formula \{(total score-41)*100\}/4.
RESULTS AND DISCUSSION
602 numbers of female subjects above 25 years of age gave consent for being a part of this study. The data collected in the data collection form was used for the following:
(1) Demographic details
(2) Past and current medical history
(3) Previous fracture history
The results are discussed under the following sections according to the objectives.

Demographic characteristics of the women

Table 1; DISTRIBUTION OF SUBJECTS ACCORDING TO AGE.

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>No. Of members</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-34</td>
<td>129</td>
<td>21.42%</td>
</tr>
<tr>
<td>35-44</td>
<td>136</td>
<td>22.59%</td>
</tr>
<tr>
<td>45-54</td>
<td>163</td>
<td>27.07%</td>
</tr>
<tr>
<td>55-64</td>
<td>106</td>
<td>17.6%</td>
</tr>
<tr>
<td>65-74</td>
<td>56</td>
<td>9.3%</td>
</tr>
<tr>
<td>75 and above</td>
<td>12</td>
<td>1.99%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>602</td>
<td></td>
</tr>
</tbody>
</table>

The demographic details show that 70% of the population is in the age group of 25 to 54 years. Assessing and improving KAP in this age group has significant benefits in reducing the modifiable risk of osteoporosis and improving the Quality of life.

Table 2; DISTRIBUTION OF SUBJECTS ACCORDING TO AGE AND BMI.

<table>
<thead>
<tr>
<th>AGE (YEARS)</th>
<th>No. Of members</th>
<th>UNDERWEIGHT (BMI &lt; 18)</th>
<th>NORMAL (BMI 18 - 24.9)</th>
<th>OVERWEIGHT (BMI 25-29.9)</th>
<th>OBSE (BMI &gt;30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-34</td>
<td>129</td>
<td>10 (7.75%)</td>
<td>69 (53.48%)</td>
<td>33 (25.58%)</td>
<td>17 (13.17%)</td>
</tr>
<tr>
<td>35-44</td>
<td>136</td>
<td>5 (3.67%)</td>
<td>65 (47.79%)</td>
<td>45 (33.08%)</td>
<td>21 (15.44%)</td>
</tr>
<tr>
<td>45-54</td>
<td>163</td>
<td>3 (1.84%)</td>
<td>53 (32.51%)</td>
<td>70 (42.94%)</td>
<td>37 (22.69%)</td>
</tr>
<tr>
<td>55-64</td>
<td>106</td>
<td>2 (1.88%)</td>
<td>41 (38.67%)</td>
<td>36 (33.96%)</td>
<td>27 (25.47%)</td>
</tr>
<tr>
<td>65-74</td>
<td>56</td>
<td>4 (7.14%)</td>
<td>20 (35.71%)</td>
<td>23 (41.07%)</td>
<td>9 (16.07%)</td>
</tr>
<tr>
<td>75 AND ABOVE</td>
<td>12</td>
<td>0</td>
<td>4 (33.33%)</td>
<td>6 (50%)</td>
<td>2 (16.66%)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>602</td>
<td>24 (3.98%)</td>
<td>252 (41.86%)</td>
<td>213 (35.38%)</td>
<td>113 (18.77%)</td>
</tr>
</tbody>
</table>

X² = 31.4394, p<0.05
In the total population evaluated > 50% of the subjects are above the recommended BMI which points towards a lack of regular physical exercise and unhealthy dietary habits which are the major modifiable risk factors of osteoporosis.

Table 3; DISTRIBUTION OF SUBJECTS SHOWING CURRENT MEDICAL CONDITION.

<table>
<thead>
<tr>
<th>Medical Condition</th>
<th>Number of members</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Past fracture history</td>
<td>50</td>
<td>8.3%</td>
</tr>
<tr>
<td>Steroid therapy</td>
<td>19</td>
<td>3.15%</td>
</tr>
<tr>
<td>Thyroid therapy</td>
<td>31</td>
<td>5.14%</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>16.59%</td>
</tr>
</tbody>
</table>

Around 3% of the population were having thyroid dysfunction and had no knowledge about the risk of osteoporosis in long standing untreated thyroid dysfunction. 5% of the population were on glucocorticoids and also had no knowledge about the risk of osteoporosis in long term corticosteroid use.

This table and figure indicates the selected population were by and large not having any other medical conditions which leads to increased risk of osteoporosis. On the whole 16% were having other factors which are the major risk factors for osteoporosis and 83% of subjects were free from risk factor pertaining to their medical condition and drug use.

