

Physical Activity Review

October 2002

Issue. 4

IS P A P O F F

The Official Newsletter of the International Society of Physical Activity for the Prevention of Osteoporosis Falls and Fractures

The Society has grown from strength to strength during 2002. Active branches now exist in the UK, Denmark and Holland. The recently formed Turkish branch (see below) has over a thousand members, and the Belgium Branch has over 600 members. Active members also exist in many other countries including Australia, China, Costa Rica, Hungary, Ireland, Japan, Finland, New Zealand, Sweden and the USA.

This year's **International Society Meeting** will be held as a 'Physical Activity Working Group' during the American Society for Bone and Mineral Research at San Antonio, on Monday, 23 September 2002, starting at 1830 hours. Guest speakers include:

Dr Timothy Skerry, Royal Veterinary College, London, UK

Dr Joan Lappe, Creighton University, USA

Dr Kim Brixen, University of Odense, Denmark

Dr Christine Snow and team, Oregon State University, USA.

The IsPAPOFF sponsored Physical Activity Working Group at last year's ASBMR held in Phoenix, Arizona, chaired by IsPAPOFF President, Dr Ole Simonsen and Dr Lynn Kohlmeier, was generally judged to have been a success.

The IsPAPOFF Council Meeting took place this year during the World Congress of Osteoporosis, in Lisbon, Portugal. Present were Dr Ole Simonsen (*President*) Dr Tahir Masud (*Secretary*), Dr Kim Brixen, Dr Kent Kramme, Prof Gulseren Akyuz, Dr Mark Lissens and Vianda Stel. It was decided that we would explore the possibility of joining the IOF (*International Osteoporosis Foundation*) during the coming year. The aims for the next year would be to consolidate existing National Branches and to encourage other Countries to form branches as well as co-ordinating some key collaborative projects.

Please send any news, comments, questions and ideas to the Secretariat Office for inclusion in future issues of Physical Activity Review.

T. Masud (Secretary, IsPAPOFF)

Professor Gulseren Akyuz has organised the Turkish Branch of IsPA-



PROF GULSEREN AKYUZ (CENTRE)
ASSOC. PROF. DEMET OFLUOGLU (LEFT)
PROF HAKAN GUNDUZ (RIGHT)
TURKISH BRANCH OF ISPAPOFF

News from the Turkish Branch of IsPAPOFF

POFF since August 2001 within the sub-structure of the Turkish National Society of Physical and Rehabilitation Medicine (PRM). She is the President of the Turkish Osteoporosis Patient Society and Kadokoy Branch of the Turkish National Society of PRM. She is also a Board Member of the Turkish Osteoporosis Society. Dr Akyuz, as the President of Turkish IsPAPOFF, formed a working group which included 5 Psychiatrists who are working in different Medical Faculties in Istanbul.

Table of Contents:

<i>Introduction</i>	1
<i>Selected Recent Papers</i>	2
<i>Research</i>	6
<i>Membership Form</i>	8

They are Prof. Ulku Akarirmak from Istanbul University Cerrahpasa Medical School, Prof Dilsad Sondel from Istanbul University Istanbul Medical School, Assistant Prof. Hakan Gunduz and Assistant Prof. Demet Ofluoglu from Marmara University School of Medicine. This working group has been announced in www.ftr.org.tr which is the Turkish National Society PRM Website (since September 2001). Dr Akyuz can be contacted via this web page. A hundred and twenty six (126) of 1100 Psychiatrists are now members of the group. Five working group members meet every two months to plan activities.

In a recent Nationwide study of 2170 people (mean age 62 ± 8 years), involving the Turkish Branch of IsPAPOFF, regarding peoples knowledge about osteoporosis, it was found that almost 75% of people knew very little about the disease. 18.5% of the population studied had a previous osteoporetic fracture. Regular exercise was negatively correlated in with the development of fractures. Also subjects who had a higher intake of milk after the age of 50 years were found to be less prone to fracture.

Day, L Fildes, B, Gordon, I, et al.

