Osteoporosis: Physical Therapy Practice and Knowledge

Salwa F. Abdel Mageed* and Amel M. Youssef**

* Department of Traumatology and Orthopaedic Physical Therapy, Faculty of Physical Therapy, Cairo University.

** Department of Gynecology & Obstetrics Physical Therapy, Faculty of Physical Therapy, Cairo University.

ABSTRACT

Osteoporosis is by far the commonest bone disease, exceeding all others in its clinical and economic importance. The scale of this disease has doubled over the last 20 years. This study set out to identify the level of osteoporosis knowledge among physical therapists in Cairo and to determine the actual role of physical therapy in treating and or preventing osteoporosis. A questionnaire form was designed and personally administered to 200 physical therapists practising in the main Public and Teaching Hospitals in Cairo. Also, the questioned sample included most of teaching staff in the Faculty of Physical Therapy, Cairo University. Statistical analysis of the collected information revealed that 60% of physical therapists were not satisfied with their knowledge of osteoporosis. Those questioned stated that physical therapy has an important role in dealing with osteoporotic patients. The obtained information, also, revealed that in spite of the great importance of physical therapy measures in osteoporosis, the ideal approach could not be determined. It was concluded that more lectures, seminars and practical training are needed in this field to improve the level of physical therapist's knowledge of osteoporosis. Also, more researches are needed in order to determine the most effective physical therapy approach at each stage of this disease.

Key words: *Osteoporosis, Physical Therapy, and Bone mineral density.*

INTRODUCTION

Bone is a living tissue, which is continually remodeled. Calcium is the mineral essential for the development of bone strength and density[1]. Maximum bone mineral density (BMD) usually occurs early in the third decade of life. Osteoclastic and osteoblastic activity then achieves a balance that maintains the maximum BMD for about another 10 years[9]. Beyond the 30 to 40 years old age range, the osteoblastic activity fails to completely balance osteoclastic activity, resulting in an increase in the absorption of bone. The increased resorption results in an increased size of the resorption cavities and ultimately in decreased bone mass[16]. The bone loss for women over 40 years of age is greater than the loss experienced by men, although the typical rate of loss continued to be debated. The loss in bone mineral content is accounted for by a variety of factors, including the effects of gender, age, diet, physical activity, cigarette smoking and differences in hormonal functions[6], which is a normal physiological process with aging, that is considered a particular problem for women[10] .Osteoporosis

is a reduction in bone mass per unit volume with micro architectural deterioration to a level that may lead to fracture. It affects 40% of women by age 60 years[22]. Osteoporosis presents in a number of different ways ranges from vertebral fractures to life threatening hip fractures[17]. These fractures have devastating effect on patients and stress the public health system. Half the people who have hip fractures will need some temporary help with daily living and about 25% of those affected die within one year[27]. Vertebral fractures are quoted as occurring three times as often as hip fractures, but often remain undetected. Colles fractures are the most common fractures seen in women under 70 years, with approximately 75% being of osteoporotic origin[14]. Also, osteoporosis is an inevitable sequel of traumatic spinal cord injury (SCI). Increased Calcium and hydroxyproline excretion during the first six months after SCI signals the loss of bone[12].

So, osteoporosis is by far the commonest bone disease exceeding all others in its clinical and economic importance specially in post menopausal women. For it, minimizing the risk of osteoporosis fractures in later life needs BMD to be maximized, thus several researches had been advocated for this purpose[2]. Fluoride, vitamin D and calcium intake are recommended to stimulate bone formation to prevent vertebral fractures in osteoporotic patients[4,21]. Today, physical therapy can be used widely for preventing and treating osteoporosis. For example, exercise therapy is beneficial in dealing with such disease as it affects the skeleton in several ways[28].

Smith et al (1989)[26] demonstrated reduced bone loss in post menopausal women after 4 years of a walking and Jogging program. Also study of Eisman (1993)[7] showed an increase in neck femur BMD after skeletal loading. It has generally been presumed that for exercise to be effective in preventing bone loss with aging, it must be weight bearing in nature to generate enough mechanical stress. While, study of Bloomfield et al (1993)[5] provided evidence of a prospective nature that non weight bearing exercise may be effective in reversing bone loss in post menopausal women.

