CHAPTER VI

SUMMARY, CONCLUSION, RECOMMENDATIONS AND IMPLICATIONS

6.1 SUMMARY

The present study was conducted to ‘evaluate the effectiveness of Osteoporosis Prevention Programme on knowledge (osteoporosis risk factors, exercises and calcium intake), self-efficacy (perception and practice of exercises & intake of dietary calcium) and bone mineral density among female teachers in selected schools of Kanchipuram district’.

The objectives of the study were to

1. determine the effectiveness of Osteoporosis Prevention Programme on knowledge in the following aspects: osteoporosis risk factors, exercises and calcium intake of female school teachers.

2. find out the effectiveness of Osteoporosis Prevention Programme on self-efficacy in the following aspects: perception and practice of exercises & intake of dietary calcium of female school teachers.

3. evaluate the effectiveness of Osteoporosis Prevention Programme on bone mineral density of female school teachers.

The investigator made specific predictions regarding the answers to the
research questions by formulating the hypotheses and they were as follows:

1. There is a significant difference in knowledge on osteoporosis risk factors among female school teachers who participate in the OPP than those who do not.

2. There is a significant difference in knowledge on exercises among female school teachers who participate in the OPP than those who do not.

3. There is a significant difference in knowledge on intake of dietary calcium among female school teachers who participate in the OPP than those who do not.

4. There is a significant difference in perception on exercises among female school teachers who participate in the OPP than those who do not.

5. There is a significant difference in perception on intake of dietary calcium among female school teachers who participate in the OPP than those who do not.

6. There is a significant difference in practice of intake of dietary calcium among female school teachers who participate in the OPP than those who do not.
7. There is a significant difference in bone mineral density among female school teachers who participate in the OPP than those who do not.

Review of literature and related studies enhanced the investigator to gather relevant information to support the study, design the methodology, utilize a conceptual framework and in the development of the tools. The related literatures were gathered and grouped under the following headings:

1. Burden of osteoporosis.
2. Knowledge on osteoporosis.
3. Osteoporosis preventive behaviors.
4. Self-efficacy and osteoporosis prevention.
5. Osteoporosis Prevention Program.

The conceptual framework adopted for the study was based on Nola J. Pender’s Health Promotion Model. The concepts of this model were modified and utilized for the present study.

The research approach was evaluative in nature. A randomized controlled trial design was adopted to conduct the study in the government schools of the sub-urban areas of Kanchipuram district. Following randomization of the schools, the study included 170 female school teachers who fulfilled the inclusion criteria with 85 each in the study and control groups. Osteoporosis Prevention Programme was implemented to the study group. The OPP included teaching on osteoporosis & its preventive measures, demonstration of exercises, issuing of booklets ‘Healthy life: Happy life’ and
‘Invest on your bones’ and reinforcements. The control group received one of the booklets ‘Healthy life: Happy life’ that contained general health tips.

The instrument used for the present study had two sections: A. Background variables which included demographic & personal variables and B. Osteoporosis Prevention Programme Outcome which included five parts: 1. Bone mineral density record, 2. Osteoporosis knowledge test (Osteoporosis risk factor scale, exercise scale & calcium intake scale), 3. Osteoporosis self-efficacy scale [Exercise self-efficacy scale, calcium self-efficacy scale, assessment of practice of exercise (checklist to assess the practice & daily calendar to assess the regularity) and assessment of practice of intake of dietary calcium (food frequency questionnaire & 24 hours dietary recall)]. The validity of the developed tools was ascertained from the experts in the respective fields.

The pilot study was conducted in the selected government schools in Porur, Thiruvallur district and ensured the feasibility to conduct the main study. The data collected from the main study participants were analysed using statistical tests. The study findings supported the effectiveness of the Health promotion model applied in this study. The major findings of the study were given below.
6.2 FINDINGS OF THE STUDY

Background variables

- The background variables (demographic and personal variables) of the subjects in the study and control groups were found to be homogenous in nature as there were no statistically significant differences between the groups.

Knowledge

Knowledge on osteoporosis risk factor

- The comparison of mean scores of knowledge on osteoporosis risk factors between the study (7.73, 7.94 & 7.96) and control group (2.28, 2.11 & 2.90) during posttests-I, II & III showed the level of knowledge to be high among study group which was statistically significant at p<0.001.

- The knowledge on osteoporosis risk factors showed improvement in the posttest (7.96) than in the pretest (1.68) in the study group, at p<0.001.