Selected Recent Papers: Older People Falls and Fall Risk Factors

Radomised factorial trial of falls prevention among older people living in their own homes B. Med. J. (2002) 325 (7356): 128-131

Fall prevention strategies could include a number of possible interventions. Several studies have examined the effects of multifactorial interventions, but in these studies it is difficult to determine which of the components are effective. Other studies have examined the effects of single interventions but these studies do not yield information as to whether a combination of interventions might further reduce fall risk. This study aimed to examine the effects of various interventions, separately and in combination, in 1090 urban home-dwelling Australians aged 70 and over. Risk factors were assessed at baseline and subjects randomly assigned into one of seven groups, who received no intervention, or exercise and/or vision and/or home hazard interventions. Falls were monitored over the subsequent 18 months in 971 who completed the study, and risk factor assessment was repeated in a randomly selected subsample of 442. The exercise intervention consisted of 15 weekly strength/balance training classes, supplemented by daily home exercises. 60% of those assigned to the exercise group attended at least half of the classes, and home exercises were performed on average twice weekly. Strength and balance improved over the period of intervention. During followup, balance did not change significantly in the exercise intervention group, but deteriorated in the control group. The home hazard intervention resulted in 88% of participants being advised to make modifications. The total number of hazards had fallen significantly on reassessment from 10.2 to 7.9 (compared to a fall from 9.1 to 7.9 in the control group). The vision correction intervention resulted in referral of 18% of participants who did not already have eye care assessments planned. Only 5% had treatment (new or modified prescription glasses or surgery). Visual acuity was little changed in the group as a whole.

The exercise intervention was the most effective of those studied, resulting in a 7% reduction in annual fall rate. This effect may be mediated through a reduction in the age-related deterioration in balance. The other interventions had smaller effects, but when combined with exercise resulted in a cumulative reduction in annual fall rate of 14%. The study provides evidence that an exercise intervention can significantly reduce fall rate in older people, even when compliance is only modest. Adding home hazard and vision correction interventions can further reduce fall incidence.

Robertson, MC, Campbell, AJ, Gardner, MM, et al.

Preventing injuries in older people by preventing falls: A meta-analysis of individual-level data. J. Am. Geriatr. Soc. (2002) 50(5): 905-911

This group have previously conducted four trials of an exercise programme designed to prevent falls. A reduction in falls was observed in three of these trials, with a reduction in serious injuries in one and a reduction in moderate injuries in two. This paper describes a meta-analysis of the four trials.

There were a total of 1016 men and women aged 65 to 97. Participants were assigned to exercise and control groups either randomly or by centre. Exercisers undertook an individually prescribed programme of home strength and balance training exercise, three times weekly (supplemented by two weekly walks) for 44 or 52 weeks. Exercisers sustained 35% fewer falls and fall related injuries. The programme was most effective in those aged over 80, whilst being equally effective in fallers and non-fallers, and men and women.

Skelton, DA, Kennedy, J, Rutherford, OM

Explosive power and asymmetry in leg muscle function in frequent fallers and non-fallers aged over 65 Age Ageing (2002) 31(2): 119-125

Previous studies have identified frailty and low muscular strength as risk factors for falls. This study examined whether a greater range of measurements of muscle performance differed between 15 women aged 65+ who had a history of frequent falls and 20 controls.

Most measures of eccentric, isometric and concentric lower limb strength did not differ significantly between the two groups, although means tended to be lower in the group of fallers. The lack of significance may be due to the relatively small sample size studied. Interestingly though, the authors noted significant differences between legs in muscular strength and power. This asymmetry was more marked in the fallers than controls. Although explosive power (a measure of how fast force can be applied during the first 0.3s) did not differ between groups, the explosive power of the weaker leg was lower in controls.

This study suggests that explosive power and asymmetry in lower limb strength and power could be risk factors for falls and should be evaluated in larger studies. Importantly, the study also highlights the importance of assessing *both legs* when tests of muscle performance are used.

Timonen L, Rantanen T, Rynnänen, O-P, Taimela S, Timonen, T E, Sulkava R (2002)

A randomized controlled trial of rehabilitation after hospitalization in frail older women: effects on strength, balance and mobility. Scand J Med Sci Sports 12:186-192

Elderly women with limited mobility (mean age 83y) being discharged from hospital after acute illness were assigned to attend strength and functional exercise training classes for 10 weeks, or given advice on functional exercises to perform at home. Women who attended training classes showed significant improvements in strength, balance and walking speed. These benefits were still evident 3 months (and to a lesser extent 9 months) after the intervention. The women who were assigned to home exercise showed smaller improvements on discharge from hospital, with declines over the 9 month follow up.

