“A study to evaluate the effectiveness of structured teaching programme on knowledge regarding bone strengthening exercises among women with osteoporosis attending out-patient department in selected hospital at Mangaluru”

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ABSTRACT

Osteoporosis results in an overall loss of bone mass and decreased bone density due to deficiency of protein matrix in which calcium is laid down the loss of bone mass in the body increases the risk of fracture with mild trauma. Women suffer from osteoporosis more than men. A quantitative approach was adopted to evaluate the effectiveness of a structured teaching programme. The investigator selected a pre-experimental one group pre-test, and post-test design. Non-probability, consecutive sampling technique used to select 60 women diagnosed with osteoporosis attending orthopedic OPD at a selected hospital at Mangaluru. The knowledge level on the bone-strengthening exercises was assessed through a self-prepared semi-structured knowledge questionnaire using the interview method. A structured teaching programme was administered by the investigator and the booklet was provided. Post-test was conducted after a week using the same tool. The pre-test score of the present study showed that among 60 women, the majority of women 39(65%) had inadequate knowledge, 21(35%) had moderate knowledge and none of the women had adequate knowledge of bone-strengthening exercise. Whereas the post-test reveals that, out of 60 there were 36(60%) had adequate knowledge, 24 (40%) had moderate knowledge and none of the women had inadequate knowledge. The percentage score of enhancement was 38%. The effectiveness of a structured teaching programme on bone-strengthening exercise was evaluated by using paired ‘t-test and the obtained value was 28.67 which was greater than the table value at p<0.05 level of significance. Chi-square was used to check the association between post-test with selected socio-demographic variables. There was significant association was found with age in years and educational status. Hence, the structured teaching programme on bone strengthening exercises was found to be effective in improving the knowledge among women with osteoporosis.

Keywords

Effectiveness; structured teaching programme; bone strengthening exercises; women with osteoporosis.

INTRODUCTION

Title of dissertation

“A study to evaluate the effectiveness of structured teaching programme on knowledge regarding bone strengthening exercises among women with osteoporosis attending out-patient department in selected hospital at Mangaluru”

Introduction

Bone is an important part of the musculoskeletal system and living tissue that makes up the body skeleton. Bones are specialized, highly vascular, constantly changing, and mineralized connective tissue, hard, resilient, and have enormous regenerative capacity. The types of bone cells include the osteoblast found within the bone and function is to form new bone tissue; Osteoclast a very large cell formed in bone marrow, the function is to absorb and remove unwanted tissue; Osteocyte found within the bone, which function is to maintain bone as living tissue; Hematopoieticfound in bone marrow and function is to produce red blood cells, white blood cells and plateletsalso serve as a storage site for minerals. Bone provides shape and support for the body, as well as protection for some organs.1

Osteoporosis is a disease that results from an imbalance between calcium reabsorption and bone formation. Osteoporosis results in an overall loss of bone mass and decreased bone density due to deficiency of protein matrix in which calcium is laid down the loss of bone mass in the body increases the risk of fracture with mild trauma. Women suffer from osteoporosis more than men as there is accelerated loss of bone mass due to a deficiency of estrogen after menopause.2

Osteoporosis was officially recognized as a disease by WHO in 1994, and the number of women with osteoporosis, ie, with reduced bone mass and the disruption of bone is increasing.3 Osteoporosis is known as the “silent thief” because it slowly and insidiously
loses an excessive amount of protein and mineral content, particularly calcium therefore bone strength is reduced and can eventually become so fragile that cannot withstand normal mechanical stress.2

The board of the international menopause society worldwide estimated that osteoporosis affects 200 million women. Women above the age group of 50 years experience osteoporotic fracture every 3 seconds which accounts for about 8.9 million osteoporotic fractures annually. The main fracture site in females is about 80% of the forearm, 75% of the humerus, 70% of the hip, and 58% of the spine. Osteoporosis affects women according to their age one-tenth of women in 60 years, one-fifth in 70 years, two-fifths by 80 years and two-thirds in 90 years.4