KNOWLEDGE ATTITUDE AND PRACTICES:
In case of each KAP form, the correct answers were counted and the scores were categorized in three scales of 0 to 5, 6 to 10 and 11 to 20. The data is tabulated in Table 3 shown in Fig.
Table 4: REPRESENTATION OF OSTEOPOROSIS QUESTIONNAIRE (OPQ) INDICATING KNOWLEDGE, ATTITUDE AND PRACTICES.

<table>
<thead>
<tr>
<th>AGE (YEARS)</th>
<th>OSTEOPOROSIS QUESTIONNAIRE (OPQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-5 (POOR)</td>
</tr>
<tr>
<td>25-34 (n=129)</td>
<td>80 (62.01%)</td>
</tr>
<tr>
<td>35-44 (n=136)</td>
<td>85 (62.5%)</td>
</tr>
<tr>
<td>45-54 (n=163)</td>
<td>115 (70.55%)</td>
</tr>
<tr>
<td>55-64 (n=106)</td>
<td>84 (79.24%)</td>
</tr>
<tr>
<td>65-74 (n=56)</td>
<td>48 (85.71%)</td>
</tr>
<tr>
<td>75 &amp; above (n=12)</td>
<td>11 (91.66%)</td>
</tr>
<tr>
<td>TOTAL (n= 602)</td>
<td>423 (70.26%)</td>
</tr>
</tbody>
</table>

X² =21.0852, p<0.05.

Figure 4: REPRESENTATION OF OSTEOPOROSIS QUESTIONNAIRE (OPQ) INDICATING KNOWLEDGE, ATTITUDE AND PRACTICES.

The base line KAP screening indicates that > 70% of the subjects have poor knowledge about osteoporosis. Less than 5% have good knowledge. This indicates that by and large the population may be at a high risk of osteoporosis due to the following reasons:
(1) Lack of knowledge about the disease
(2) No awareness about the risk factors
(3) Poor idea about risk mitigation
(4) No idea about screening tests and procedures.
(5) Effect of medication on bones.

RISK:

It includes 9 questions about modifiable risk factors like diet and exercise. 7 questions on non-modifiable risk factors like past fracture history, age, familial history. It is scored accordingly and the result is described as;

Table 5: REPRESENTATION OF RISK FOR OSTEOPOROSIS.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Average modifiable risk (SD)</th>
<th>Average Non-modifiable risks (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-34 (n=129)</td>
<td>4.52 (1.27)</td>
<td>2.65 (0.7)</td>
</tr>
<tr>
<td>35-44 (n=136)</td>
<td>4.81 (1.31)</td>
<td>2.87 (0.66)</td>
</tr>
<tr>
<td>45-54 (n=163)</td>
<td>4.7 (1.43)</td>
<td>3.06 (0.86)</td>
</tr>
<tr>
<td>55-64 (n=106)</td>
<td>4.67 (1.11)</td>
<td>3.07 (0.77)</td>
</tr>
<tr>
<td>65-74 (n=56)</td>
<td>4.98 (0.96)</td>
<td>3.69 (0.82)</td>
</tr>
<tr>
<td>75 &amp; above (n=12)</td>
<td>5.16 (0.71)</td>
<td>4.83 (0.83)</td>
</tr>
</tbody>
</table>

This table identifies the average number of modifiable and non-modifiable risk factors present in women. The number of average modifiable risk factors increased as the age increased and the same was with non-modifiable risk factors. There were around 5.16 average numbers of modifiable risk factors in women of age 75 and above. 4.83 average non modifiable risk factors were present in the women of age 75 years and above.
Modifiable risk factors include diet, exercise and the knowledge regarding the diseases. Non-modifiable risk factors include age, past history of fracture, family history, estrogen use and disease conditions like long standing hypothyroidism, patients on steroid therapy.

![Figure 4: Representation of risk in subjects]

Figure 5; REPRESENTATION OF RISK FOR OSTEOPOROSIS.

By this figure it is seen that modifiable risk remain same for all age groups and is above 4.5, considered as high. This may be attributed to poor knowledge regarding the risk factors.

INTERNATIONAL OSTEOPOROSIS FOUNDATION (IOF) ONE-MINUTE OSTEOPOROSIS RISK TEST:

It has 18 questions regarding all possible risk for osteoporosis. It is evaluated based on number of yes option responded by subjects. 0-1 indicates no risk, 2-3 indicates some risk and 4 and above represents at risk. The following table depicts the distribution;

Table 6: REPRESENTATION OF INTERNATIONAL OSTEOPOROSIS FOUNDATION (IOF) ONE-MINUTE OSTEOPOROSIS RISK TEST.