This study is of importance in examining a frail population. Given the population, compliance was good- only 24% of women assigned to the exercise intervention dropped out. The compliance might indicate that discharge from hospital is time when older women are particularly amenable to intervention (although the provision of transport and lunch may also have helped). The reference group in this study were prescribed home exercises but still showed declines in most variables during the 9 months following discharge from hospital. It is possible that even greater declines might have occurred with no intervention.

Chang M; Yabushita N; Sakai T; Nakagaichi M; Nho H; Tanaka K; Shigematsu R

Dance-based aerobic exercise may improve indices of falling risk in older women Age and Ageing 31 (4): 261-266

For an exercise intervention to be effective, it needs to be acceptable to the target population. Dance based exercises may be more popular with older people than other interventions such as resistance training. This study examined the effects of 60 minutes of dance based aerobic exercise, 3 times per week for 12 weeks, in Japanese women aged 72 to 87. Exercisers attended 79% of sessions on average, and showed improvements in some measures of balance and agility. Dance based exercise could thus be a possible intervention for falls prevention in older people, although it would be useful to see a study examining its effect on fall incidence.

Lunt, M, Masaryk, P, Scheidt-Nave, C, et al.

Older People Bone Mineral Density and Metabolism

The effects of lifestyle, dietary dairy intake and diabetes on bone density and vertebral deformity prevalence: The EVOS study. Osteoporosis Int. (2001) 12(8): 688-698

Associations between lifestyle and vertebral deformity were examined in nearly 4000 men and women aged 50 to 80 years at 13 centres across Europe. Sporting activity and to a lesser extent cumulative physical activity and walking time were positively associated with BMD. The effect was stronger at the hip than spine and stronger in men than women. In women, significant interactions were observed such that physical activity had the largest beneficial effect in women of low weight, or women taking HRT.

Puntila, E, Kroger, H, Lakka, T, et al.

Leisure-time physical activity and rate of bone loss among peri- and postmenopausal women: A longitudinal study. Bone (2001) 29(5): 442-446

1873 Finnish peri- and post- menopausal women initially aged 47 to 56y were followed up for an average of 5.6y. 26% reported regular participation in weightbearing activity for at least an hour per week, mostly walking/jogging, skiing, gymnastics/aerobics and rowing. The loss in lumbar spine BMC was 27% smaller in the physically active than inactive after adjustments for age, weight, chronic disease, smoking, time since menopause, HRT use and baseline BMC. The reduction in bone loss was even greater in the subgroup who engaged in walking/jogging. The loss in femoral neck BMC was not significantly related to physical activity participation.

The strengths of this study are its large sample size and the information on bone loss peri/postmenopausally. This study suggests that even activities associated with low strains on bone are associated with reduced lumbar bone loss in peri/post-menopausal women. However, it was not clear how many of the walking/jogging group participated in jogging, which will impose higher strains on bone. Furthermore, it is possible that this group also had greater exposure to other types of activity e.g. stair climbing. It would have been interesting to have had some indication of bone loss rates broken down according to both physical activity and hormonal status, to allow detection of any interactive effects of physical activity and oestrogen.

Vincent, KR, Braith, RW.

Resistance exercise and bone turnover in elderly men and women. Med. Sci. Sports Exerc. (2002) 34(1): 17-23

High intensity resistance exercise (80% of 1RM for 8 repetitions, 3 times per week for 24 weeks) increased BMD of elderly men and women (age 60-83). There were substantial increases in serum osteocalcin which were not paralleled by increases in pyridinoline excretion. The findings of a modest improvement in BMD with higher intensity resistance training is consistent with several previous studies. The changes in bone turnover could indicate increased bone formation and/or turnover and contrast with findings of some other studies in older people where bone turnover/resorption was reduced.

Herala, M, Kivela, SL, Honkanen, R, et al.

Older People – Fractures

Recent decline in heavy outdoor work activity predicts occurrence of fractures among the home-dwelling elderly. Osteoporosis Int. (2002) 13(1): 42-47

This study examined 284 adults who regularly engaged in heavy outdoor work activities at baseline. Injuries and fractures were monitored over the next two years, and compared between those who maintained (n=169) and those who ceased (n=64) this activity. Fractures were experienced by 15% of those who reduced activity, but only 5% of those who maintained activity. However, soft tissue injury incidence did not differ between the two groups. This study indicates a fairly rapid increase in fracture incidence following a reduction in physical activity. Unfortunately bone mineral density was not assessed so it is difficult to conclude whether this change in fracture incidence was due to changes in bone, fall risk or other factors.