Data from the national health and nutrition examination survey on osteoporosis of older adults in the united states, the prevalence of osteoporosis among adults aged above 50 years was 12.6% and higher among women 19.6% compared with men at 4.4%. Hence, the prevalence was higher in women than men. The prevalence of low bone mass among adults above 50 years of age was 43.1% and among women 51.5% compared with men was 33.5%. Prevalence of osteoporosis among women increased from 14% to 19.6% in the past 10 years (2007-2017) but no significant change was seen among men.5

Exercises for osteoporosis are warm-up, flexibility, stretching exercises, weight-bearing exercises, balance exercises, muscle strengthening exercises, flexibility and stretching exercise are important parts of being fit and active. Regular gentle stretches for the muscles and joints of the shoulders, upper back, and neck improve posture, which plays an important in reducing osteoporosis. Weight-bearing exercises are performed on bones supporting own body weight, research has shown that regular exercises such as walking, stair climbing, low impact aerobics and dancing can slow down bone loss. Muscle strengthening exercises like hip strengthening exercises, hamstring stretch exercises, and calf stretch exercises for stronger muscles will help to reduce pain and give support to bones and joints and also help in better balance, which reduces the fracture rate. Balance exercise improves the balance and decreases the fall rate.10

During the clinical posting the investigator found that women were attending OPD with fracture related to osteoporosis. It was found that women do not have enough knowledge on osteoporosis and bone-strengthening exercises to prevent fractures and maintain an optimal healthy lifestyle. The family members are required to know about the early diagnosis and the preventive therapy that reduces the burden of care. Hence, the investigator decided to provide knowledge regarding osteoporosis and bone strengthening exercises which help the women to gain knowledge and improve their bone and muscle health. Thereby, preventing complication of osteoporosis lead to better lifestyle behaviors, positive harmony and longevity of life.

Research approach

In the present study quantitative research approach was used to find the effectiveness of a structured teaching programme on knowledge regarding bone strengthening exercises among women with osteoporosis attending the out-patient department in a selected hospital at Mangaluru.

Study design

The investigator selected a pre-experimental one-group pre-test and post-test design to evaluate the effectiveness of a structured teaching programme on knowledge regarding osteoporosis and bone strengthening exercises among women with osteoporosis attending the out-patient department in a selected hospital at Mangaluru.

Non-probability, consecutive sampling technique used to select 60 women diagnosed with osteoporosis attending orthopedic OPD at a selected hospital at Mangaluru.

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-test</th>
<th>Treatment</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women diagnosed with osteoporosis and attending OPD at a selected hospital, Mangaluru</td>
<td>O₁</td>
<td>X</td>
<td>O₂</td>
</tr>
</tbody>
</table>

Figure 4.2 Schematic representation of research design

O₁ – Assessment of pre-test knowledge regarding bone strengthening exercises among women with osteoporosis attending outpatient department before administration of structured teaching programme.

X – Administration of structured teaching programme on knowledge regarding bone strengthening exercises like hamstring stretch, quadriceps stretch, calf stretch, shoulder stretch, sit and stand, wall-press, steps-ups, ankle strengthener, hip strengthener, back strengthener and wrist strengthener.

O₂ – Assessment of post-test knowledge regarding bone strengthening exercises among women with osteoporosis attending outpatient department after the administration of structured teaching programme on knowledge regarding bone strengthening exercises.
Research setting

The study was conducted in Yenepoya Medical College Hospital at Mangaluru. Each out-patient department is well equipped with qualified doctors, nurses, and paramedical staff. Around 65 female patients attended orthopedic OPD for treatment among them around 12 women are taking treatment for osteoporosis on weekly basis. The health professionals were cooperative in the conduction of the study. The patient was shown interest to understand the intervention provided.

Sample

In the present study, the sample comprises women who are diagnosed with osteoporosis, undergoing treatment and met all the inclusion criteria and attending the out-patient department at the selected hospital Mangaluru.

Plan for data analysis

The investigator planned to analyze the data based on the objectives and hypothesis of the study. Data obtained from the subjects were organized, coded, and tabulated and an excel sheet was made. The data were analyzed according to the objectives of the study using both descriptive and inferential statistics.