<table>
<thead>
<tr>
<th>AGE (YEARS)</th>
<th>IOF ONE MINUTE OSTEOPOROSIS RISK TEST</th>
<th>NO RISK</th>
<th>SOME RISK</th>
<th>AT RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-34 (n=129)</td>
<td>57 (44.18%)</td>
<td>58 (44.9%)</td>
<td>14 (10%)</td>
<td></td>
</tr>
<tr>
<td>35-44 (n=136)</td>
<td>37 (27.2%)</td>
<td>77 (56.67%)</td>
<td>22 (16.17%)</td>
<td></td>
</tr>
<tr>
<td>45-54 (n=163)</td>
<td>30 (18.4%)</td>
<td>93 (57.05%)</td>
<td>40 (24.53%)</td>
<td></td>
</tr>
<tr>
<td>55-64 (n=106)</td>
<td>14 (13.2%)</td>
<td>61 (57.54%)</td>
<td>31 (29.24%)</td>
<td></td>
</tr>
<tr>
<td>65-74 (n=56)</td>
<td>7 (12.5%)</td>
<td>28 (50%)</td>
<td>21 (37.5%)</td>
<td></td>
</tr>
<tr>
<td>75 &amp; above (n=12)</td>
<td>0</td>
<td>3 (25%)</td>
<td>9 (75%)</td>
<td></td>
</tr>
<tr>
<td>TOTAL (n=602)</td>
<td>145 (24.08%)</td>
<td>320 (53.15%)</td>
<td>137 (22.75%)</td>
<td></td>
</tr>
</tbody>
</table>

![Figure 6: Representation of International Osteoporosis Foundation (IOF) One-Minute Osteoporosis Risk Test]

Figure 6; REPRESENTATION OF INTERNATIONAL OSTEOPOROSIS FOUNDATION (IOF) ONE-MINUTE OSTEOPOROSIS RISK TEST.

The risk evaluation questionnaire indicates the following:
(1) > 50% of the population in the age group of 25 to 65 years is at moderate risk of osteoporosis.
(2) The risk of osteoporosis increases as the age increases and it is highest at age of 75 and above.
International osteoporosis foundation (IOF) Quality of life (QUALEFFO-41)

This questionnaire includes domains like pain, activities of daily living, jobs around the house, mobility, leisure, social activities, general health perception and mental function and a total domain scoring is present. These are given in percentages indicating lesser percentage as good quality of life and higher percentage as poor quality of life but the domain mental function is evaluated as lesser percentage indicate poor quality of life and higher percentage indicate good quality of life. Individual Domain score is calculated using formula \( \frac{(average \ score - least \ possible \ score) \times 100}{4} \). Total domain score is calculated using formula \( \frac{(total \ score - 41) \times 100}{4} \).

The scores are represented as:

<table>
<thead>
<tr>
<th></th>
<th>Pain %</th>
<th>Activities of daily living %</th>
<th>Jobs around the house %</th>
<th>Mobility %</th>
<th>Social activities %</th>
<th>Health perception %</th>
<th>Mental function %</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osteoporotic (n=32)</td>
<td>45.95</td>
<td>43.45</td>
<td>40.82</td>
<td>44.01</td>
<td>47.10</td>
<td>46.80</td>
<td>47.26</td>
<td>59.63</td>
</tr>
<tr>
<td>(n=120)</td>
<td>(21.71)</td>
<td>(16.96)</td>
<td>(16.96)</td>
<td>(15.93)</td>
<td>(17.28)</td>
<td>(13.32)</td>
<td>(15.03)</td>
<td>(12.50)</td>
</tr>
<tr>
<td>Subjects at high risk of osteoporosis</td>
<td>33.46</td>
<td>34.37</td>
<td>35.87</td>
<td>35.34</td>
<td>43.76</td>
<td>47.07</td>
<td>54.18</td>
<td>56.24</td>
</tr>
<tr>
<td>Subjects at moderate risk of osteoporosis</td>
<td>27.58</td>
<td>30.22</td>
<td>29.22</td>
<td>32.33</td>
<td>39.42</td>
<td>44.12</td>
<td>56.3%</td>
<td>50.27</td>
</tr>
</tbody>
</table>

This table indicates the quality of life (QOL) scores indicate that there is no significant difference in the total QOL scores across the three identified groups. However, osteoporotic subjects scored poorly in the area of pain and mobility. No significant difference in the scores was determined for subjects at high risk and moderate risk. Mental function in moderate subjects (56%) is good when compared to subjects at high risk (54%). The subjects who were at high risk were earmarked for follow up on KAP and QOL, 2 months after the collection of base line data and counseling.