Sinaki, M, Itoi, E, Wahner, HW, et al.

Stronger back muscles reduce the incidence of vertebral fractures: A prospective 10 year follow-up of postmenopausal women. Bone (2002) 30(6): 836-841

Fifty healthy postmenopausal women who had participated in a two year randomised controlled trial of back extensor strength training were followed up 8 years later. Over the entire 10 years, back extensor strength had declined less in the 27 women who had participated in the exercise than in the 23 who had acted as controls (declines from baseline being 17 and 27 % respectively). Bone mineral density was higher in exercisers than controls before and at 2 and 10 years after the start of the exercise intervention (by 7, 5, and 9 % respectively) although the difference between the two groups only reached statistical significance at 10 years. Vertebral fractures were sustained by 30% of women in the control group compared to only 11% in the exercise group. (This difference in vertebral fractures was significant when comparing the total number of fractures between groups, but not when comparing the number of women with fracture).

This study could indicate that a period of back extensor training produces postural improvements which persist and produce benefits years after cessation of the programme. However, there are a number of factors which should be considered when interpreting these data. The women who had undertaken the back extensor training programme were more physically active at the follow up than controls, so any differences between groups could be in part due to the current physical activity rather than the previous training programme (although it could be argued that higher current physical activity levels are another benefit of the training programme, as physical activity levels did not differ between groups at baseline). The differences in BMD between groups were similar throughout the study, and

that this difference only reached statistical significance after 10 years could be a chance effect. More convincing evidence of a benefit as regards BMD would have been provided by showing a significant difference in the *change* in BMD over the 10 years. Finally, although the reduction in the proportion of vertebral fractures seems impressive, fractures were sustained by only 10 women- a fairly small sample size. Despite these limitations, these findings justify further research examining long term effects of back extensor training.

Neville, CE, Murray, LJ, Boreham, CAG, et al.

Young Adults

Relationship between physical activity and bone mineral status in young adults: The Northern Ireland young hearts project. Bone (2002) 30(5): 792-798

The associations between bone mineral properties and physical activity (assessed by questionnaire) were examined in 242 men and 212 women aged 20-25 years. After adjustment for possible confounding factors (height, weight, diet and smoking) sporting activities were found to be associated with lumbar spine and femoral neck BMC and BMD in men, but not women. Work and leisure related physical activity was not related to bone parameters. There was no association between physical activity and bone properties in women. The study could be subject to selection bias, but seems to indicate that physical activity engaged in for work and non-sporting recreation was not related to BMD. The difference in findings between men and women may indicate sexual dimorphism, or may be related to the lower prevalence of sporting activities in women compared to men (27 versus 38%) or the different types of sports engaged in (the most common sport in men was football, whilst most common sport reported by women was walking, which presumably exerts lower strains on bone).

Delvaux, K, Lefevre, J, Philippaerts, R, et al.

Bone mass and lifetime physical activity in Flemish males: a 27-year follow-up study. Med. Sci. Sports Exerc. (2001) 33(11): 1868-1875

This study examined measures of physical activity and physical fitness in males from the ages of 13 to 40 and related these changes to bone mineral density at 40. The major predictor of adult BMD was body mass index at all ages. Other predictors of BMD included shuttle run performance at age 18, measures of upper extremity strength at ages 18 and 40, and sports participation at age 40.

This study is of interest for its long followup time. It is subject to selection bias, but authors tried to minimise this effect by controlling for the change in motor fitness from ages 13 to 18, which they suggested will be related to magnitude of genetic effects. Unfortunately physical activity participation was only assessed at age 40, so there is no information from this study as to whether physical activity during development has greater effects than physical activity in adulthood. It is clear though that some measures of physical fitness at 18 were associated with BMD at 40- although it would have been useful to see more data to show the magnitude of effects.

Uusi-Rasi, K, Sievanen, H, Pasanen, M, et al.

Association of physical activity and calcium intake with the maintenance of bone mass in premenopausal women. Osteoporosis Int. (2002) 13(3): 211-217

This study compared rates of bone loss over 4y in premenopausal women with high and low physical activity levels and high and low calcium intakes. Physical activity and physical fitness were not associated with subsequent bone loss in this group. This finding contrasts with the relative maintenance of bone mass in *postmenopausal* women associated with high physical activity in a previous study from this group.