- Descriptive statistics: Frequency & percentage distribution were calculated to describe the socio-demographic variables. Mean and SD was used to assess the level of knowledge regarding bone-strengthening exercises for osteoporosis.
- Inferential statistics: The paired ‘t’ test was used to find out the effectiveness of bone-strengthening exercises.
- The association of post-test knowledge with selected socio-demographic variables was assessed by ($\chi^2$) chi-square test.

RESULTS

The result chapter deals with the analysis and interpretation of data collected from 60 osteoporosis women attending the out-patient department selected hospital Mangaluru to evaluate the effectiveness of a structured teaching programme on knowledge regarding bone strengthening exercises which involves computation of certain measures related to studies.

Objectives of the study

- To assess the knowledge regarding bone strengthening exercises among women with osteoporosis.
- To evaluate the effectiveness of a structured teaching programme on bone strengthening exercises among women with osteoporosis.
- To find the association of post test level of knowledge regarding bone strengthening exercises with selected socio-demographic variables like age in years, religion, marital status, social habits, educational status, occupation, menstrual history, BMI and source of information regarding osteoporosis.

Hypotheses

All the hypotheses tested at a 0.05 level of significance.

$H_1$: There was a significant difference between pre-test and post-test knowledge scores on bone strengthening exercises among women with osteoporosis.

$H_2$: There was a significant association between the post test level of knowledge regarding bone strengthening exercises with selected demographic variables like age in years, religion, marital status, social habits, educational status, occupation, menstrual history, duration of illness in years, BMI and source of information regarding the osteoporosis.

Section II: Assessment of pre-test knowledge regarding bone strengthening exercises among women with osteoporosis.

Table 2.1: Distribution of women with osteoporosis according to pre-test score

<table>
<thead>
<tr>
<th>Level of knowledge</th>
<th>Frequency(N)</th>
<th>Percentage(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate</td>
<td>39</td>
<td>65</td>
</tr>
<tr>
<td>Moderate</td>
<td>21</td>
<td>35</td>
</tr>
<tr>
<td>Adequate</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The data presented in table 2.1 depict that among 60 women 39(65%) of the women had inadequate knowledge, 21(35%) had moderate knowledge and none of the women had adequate knowledge of bone-strengthening exercises.
Figure 5.2.14 Distribution of overall pre-test knowledge level among women with osteoporosis

Figure 5.2.14 shows that among 60 women majority 65% of the women had inadequate knowledge.

Table 2.2 Area-wise distribution of pre-test knowledge regarding bone strengthening exercises among women with osteoporosis

The data presented in table 2.2 indicates that area-wise pre-test knowledge of osteoporosis women the pre-test mean score with standard deviation was 1.96±1.08 and the mean score percentage was 39.32% regarding general information on osteoporosis. In the aspect of general guidelines on exercisethe mean score with standard deviation was 1.83±1.06 mean score percentage was 30.55%. and regarding the aspect of knowledge on bone-strengthening exercise mean score with standard deviation was 5.3±2.55 mean score percentage was 27.89%.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Area</th>
<th>Max. score</th>
<th>Mean score</th>
<th>Standard deviation</th>
<th>Mean percentage(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General Information on Osteoporosis</td>
<td>5</td>
<td>1.966</td>
<td>1.08</td>
<td>39.32</td>
</tr>
<tr>
<td>2</td>
<td>General Guidelines On Exercises</td>
<td>6</td>
<td>1.833</td>
<td>1.0663</td>
<td>30.55</td>
</tr>
<tr>
<td>3</td>
<td>Knowledge On Bone Strengthening Exercises</td>
<td>19</td>
<td>5.3</td>
<td>2.5579</td>
<td>27.8947</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>30</td>
<td>9.099</td>
<td>4.7042</td>
<td>32.58</td>
</tr>
</tbody>
</table>
The Figure 5.2.15 represents the area-wise overall pre-test mean score with standard deviation was 9.09 ± 4.70 with a mean score percentage was 32.58%.

**Section III: Effectiveness of structured teaching programme among women with osteoporosis.**

**Table 3.1: Distribution of women with osteoporosis according to post-test score.**

The data presented in table 3.1 depict that among 60 women 36(60%) had adequate knowledge, 24(40%) had moderate knowledge of bone-strengthening exercises and none of the women had inadequate knowledge after administration of the structure teaching programme.