A baseline data of 602 women was taken and out of them 153 women who were at high risk were selected for review depending on International osteoporosis foundation (IOF) one minute osteoporosis risk test.

Table 8; REPRESENTATION OF OSTEOPOROSIS QUESTIONNAIRE (OPQ) INDICATING KNOWLEDGE, ATTITUDE AND PRACTICES (KAP) IN HIGH RISK WOMEN.

<table>
<thead>
<tr>
<th></th>
<th>BEFORE COUNSELING</th>
<th>AFTER COUNSELING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor Knowledge</td>
<td>114 (74.50%)</td>
<td>29 (18.95%)</td>
</tr>
<tr>
<td>Fair Knowledge</td>
<td>38 (24.83%)</td>
<td>103 (67.32%)</td>
</tr>
<tr>
<td>Good Knowledge</td>
<td>1 (1%)</td>
<td>21 (13.72%)</td>
</tr>
<tr>
<td>Total</td>
<td>153</td>
<td>153</td>
</tr>
</tbody>
</table>

Figure 8; REPRESENTATION OF OSTEOPOROSIS QUESTIONNAIRE (OPQ) INDICATING KNOWLEDGE, ATTITUDE AND PRACTICES IN HIGH RISK WOMEN.

This graph indicates the improve in knowledge attitudes and practices of women regarding the disease and factors causing the disease. Before counseling the knowledge was poor (74.5%) and after counseling there was significant improvement in
knowledge. 81.04% of women were having good knowledge about osteoporosis after counseling compared to 25.49% before counseling. There was a significant increase in knowledge mainly in the fair zone, this is due to Pharmacist counseling.

### Table 9: REPRESENTATION OF AVERAGE MODIFIABLE RISK FACTORS IN HIGH RISK WOMEN.

<table>
<thead>
<tr>
<th>MODIFIABLE RISK</th>
<th>BEFORE COUNSELLING</th>
<th>AFTER COUNSELLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXERCISE</td>
<td>1.56 (0.55)</td>
<td>0.84 (0.69)</td>
</tr>
<tr>
<td>DIET</td>
<td>2.96 (1.18)</td>
<td>1.41 (0.9)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4.5 (1.23)</td>
<td>2.26 (1.12)</td>
</tr>
</tbody>
</table>

Modifiable risk factors were present in women at high risk which were identified in the women and necessary counseling showed a decrease in average modifiable risk factors. Major change was seen in aspects of diet. There was a decrease in modifiable risk from 4.5 to 2.26 which was due to the increase in knowledge about osteoporosis and its risk.

### Figure 9: REPRESENTATIONS OF MODIFIABLE RISK FACTORS IN HIGH RISK WOMEN.

This figure shows the average modifiable risk factors before and after counseling. Before counseling an average of 4.5 +/- 1.23 was present in 153 high risk women and after counseling it went down to 2.26 +/- 1.12. This clearly shows impact of Pharmacist counseling in reducing modifiable risk factors.

### Table 10: QUALITY OF LIFE OF SUBJECTS AFTER COUNSELING.

<table>
<thead>
<tr>
<th>Pain %</th>
<th>Activities of daily living %</th>
<th>Jobs around the house %</th>
<th>Mobility %</th>
<th>Social activities %</th>
<th>Health perception %</th>
<th>Mental function %</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counseling</td>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
<td>Before</td>
</tr>
<tr>
<td>Osteoporotic (n=32)</td>
<td>45.9</td>
<td>41.8</td>
<td>43.4</td>
<td>40.1</td>
<td>40.8</td>
<td>38.2</td>
<td>44.0</td>
</tr>
<tr>
<td>(n=32)</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td>2</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>High risk (n=120)</td>
<td>33.4</td>
<td>30.4</td>
<td>34.3</td>
<td>32.3</td>
<td>35.8</td>
<td>30.8</td>
<td>35.3</td>
</tr>
<tr>
<td>Subjects</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>

After counseling no significant difference was observed in the total quality of life but the members reporting the pain, mobility and social activities were found to be lowered. The Pharmacist counseling if continued can help subjects to maintain the present quality of life in the subject at least without making it worse.