- A statistically significant difference was found over a period for the study group (pretest, posttests-I, II, III,) with relation to knowledge on osteoporosis risk factors at p< 0.001 (F=404.416) than in the control group.
Knowledge on exercises

- There was an improvement in the mean scores of knowledge on exercises of the study group (13.88, 13.77 & 13.67) than in the control group (3.88, 4.13 & 5.49) during posttest-I, II and III, which was statistically significant at p< 0.001

- The level of knowledge on exercises was found to be high in posttest (13.67) compared to the pretest (3.02) in the study group, at p< 0.001

- A statistically significant difference was found over a period of time (pretest, posttests-I, II, III,) in relation to knowledge on exercises in the study group at p< 0.001 (F=1127.872) than in the control group

Knowledge on calcium intake

- The comparison of the mean scores of knowledge on calcium intake of the study group (14.06, 13.99 & 14.15) and control group (3.76, 3.76 & 4.59) during posttest-I, II and III showed high scores in the study group which was statistically significant at p< 0.001

- There was an improvement in the posttest knowledge on calcium intake (14.15) than its pretest (3.17) among the study group

- The mean scores of knowledge on calcium intake between study and control groups over a period of time were found to have a statistically significant difference at p< 0.001 (F = 1114.664)
Self-efficacy

Perception on exercises

- The perception on exercises of the subjects was higher in the study group (79.85, 88.98 & 96.21) than in the control group (38.73, 46.13 & 50.28) during the posttest-I, II & III and was statistically significant at p< 0.001

- The perception on exercises showed improvement in the posttest (96.21) than in the pretest (39.23) in the study group, at p< 0.001

- A statistically significant difference at p<0.001 (F = 802.204) was noted in the mean scores of perception on exercises between the two groups and the perception on exercises was found to be consistently high among the subjects in the study group, over a period of time

Perception on intake of dietary calcium

- There was an improvement in the perception on intake of dietary calcium in the study group (81.52, 90.63, 95.94) than in the control group (46.93, 48.49, 52.16) and was statistically significant at p<0.001 during posttest-I, II and III

- In the study group the perception on intake of dietary calcium improved during the posttest (95.94 ) than in the pretest (46.94), at p<0.001
The perception on intake of dietary calcium over a period of time was found to be high in the study group than in the control group, at p<0.001 (F = 641.794)

Practice of exercises

- The practice of exercises was good among 49 (57.6%) subjects during posttest-I, 68 (81.9%) subjects during posttest-II and 77 (95.1%) during posttest-III in the study group

- Exercises were practiced regularly by 54 (63.5%) subjects during posttest-I, 68 (81.9%) in posttest-II and 71 (87.7%) in posttest-III in the study group

- The mean scores of the balancing, hip and spine exercises showed an improved scores in the posttest-III (11.95, 10.19 & 3.10) than in the posttest-I (10.98, 8.71 & 2.22) and these differences were statistically significant at p< 0.001. Improvement in the practice of toe and heel walking at p< 0.01 and squat at p< 0.05 was also noted

- There was an improvement in the overall practice of exercise among the subjects in the study group during posttest-II (41.12) & III (41.96) than in the posttest-I (38.0) which was statistically significant at p<0.001
Practice of intake of dietary calcium

- The intake of dietary calcium as estimated by FFQ was found to be ≥ 600 mg/day among 43 (51.8%) and 72 (88.9%) subjects during posttest-II and posttest-III in the study group whereas in the control group all the subjects had < 600 mg of dietary calcium per day

- A statistically significant improvement at p< 0.001 was noted in the study group when the mean scores of dietary calcium intake estimated by FFQ were compared between study group (273.55, 594.38, 691.61) and control group (222.535, 225.318, 239.246) during the posttest-I, II & III

- The intake of dietary calcium was high during the posttest (691.610) than during the pretest (227.80) in the study group which was significant at p< 0.001

- The calcium intake as estimated by FFQ was found to be consistently high in the study group over a period of time which was statistically significant at p< 0.001 (F = 861.817)

- In the study group an improvement was noticed in the intake of dietary calcium as estimated by 24 hr dietary recall as 32 (38.6%) and 59 (72.8%) subjects had ≥ 600 mg of dietary calcium per day during posttest-II & III respectively, whereas no subjects were found to be in that category in the control group
• There was a high intake of dietary calcium as estimated by 24 hr dietary recall among study group (261.379, 542.727 & 665.195) than the control group (213.712, 214.795 & 220.304) during posttest- I, II & III, which was statistically significant at p< 0.001