<table>
<thead>
<tr>
<th>Level of knowledge</th>
<th>Frequency (N)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Moderate</td>
<td>24</td>
<td>40</td>
</tr>
<tr>
<td>Adequate</td>
<td>36</td>
<td>60</td>
</tr>
</tbody>
</table>

N=60

**Figure 5.3.16 Distribution of overall post-test knowledge level among women with osteoporosis**

Figure 5.3.16 shows that among 60 women majority 60% had adequate knowledge.
Table 3.2 Area wise of post-test knowledge regarding bone strengthening exercises among women with osteoporosis

The data presented in table 3.2 revealed area-wise post-test knowledge mean score with standard deviation was 3.46±1.41 and the mean percentage score was 69.2% regarding the general information on osteoporosis. The mean score with standard deviation was 3.96±1.74 mean percentage score was 66% regarding general guidelines on exercise and related to the knowledge on bone-strengthening exercise mean with standard deviation was13.05±3.39 and the mean percentage was 68.68%

N = 60

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Area</th>
<th>Post-test</th>
<th>Max. score</th>
<th>Mean score</th>
<th>Standard deviation</th>
<th>Mean percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General Information on Osteoporosis</td>
<td></td>
<td>5</td>
<td>3.46</td>
<td>1.41</td>
<td>69.2</td>
</tr>
<tr>
<td>2</td>
<td>General Guidelines On Exercises</td>
<td></td>
<td>6</td>
<td>3.96</td>
<td>1.74</td>
<td>66</td>
</tr>
<tr>
<td>3</td>
<td>Knowledge On Bone Strengthening Exercises</td>
<td>19</td>
<td>13.05</td>
<td>3.39</td>
<td>68.68</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>30</td>
<td>20.47</td>
<td>6.54</td>
<td>67.96</td>
<td></td>
</tr>
</tbody>
</table>

Figure 5.3.17 Area-wise overall post-test knowledge level among women with osteoporosis.

The figure 5.3.17 represents the area wise overall post-test mean score with standard deviation was 20.47±6.54 with mean percentage 67.96%.

Table 3.6: Overall comparison pre-test and post-test knowledge level of women with osteoporosis.
Table 3.6 reveals that in the pre-test majority of the patient 39(65%) had inadequate knowledge of bone-strengthening exercise and 21(35%) had moderate knowledge of bone-strengthening exercise whereas in the post-test 36(60%) had adequate knowledge on bone-strengthening exercise and 24 (40%) had a moderate knowledge. Hence, it was concluded that there was an improvement in knowledge of bone-strengthening exercises after the structured teaching programme among women with osteoporosis.

N = 60

<table>
<thead>
<tr>
<th>Level of knowledge</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency(N)</td>
<td>Percentage(%)</td>
</tr>
<tr>
<td>Inadequate</td>
<td>39</td>
<td>65</td>
</tr>
<tr>
<td>Moderate</td>
<td>21</td>
<td>35</td>
</tr>
<tr>
<td>Adequate</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Figure 5.3.18: Overall comparison of pre-test and post-test knowledge regarding bone-strengthening exercises among women with osteoporosis

The figure 5.3.18 represents that compared to pre-test in post-test women gained adequate level of knowledge.

Table 3.7: Effectiveness of structured teaching programme on knowledge regarding bone-strengthening exercises among women with osteoporosis.

The table 3.7 revealed that the pre-test mean score with standard deviation was 9.1±3.81 and mean percentage score was 30.33% and the posttest mean score with standard deviation was 20.48±5.45 and the mean percentage score was 68.27% whereas mean percentage score difference was 38%. The obtained ‘t’ value was 28.67 which was greater than the table value at p<0.05 level of significance, after a structured teaching programme on bone-strengthening exercise. The study concluded that a structured teaching programme on bone-strengthening exercise was found to be effective in improving the knowledge among women with osteoporosis. Hence, the research hypothesis H₁ was accepted.