In our study it was found that >70% of women were having poor knowledge about osteoporosis and its risk factors which was similar to the study conducted by Mehmet Ungan et.al and Z. Zalili, Nakhee, et.al which showed inadequate knowledge in women about osteoporosis. In our study modifiable risk before counseling were on higher side which decreased significantly with the increase in knowledge of osteoporosis and its risk. It was similar to a study conducted by Elizabeth S. Stetzer et.al and Anastasia M. Snelling et al, which identified the risk factor for osteoporosis and focused in increasing the concern towards young women by educating them and thereby decreasing there modifiable risk factors through practices.
CONCLUSION

Osteoporosis is a disease characterized by low bone mass and micro-architectural deterioration of bone tissue, leading to enhanced bone fragility and a consequent increase in fracture risk. There are two types of osteoporosis: Type I osteoporosis (postmenopausal osteoporosis) and Type II osteoporosis (senile osteoporosis). Osteoporosis may either be a primary problem (Type I or Type II) or may be secondary to another problem. Approximately 20% of women and 40% of men with osteoporosis have a secondary cause of osteoporosis. In India 1 out of 3 females suffers from osteoporosis, making India one of the largest affected countries in the world. There are two types of risk factors: modifiable and non-modifiable, responsible for causing osteoporosis. Non-modifiable factors are genetic factors, ageing and post-menopausal women. Whereas modifiable factors are low body weight, nutritional deficiencies, smoking, lack of exercise and sun exposure. Can be done by first undergoing the assessment of risk in the individuals and secondly according to results can be further screened for bone mineral density (BMD) using BMD screening devices.

Patients can be treated with Non-pharmacological treatment includes proper calcium and vitamin intake, smoking cessation, proper exercise, fall prevention and hip protectors. Pharmacological treatment include use of Calcium and vitamin D, Calcitonin, Bisphosphonates, estrogen replacement, Selective Estrogen Receptor Modulators and Parathyroid Hormone.

The study was conducted door to door in randomly selected houses of different locations of Hyderabad based on convenient sampling for a period of 6 months (February 2014 – July 2014). It is a cross sectional study with sample size of 602 subjects. All the women of age 25 years and above were included in the study and Bed-ridden patients and those who are not willing to participate in the study were excluded from the study. The study was explained to the women, written consent was obtained and confidentiality of data was assured to them. Necessary history was taken with the help of a data collection form. Women were assessed for their level of risk at osteoporosis by a questionnaire (one minute risk test by IOF), for their knowledge, attitude towards osteoporosis with the help of a questionnaire (OPQ questionnaire) and for Quality Of Life (QOL questionnaire). Women at risk were reassessed after 2 months to evaluate the current KAP status, and modifiable risk factors with subsequent improvement in QOL.

The demographic details show that 70% of the population are in the age group of 25 to 54 years. Assessing and improving KAP in this age group has significant benefits in reducing the modifiable risk of osteoporosis and improving the Quality of life. In the total population evaluated > 50% of the subjects are above the recommended BMI which points towards a lack of regular physical exercise and unhealthy dietary habits which are the major modifiable risk factors of osteoporosis.

The risk evaluation questionnaire indicates the following: Firstly > 50% of the population in the age group of 25 to 65 years is at moderate risk of osteoporosis and secondly the risk of osteoporosis increases as the age increases and it is highest at age of 75 and above. Before counseling an average of 4.5 +/- 1.23 was present in 153 high risk women and after counseling it went down to 2.26 +/- 1.12.

The QOL scores indicate that there is no significant difference in the total QOL scores across the three identified groups. However, osteoporotic subjects scored poorly in the area of pain and mobility. No significant difference in the scores was determined for subjects at high risk and moderate risk. After counseling no significant difference is observed in the total quality of life but standard deviation was found to be decreased in following domains pain mobility and social activities.

On the whole the identification of risk factors in the subjects can be possible through the increase in knowledge about the osteoporosis. Necessary measures were taken to increase their knowledge and by continuing this type of education the risk of acquiring osteoporosis can be reduced to a significant amount. The focus of osteoporosis was always in the treatment of older women but now it is necessary to shift the focus of osteoporosis to prevention in younger women. By educating patients about the risk factors that are present and gaining awareness that development begins early, patients can work to prevent it. The goal is to eradicate preventable disease osteoporosis.

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