The major disadvantage of this study is that of the original 132 subjects, only 70% participated in the followup, of whom 13% had changed physical activity category in the interim resulting in incorrect classification. These factors might have reduced the likelihood of a significant effect being detected.

Sugiyama, T, Yamaguchi, A, Kawai, S.

Effects of skeletal loading on bone mass and compensation mechanism in bone: a new insight into the "mechanostat" theory. J. Bone Miner. Metab. (2002) 20(4): 196-200

This study compared the responses to a 6 month vertical jumping intervention in pre- and post-menopausal women of similar age (range 44 to 55y). Whole body, spine and hip BMD were assessed, as was urinary Gla, a possible marker of osteocalcin carboxylation. An increase in hip BMD was observed in pre- but not post- menopausal women. Unfortunately, any changes in Gla in each group were not reported in this brief publication, but change in BMD was found to be inversely correlated with baseline Gla level. The authors suggest that lower Gla levels are associated with impaired material properties of bone and that in this subgroup an increased response to mechanical loading provides a compensatory increase in bone mass. However the observation on which this theory is based is based on an association in a rather small group of women (n=14), who did not show any overall significant change in total body BMD, so this could be a chance effect.

Nara-Ashizawa, N, Liu, LJ, Higuchi, T, et al.

Paradoxical adaptation of mature radius to unilateral use in tennis playing. Bone (2002) 30(4): 619-623

Previous studies comparing loaded and unloaded arms in young tennis players have suggested that the higher BMD in the loaded arm may be due to differences in bone size rather than volumetric bone density. This study used pQCT to compare loaded and unloaded arms in 92 middle-aged female tennis players who had commenced playing in adulthood. At the distal radius, trabecular and whole BMD were significantly higher in the loaded arm, although cortical area was lower. At the mid-radius, endocortical and perisoteal areas, BMD and indices of mechanical strength were unexpectedly lower in the dominant arm. Age related changes were seen in the non-dominant but not dominant arm.

Magnusson, H, Linden, C, Karlsson, C, et al.

Exercise may induce reversible low bone mass in unloaded and high bone mass in weight-loaded skeletal regions. Osteoporosis Int. (2001) 12(11): 950-955

Current soccer players (n=67) had higher femoral neck bone density, but lower upper skull BMD, than 138 controls. Height, weight, lean mass and fat mass did not differ between the groups. Smaller differences were observed between former soccer players and controls, with no effect in former players above 70y. The authors suggest that this indicates that physical activity is provoking a redistribution of bone mass.

Duncan, CS, Blimkie, CJR, Cowell, CT, et al.

Children/Adolescents

Bone mineral density in adolescent female athletes: relationship to exercise type and muscle strength Med. Sci. Sports Exerc. (2002) 34(2): 286-294

Duncan, CS, Blimkie, CJR, Kemp, A, et al.

Mid-femur geometry and biomechanical properties in 15-to 18-yr- old female athletes Med. Sci. Sports Exerc. (2002) 34(4): 673-681

These studies compared bone mineral density and bone geometry in elite adolescent female athletes and controls. The first study reported higher BMD of weightbearing sites in runners than swimmers and cyclists. Even more interestingly, the second study examined bone geometry and estimated biomechanical parameters, which were assessed using measurements from magnetic resonance imaging. Total bone cross-sectional area did not differ significantly between groups. Swimmers and cyclists had larger medullary cavity area, which might confer increased strength in bending. Runners had higher cortical cross-sectional area. The higher areal BMD in runners did not persist when adjusted for higher cortical volume. Estimated cross-sectional moment of inertia and bone strength index were highest in runners and lowest in swimmers. The study is important in examining bone geometry as well as bone mineral density, and indicates that geometry as well as BMD may adapt to loading. The disadvantages are the relatively small sample size, which means that small effects might have been missed, and the cross-sectional design, which makes the study susceptible to selection bias (although the authors could not find any evidence of greater bone density at non-loaded sites in athletes and controls which would support selection bias).