In postmenopausal spinal osteoporosis, the definite effective medical treatment is still not known[27]. So prevention of further bone loss and fractures is an integral goal that must be tried through the application of different physical therapy modalities.

The finding that muscle stress suffices to stress bones, without a requirement for weight bearing was reported by Orwell et al (1987)[18] who noted greater vertebral bone mineral content in male and female swimmers than their sedentary counter parts of the same sex.

Similarly, Sinaki and Mikkelsen (1994)[25] showed that back extension exercise is advised in post menopausal women as it lowers the incidence of osteoporotic fractures. Other beneficial physiological effects of exercise was reported by Lord & Castell (1994)[13] who studied the effects of a one hour general fitness program, twice weekly on elderly population. Improvements in strength, balance and reaction times were observed. This has implications for prevention of falls, which is the major cause of fractures.

Exercise therapy also, is helpful in the recovery of osteoporosis induced by immobilization. Elias and Gwinup (1992)[8] reported that bone loss which follows immobilization may increase susceptibility to fractures involving long bones more than spinal column, and is due more to decreased bone formation than to accelerated bone resorption. The authors concluded that weight

bearing exercises increased the natural piezoelectric forces which is produced.

Physical therapists have the ultimate knowledge of physiology and pathogenesis of osteoporosis. Also, having a remarkable information about exercise which can be used for the treatment and prevention of osteoporosis. So, this study aimed to identify the current physical therapy practice and knowledge in this field and to determine the actual and / or the ideal physical therapy role in osteoporosis.

METHODOLOGY

Two hundred physical therapists worked mainly in various departments at Faculty of Physical Therapy, Public Hospitals, and Teaching Hospitals in Cairo were recruited in this study. Most of questioned practised physical therapy for at least three years prior to participation in this study. The sample was selected using an incidental sampling technique based on ease of accessibility.

In this study, a questionnaire form had been designed, based on the reviewed literature. The broad objectives of this questionnaire were to determine the level of physical therapists' knowledge of osteoporosis and its risk factors and to find evidence concerning optimum physical therapy approaches to prevent and treat this disease. Conclusions of the applied questionnaire are shown in table (1).

Table (1): Conclusion of the applied questionnaire form

Questions	Information required
1- How many years did you practice? And in which department?	✯ The correlation between practice and knowledge.
2- How many patients did you see per month and at which age group?	✯ Physical therapy involvement with treating osteoporotic patients.
3- What is the actual role of physical therapy in osteoporosis? Is it mainly treatment or prevention?	✯ Identifying the important physical therapy measures in osteoporosis
4- Rank ten exercises in order benefit to prevent or even treat osteoporosis.	✯ Determination of the most beneficial forms of exercises.
5- Are you satisfied with your knowledge of osteoporosis? and what is your main sources of information?	✯ The level of physical therapists knowledge in this field.

HYPOTHESES

In this study it was hypothesized that

Physical therapists are not satisfied with their knowledge of osteoporosis and its risk factors.

There is no definite role of physical therapy in osteoporosis.

Each physical therapist, completed the questionnaire form while the researchers were presented in order to clarify any question when needed. This questionnaire took about 15-20 minutes to be completed.

Collected data were fed into a computer system for statistical analysis using descriptive statistics, percentages and means.

RESULTS

The results of this study are presented under the following items

I- Level of physical therapist involvement with osteoporotic patients

All physical therapists recruited in this study represented a contact with osteoporotic

patients, so, their response rate was 100%. They reported that the primary reason for referring those patients to them was pain management. In this study, the average number of osteoporotic patients treated by all physical therapists was 45 patients / month, referred from various medical departments, with major numbers from orthopedic 70%, gynecological 20% and other departments 10%.