N = 60

<table>
<thead>
<tr>
<th>Sl.no.</th>
<th>Variables</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Mean difference</th>
<th>Enhancement of mean score percentage (%)</th>
<th>‘t’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pre – test</td>
<td>9.1</td>
<td>30.33</td>
<td>11.38</td>
<td>38</td>
<td>28.67</td>
</tr>
<tr>
<td>2</td>
<td>Post – test</td>
<td>20.48</td>
<td>68.27</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The figure 5.3.18 represents the comparison of the pre-test and post-test mean and mean percentage was greater after the structured teaching programme on bone-strengthening exercise.

Section IV: Association between post-test knowledge level of women with osteoporosis and selected socio-demographic variables.

Table 4.1: Association between post-test knowledge level of women with osteoporosis and selected socio-demographic variables.

There was a significant association found with selected socio-demographic variables such as age in years and educational status. There was no significant association with other socio-demographic variables. Hence the research hypothesis H2 was accepted.

<table>
<thead>
<tr>
<th>Socio-demographic variable</th>
<th>Inadequate</th>
<th>Moderate</th>
<th>Adequate</th>
<th>df</th>
<th>Chi-square(χ²)</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Age in years</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 years</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41-50 years</td>
<td>0</td>
<td>8</td>
<td>22</td>
<td>6</td>
<td>13.61</td>
<td>S</td>
</tr>
<tr>
<td>51-60 years</td>
<td>0</td>
<td>8</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>61-65 years</td>
<td>0</td>
<td>8</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2. Religion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hindu</td>
<td>0</td>
<td>10</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muslim</td>
<td>0</td>
<td>14</td>
<td>13</td>
<td>6</td>
<td>4.59</td>
<td>NS</td>
</tr>
<tr>
<td>Christian</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If other specify</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3. Marital Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>0</td>
<td>18</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unmarried</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>1.93</td>
<td>NS</td>
</tr>
<tr>
<td>Widow</td>
<td>0</td>
<td>6</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4. Social Habits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcoholism</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Smoking</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Betel chewing</td>
<td>0</td>
<td>9</td>
<td>4</td>
<td>8</td>
<td>5.89</td>
<td>NS</td>
</tr>
<tr>
<td>Drug use</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No any bad habits</td>
<td>0</td>
<td>15</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>5. Educational status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal education</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td>23.56</td>
<td>S</td>
</tr>
</tbody>
</table>
Primary | 0 | 18 | 17
Secondary | 0 | 0 | 19
Graduate/post graduate | 0 | 0 | 0

<table>
<thead>
<tr>
<th>Socio-demographic variable</th>
<th>Inadequate</th>
<th>Moderate</th>
<th>Adequate</th>
<th>df</th>
<th>Chi-square(χ²)</th>
<th>Inference</th>
</tr>
</thead>
</table>

6. Occupation

Housewife | 0 | 16 | 13
Self-employed | 0 | 8 | 10
Employed | 0 | 0 | 12
If others specify | 0 | 0 | 1

7. Duration of illness in years

>5 | 0 | 15 | 33
5 to 10 | 0 | 9 | 3
10 to 15 | 0 | 0 | 0
<15 | 0 | 0 | 0

8. Age of Menopause

Not attained | 0 | 1 | 9
35-40 | 0 | 0 | 2
41-45 | 0 | 18 | 17
46-50 | 0 | 5 | 8

9. Body Mass Index (BMI)

Underweight | 0 | 0 | 9
Normal weight | 0 | 7 | 14
Pre-Obesity | 0 | 7 | 7
Obesity Class I | 0 | 10 | 6

10. Source of information regarding osteoporosis

Health care professionals | 0 | 10 | 13
Friends/family members | 0 | 9 | 17
Mass media/newspaper | 0 | 4 | 6
If others specify | 0 | 1 | 0

*S = Significant; NS = Non-significant

The study findings revealed that the mean score with a standard deviation of post-test was 20.48 ± 5.45 and the mean percentage score of 68.27% was higher than the pre-test mean score with a standard deviation of 9.1± 3.81 and mean percentage score was 30.33% and the enhancement was 38%. This shows that the mean post-test knowledge level of the women were significantly higher than their mean pre-test knowledge level. The calculated ‘t’ value was 28.67 which was greater than the table value at p<0.05 level of significance. The study concluded that a structured teaching programme on bone-strengthening exercise was found to be effective in improvement in knowledge increased from inadequate level to moderate and adequate level.