• A high intake of dietary calcium was observed among the subjects in the study group during posttest (665.19) than during the pretest (218.252), at p< 0.001

• A significant statistical difference was observed in the mean scores of dietary calcium intake estimated by 24 hr-dietary recall over a period of time between the groups at p< 0.001 (F = 657.883)

**Bone mineral density**

• The BMD score of -1 to -2.5 (osteopenia) was found among 71 (87.7%) subjects in the study group and 59 (71.1%) subjects in the control group

• In the study group 10 (12.3%) subjects were found to be osteoporotic (< -2.5 BMD score) whereas in the control group more number of subjects 24 (28.9%) were noticed to have osteoporosis

• The posttest BMD score was found to be minimally reduced in the study group (pretest mean= -1.754; posttest mean= -1.891) whereas in the control group (pretest mean= -1.715; posttest mean= -2.192) the reduction resulted in a higher mean difference
• The BMD scores were reduced in the control group (-2.192) during posttest-III than in the study group (-1.891) which was statistically significant at p < 0.001.

6.3 CONCLUSION

The appeal of disease prevention and health promotion is particularly attractive when weighed against the growing costs for medical treatment and rehabilitation. There is an overwhelming need for wider dissemination of information about osteoporosis, especially targeting premenopausal women, to halt the progression of this silent disease.

This study generated information on the BMD status, self-efficacy, knowledge on osteoporosis and its preventive measures among female school teachers before and after the intervention, OPP. The women who improved their calcium intake and physical activity by following the recommended protocol had maintained their BMD that is better than those in the control group. The study suggests that a multidisciplinary education program which encompasses teaching, demonstration, issuing of booklets and reinforcements may have an impact on knowledge and behaviours that may help to delay the development of osteoporosis.

The hypothesized model based on the Pender’s health promotion model is useful in understanding the influence of cognition, perception and action on health-promoting behaviours. Based on the study findings it is evident that implementation of OPP among women with low BMD ensures
adequate knowledge, improves self-efficacy, promotes osteoporosis preventive behaviours and reduces bone loss.

6.4 RECOMMENDATIONS

- Prevalence of osteopenia and osteoporosis can be studied
- This study can be replicated on a larger scale in other settings
- A comparative study can be conducted between male and female with similar study variables
- Similar studies can be conducted with different teaching aids e.g video assisted teaching, laptop assisted teaching
- A similar study with inclusion of other biophysiological parameters like serum calcium, vitamin-D can be conducted
- A similar study can be conducted among children to evaluate the effectiveness of OPP on peak bone mass
- A follow-up study can be carried out to reflect sustained change in risk reduction behaviours and maintenance of BMD
- A large scale study can be executed to determine the normative reference range of BMD for Indians
- A correlational study can be conducted to find out the relationship among the study variables
6.5 IMPLICATIONS

6.5.1 Nursing Practice

- Nurses must realize and accept the teaching role, as the members of the society are aware that it is their right to be informed and they need to know more
- The booklet can be utilized in patient teachings and health education sessions
- Screening for low BMD cases can be routinely carried out in the outpatient departments to identify and manage at its earlier stage
- Osteoporosis prevention exercises can be demonstrated to the patients and family as part of home care advices
- Nurses must update and implement the recommendations of OSI and IOF in patient care

6.5.2 Nursing Education

- Osteoporosis training programs can be conducted to train the candidates as resource persons so that they in turn could provide training to other group of people thus the teaching program could be extended to larger scale covering large population
• Emphasis on organization and conduction of screening camps in hospital and community setting could be considered in the nursing curriculum

• Student nurses could be encouraged to render health education utilizing the booklet

6.5.3 Nursing Administration

• Policies and protocols regarding regular conduction of patient and family education could be formulated

• Measures to make available of the information booklet on osteoporosis for the patients and their family members could be carried out

• Screening camps and teaching programs on osteoporosis could be planned

• Availability of bone densitometer (QUS) in the Out-patient department could be ensured

• Collaboration with community health nurses in planning and implementing osteoporosis preventive measures could be practiced

6.5.4 Nursing Research

• Dissemination of research findings could be carried out

• Many such research studies could be conducted
• Osteoporosis registry could be maintained

• The data from similar research studies could be collected to submit the report to the government to formulate policies on osteoporosis prevention and management at primary health levels

• The research report could be presented to the government and educational authorities to develop courses in all high schools to help the children to attain peak bone mass