II- Physical therapy approaches

Exercise constitutes the most important method of treatment as reported from all physical therapists participated in the questionnaire. Walking (60%) was the most popular, strength training (25%) was also preferred by a large number of physical therapists especially for the middle aged group of patients. Aerobic exercise was used only by a small number (5%).

Electrotherapy was used by 85%, especially among those who had qualified more recently. Transcutaneous electric nerve stimulation (TENS) was favored by 55%, infra-red (25%) and laser (20%) for the management of chronic pain mainly.

Hydrotherapy (20%) was reported in the treatment of spinal osteoporosis but some physiotherapists mentioned that the application of hydrotherapy was not commonly used because its facilities were not available in their hospitals.

III- Beneficial exercises

Physical therapists were asked to rank ten exercises in order of benefit to those at risk of osteoporosis. The individual rank positions were summed to give the positions demonstrated in table (2), which included an ideal column that is based on previous literature review.

Table (2): Exercises are ranked in order of benefit in the prevention of osteoporosis by those questioned as compared with the ideal from the literature.

Rank	Physical therapists exercises as ranked in the questionnaire	Ideal exercises for osteoporosis
1	Walking	Run / Jump
2	Strength training	Walking
3	Postural exercise	Strength training
4	Flexibility	Extension
5	Swimming	Postural exercise
6	Cycling	Flexibility
7	Run / Jump	Swimming
8	Extension	Cycling
9	Flexion	Flexion
10	Bed rest	Bed rest

IV- Aims of the different physical therapy approaches

Physical therapists found it difficult to identify a single aim for their treatment, most reported more than one. Weight bearing exercises such as walking were reported by 70% to stress bone, while 30% referred to pain reduction aims. Strength training in our study comes in the second row as an important method for treatment to stress bone by 40%, while flexibility and postural exercises

represented 20% of application for pain reduction.

(a) Advice

Physical therapists were asked about advice which could be offered to the patients to influence the treatment of the condition. Most of them offered advice on diet by increasing calcium intake, exercise specially weight bearing, life style by increasing their activities, stop smoking and to correct posture (Table 3).

Table (3): Advice given to patients with osteoporosis by the questioned physical therapists

Advice		Percentage
Diet	Increased Ca intake	55
	Balanced diet	23
	No advice	15
	Refer to dietitian	7
Exercise	Weight bearing exercises	75
	Regular exercises	18
	Strength training	5
	Extension exercises	2
Smoking	Stop	80
	No advice	20
Posture	Functional advice	30
	Strength exercise	25
	Prevent kyphosis	20
	No advice	25
Life Style	Increased activity	75
	advice on activities of daily living	20
	No advice	5

(b) Treatment

About 75% of all questioned believed that they have a role, but standard and definite role, differ among the questioned due to late diagnosis of osteoporotic patients, lack of knowledge about the nature of the disease and its treatment. Also, treatment offered for those patients can not be standardized as it differs from patient to another according to its specific condition.

(c) Prevention

From the questioned physical therapists, about 80% believed that they had role in the prevention and treatment of this disease and if it occurred, their role directed to the prevention and treatment of its complications, while the remained 20% reported that they have no role. Also, when questioned about their role, the majority of them referred to combination of treatment and prevention (70%), while for treatment alone 15% and prevention alone 15%.

V- Knowledge

Concerning level of knowledge on osteoporosis, small numbers (40%) were satisfied of their knowledge, gained from post graduate study only, but major numbers are not satisfied with their knowledge, especially those who have no post graduate study. Physical therapists, who were satisfied of their knowledge were asked about the source of

these knowledge. They reported that 60% from post graduate education, 20% from seminars and literatures and 10% from departmental training, while the young reported that they gained some knowledge from few lecturers at the undergraduate study.

DISCUSSION

Osteoporosis was clearly a topic of considerable interest to the questioned physical therapists, especially to those working in orthopedic and gynecological departments. The important role of physical therapy in osteoporosis was greatly appreciated by most of the questioned.