DISCUSSION

This represents the major findings of the study and discusses them with other similar studies conducted by other researchers. The study aimed to evaluate the effectiveness of a structured teaching programme on knowledge regarding bone strengthening exercises among women with osteoporosis attending out-patient department in selected hospital at Mangaluru. The study findings had been discussed according to the objectives and hypothesis along with results of other studies.
Socio-demographic variables of the women with osteoporosis.

- The distribution of subjects based on their age showed that the majority of the women 30(50%) were within the age group of 40-50 years. 13(22%) belonged to the 51-60 years, 11(18%) were 60-65 years of age and 6(10%) were 40 years of age.
- Among 60 women according to their religion 29(48%) were Hindu, 27(45%) were Muslim and 4(7%) were Christians and none of the women belongs to other religion.
- With regards to marital status, there were 50(83%) were married and 10(17%) were a widow and none of them were unmarried.
- In the present study, 47(78%) were not having social habits and 13(22%) were having betel leaf chewing and none of the women had alcoholism, smoking and use of drugs.
- Distribution of women based on the educational status 35(58%) had primary education, 19(32%) had secondary education, 6(10%) had no formal education and none of the women was a graduate or postgraduate.
- With regards to occupation, 29(48%) were housewives, 18(30%) were self-employed 12(20%) were employed and 1(2%) woman was working in another sector.
- Among 60 women according to the duration of illness 48(80%) were belongs to less than 5 years, and 12(20%) belonged to the 5-10 years and none of them belonged to the group of 10-15 and more than 15 years of duration.
- Distribution of women based on the age of menopause 35(58%) belong to the 36-40 years, 13(22%) belong to 41-45 years, 10(17%) were not attained and 2(3%) belong to less than 35 years.
- Among 60 women according to the BMI 21(35%) were normal, 16(27%) were in obesity class I, 14(23%) were in pre-obesity and 9(15%) were underweight.
- In the present study, 26(43%) gained information regarding osteoporosis from family and friends, 23(38%) were from a health care professional, 10(17%) were from mass media and 1(2%) were from other sources.

Assessment of pre-test level of knowledge regarding bone strengthening exercises among women with osteoporosis.

The pre-test score of the present study showed that among 60 women majority of the majority 39(65%) had inadequate knowledge of bone-strengthening exercises and 21(35%) had moderate knowledge of bone-strengthening exercises.

Area-wise pre-test knowledge of osteoporosis women the pre-test mean score with standard deviation was 1.96±1.08 and the mean score percentage was 39.32% regarding general information on osteoporosis. In the aspect of general guidelines on exercise, the mean score with standard deviation was 1.83±1.06 mean score percentage was 30.55% and regarding the aspect of knowledge on bone-strengthening exercise mean score with standard deviation was 5.3±2.55 mean score percentage was 27.89%. The overall area-wise pre-test mean score with standard deviation was 9.09±4.70 with a mean score percentage was 32.58%.

Item-wise pre-test score was minimum in knowledge regarding muscles and bone strengthening exercises for osteoporosis and Meaning of shoulder stretch was known by 7(12%) and maximum knowledge regarding the posture during sitting was 33(55%).

The present study is supported by a cross-sectional survey on the assessment of osteoporosis knowledge in perimenopausal females attending the outpatient department at a tertiary care hospital at central Gujarat. A purposive sampling technique was used to select 300 subject. The study findings showed that 158(52.7%) had poor knowledge whereas 121(40.3%) had average knowledge and 21(7%) had good knowledge of all aspects of Osteoporosis. Based on the findings, the present study concluded education programme aspect was important to provide knowledge on osteoporosis and treatment for perimenopausal females on a routine basis.

Effectiveness of structured teaching programme among women with osteoporosis.

The post-test result reveals that out of 60 women 36(60%) of the women had adequate knowledge and 24(40%) had moderate knowledge of bone-strengthening exercises and none of the samples had inadequate knowledge.