Physical therapists working in orthopedic departments, saw a greater number of osteoporotic patients which could be due to referral methods. Also, physical therapists in gynecological department saw post menopausal osteoporotic patients but in a small numbers because most of these cases were always treated firstly by hormonal replacement therapy.

The majority of the questioned physical therapists received their knowledge on osteoporosis through post graduate education and departmental training, which is self directed, dependent on individual's interest and priorities.

Those questioned were aware of the importance of various types of exercises that is supported by the literature[15,18,19], walking was most popular, but there was no mention of intensity, frequency or duration necessary to produce these salutary effects on bone mass. The reviewed literature recommended at least 30 minutes, three times a week at aerobic threshold, i.e. 50 -70% Vo_{2max} [11,24].

Strength training was the most beneficial and is supported by various studies[20,23]. It was interesting that questioned accorded relatively low priority to run or jump which have strong support in the literature, while they may not be advisable for those with fractures or even at risk. There is good evidence that even the elderly can benefit from an active approach when introduced with care. Astrand (1992)[3] describes the age-related decline in fitness as a result of decreased activity rather than its cause. Another factor may be that the respondents were seeing patients with established pathology.

Physical therapists referred to the use of exercise therapy in the treatment or prevention of osteoporosis but surprisingly none supplied exercise sheets for patients. Intensity, duration and frequency of exercise were not determined by most of the questioned physical therapists. The question which required physical therapists to rank ten exercises in order of benefit to osteoporotic patients produced interesting results. Despite the finding that a great percentage of the questioned were unsatisfied with their knowledge of osteoporosis, the exercises ranking has been correlated more closely with those recommended in the literature. It was difficult to draw conclusions from the resultant rank orders of exercises, as the majority of physical therapists were basing their responses on their clinical experience.

Most questioned felt that advice and education were important aspects of their role. For those who stated that physical therapists did not have a role in the prevention of osteoporosis, it is possible that this was due to a lack of knowledge about osteoporosis.

No clear, consistent approach to physical therapists management of osteoporosis has emerged from the questionnaire results. Further work is needed to develop standard protocol for treatment and prevention of

osteoporosis. Physical therapists in Cairo, need to be equipped with this knowledge to assist those at risk to maximize their BMD and minimize the disabling consequences of osteoporosis.

CONCLUSION

As a conclusion, physical therapists in Cairo have a great role in the treatment and prevention of osteoporosis as indicated from the questionnaire and supported by the reviewed literature. Further researches are needed to support and clarify the physical therapy role in osteoporosis.

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الملخص العربي

هشاشة العظام : العلاج الطبيعي بين المعرفة والممارسة

يعتـــبر مرض هشاشة العظام من أكثر أمراض العظام شيوعا في العالم ، حيث أنه يفوق الأمراض الأخرى من حيث الناحية الإكلينيكية و الاقتصـــادية و لقد ازداد المقياس الإحصائي لهذا المرض بمقدار الضعف في العشرين سنة الأخيرة. و نظرا لهذه الأهمية فإن هذه الدراسة اســـتهدفت تحديـــد مستوى معرفة أخصائي العلاج الطبيعي بالقاهرة بهذا المرض ، كما استهدفت أيضا تحديد الدور الأساسي و المؤثر لـــلعلاج الطبيعي في المراحل المختلفة لمرض هشاشة العظام . و من خلال استطلاع رأى مائتي أخصائي بالمستشفيات الكبرى وأعضاء هيئة التدريس بكلية العلاج الطبيعي بالقاهرة تم استنتاج ما يلي : حوالي ستون بالمائة من الأخصائيين غير راضين تماما عن مدى معرفتهم بمـــرض هشاشـــة العظـــام ، كما أنه من الصعب تحديد الدور المحدد والوسيلة المناسبة من وسائل العلاج الطبيعي لعلاج هذا المرض أو الوقاية منه. و لذلك فمن الضروري عقد ندوات و محاضرات لزيادة المستوى المعرفي للأخصائيين و أيضا زيادة الأبحاث لإيجاد أفضل طرق العلاج الطبيعي المستخدمة في المراحل المختلفة لهذا المرض.