Post-test knowledge mean score with standard deviation in 3 areas was 3.46±1.41 and the mean percentage score was 69.2% regarding the general information on osteoporosis. The mean score with standard deviation was 3.96±1.74 mean percentage score was 66% regarding general guidelines on exercise and regarding the knowledge on bone-strengthening exercise mean with standard deviation was 13.05±3.39 and the mean percentage was 68.68%. The overall area-wise post-test mean score with standard deviation was 20.47±5.64 with mean percentage 67.96%. The area-wise result shows that there was an increase in knowledge level in the post-test when compared with pre-test results.
Item-wise post-test score among 60 women, the majority 50(84%) gained knowledge regarding groups commonly affected due to osteoporosis and 31(52%) gained adequate knowledge regarding exercises is reducing the risk of osteoporosis.

The overall comparison of pre test and post-test knowledge level was improved from inadequate level to moderate and adequate level among osteoporosis women after the structured teaching programme with a mean score percentage of 68.27%.

The effectiveness of a structured teaching programme on bone strengthening exercise was proved by obtained ‘t’ value was 28.67 which was greater than the table value at p<0.05 level of significance. Therefore, the study concluded that a structured teaching programme on bone-strengthening exercise was found to be effective in improving the knowledge among women with osteoporosis. Hence, the research hypothesis H1 was accepted.

The present study is supported by the pre-experimental study conducted to assess the effectiveness of a self-instructional module on prevention of osteoporosis among middle-aged women who are attending orthopaedic outpatient department in selected hospital, Bangalore. A non-probability convenient sampling technique was used to select the 50 middle-aged women. The study finding showed the overall knowledge in pre-test knowledge was 21(41.1%). Whereas in post-test was 40(80.01%). The present study concluded structured teaching programme was effective to improve the knowledge level of middle-aged women.

**Association between post-test knowledge level of women with osteoporosis and selected socio-demographic variables.**

Chi-square test was used to assess the association between the post-test knowledge score of women with osteoporosis and socio-demographic variables. Variables such as age in years (p<0.005, 13.61), educational status (p<0.005, 23.56) were significant at p<0.05 level. But religion, marital status, social habits, occupation, menstrual history, BMI, duration of illness in years and source of information regarding osteoporosis were not significantly associated with the post-test knowledge level of the patients. So, the research hypothesis H2 was accepted.

The present study is supported by a quantitative descriptive cross-sectional study on knowledge regarding osteoporosis among young adult women of a selected community of Pokhara, Kaski. A non-probability purposive sampling technique was used to select 153 samples. The study result showed that 78(51%) of the young adult women had an average level of knowledge, 75(49%) had a poor level of knowledge regarding osteoporosis and none of them had a good level of knowledge regarding osteoporosis. A significant association was found between the knowledge level and the educational status of the respondents (p=0.002). Where in the present there was study significant association found with age in years and educational status.

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**Disclaimer**
The views and inferences expressed in this publication are those of authors

**Conflicts of interest**
None declared

**Abbreviations used**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AT</td>
<td>Aerobic training</td>
</tr>
<tr>
<td>BMD</td>
<td>Bone mineral density</td>
</tr>
<tr>
<td>BMI</td>
<td>Body mass index</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence interval</td>
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<tr>
<td>CR</td>
<td>Caloric restriction</td>
</tr>
<tr>
<td>HiPRT</td>
<td>High-intensity resistance training</td>
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<td>OPD</td>
<td>Out-patient department</td>
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<tr>
<td>QOL</td>
<td>Quality of life</td>
</tr>
<tr>
<td>QUS</td>
<td>Qualitative ultrasound</td>
</tr>
<tr>
<td>RT</td>
<td>Resistance training</td>
</tr>
<tr>
<td>SD</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>T2DM</td>
<td>Type 2 diabetes mellitus</td>
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<tr>
<td>VO2</td>
<td>Maximal oxygen consumption</td>
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</table>
WBV = Whole-body vibration
WHO = World Health Organization

REFERENCES


60. Impact. definition of research instruments and their purpose in obtaining data from research subjects. 22 October 2019.