Research

*Presented at the IOF World Congress on Osteoporosis, Lisbon, Portugal
10 - 14 May 2002*

DECREASED PHYSICAL ACTIVITY INDUCE DECREASED BONE FORMATION AND INCREASED BONE RESORPTION

Karlsson KM¹, Karlsson C¹, Ljunghall S², Obrant KJ¹;

¹Department of Orthopaedics, University Hospital MAS, SE 205 02 Malmo, Sweden, ²Department of Medicine, Uppsala, Sweden

This Swedish study evaluated the relationship between bone formation, resorption and bone mineral density (BMD) in male soccer players and controls. At the end of the season soccer players have 22% higher osteocalcin and 13% carboxyterminal propeptide of type 1 collagen (formation markers), and had significantly higher BMD than controls. However, after the end of the season the decreased activity was associated with increased bone resorption and decreased bone formation compared to controls.

PHYSICAL ACTIVITY AND THE RISK OF FALLS IN OLDER MEN AND WOMEN

Pluijm SMF¹, Stel VS¹, Visser M¹, Deeg DJH^{1,2}; Smit JH³, Lips P^{1,4};

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³Department of Sociology and Social Gerontology, Vrije Universiteit, Amsterdam, The Netherlands

⁴Department of Endocrinology, Vrije Universiteit Medical Centre (VUMC) Amsterdam, The Netherlands

This Longitudinal Aging Study Amsterdam (LASA) evaluated 1383 people aged 65-88 years and measured the level of physical activity in the previous 2 weeks by a detailed questionnaire. Over the following 3 year period physical activity was non-linearly, inversely related to the risk of falls. As compared with people in the lowest quintile, people in the highest quintile of energy expenditure had a recurrent fall rate reduction of 24%.

EFOPS – 2 YEAR RESULTS OF A 3 YEAR HIGH IMPACT EXERCISE STUDY FOR EARLY POST-MENOPAUSAL WOMEN

Engelke K¹, Kremmier W¹, Weineck J², Hensen J³, Kalender W¹;

¹Inst. Med. Physics, Univ. Erlangen, Germany, ²Inst. Sport Sci., Univ. Driangen, Germany, ³Klinikum Hannover Nordstadt, Germany

This study evaluated a vigorous, combined high impact, strength and endurance training exercise programme in early post-menopausal osteoporotic women. Compared to the control group the women undergoing the exercise programme had improved muscle strength and quality of life parameters as well as having their bone loss prevented.

EFFECTS OF LIFESTYLE FACTORS ON BONE MINERAL DENSITY IN JAPANESE BOYS AND GIRLS

Naka H¹, Iki M², Morita A², Aihara H², Ikeda Y², ¹Kyoto University of Education, Kyoto, Japan, ²Kinki University School of Medicine, Osaka-Sayama, Japan

The Japanese study examined 412 adolescent junior high school students. In boys and girls a greater milk and yogurt intake was independently associated with BMD. In girls, a greater intake of milk and yogurt in elementary school and a more active lifestyle at present were independently significantly associated with BMD.

The full abstracts of these and other studies are published in Osteoporosis International, Volume 13, Supplement 1, 2002

CAN COMMUNITY BASED HEALTH EDUCATION GROUPS INCREASE PHYSICAL ACTIVITY AND

Research

Presented at the Eighth Bath Conference, UK, on Osteoporosis

5 - 7 December 2001

PROMOTE ACTIVE LIFESTYLE CHANGES IN POSTMENOPAUSAL WOMEN AT RISK OF FRAGILITY FRACTURE?

Fraser K¹, S. Canagon¹, Pearce P¹, Roche J¹, Wheatley T¹, Claiden M², Harding A. and Partners³, Hall S⁴;

¹Princess Royal Hospital, Haywards Heath, UK; ²Brow Medical Centre, Burgess Hill, UK; ³The Medical Centre, Lindfield, UK; ⁴Department of Healthcare Research, Brighton University, Brighton, UK

The authors evaluated a programme of community based group education sessions (including an interactive talk and a practical exercise session given by a Senior Physiotherapist) in women aged 50-75 years with low bone mass density (BMD), to a control group. At baseline there was no difference between the two groups for any physical activity variable. At 6 months, there was a significant increase in the amount of sport undertaken by the intervention group (using responses from a questionnaire). The intervention group had a smaller tragus to wall measurement, decreased chair stand time, higher timed unsupported standing, and shorter stair climb time. The data suggest that such a community group education programme can significantly increase physical performance and participation in sporting activities in post menopausal women at risk of fragility fracture.

IS AN EXERCISE PROGRAMME EFFECTIVE FOR PATIENTS WITH OSTEOPOROSIS?

Francis A, Watts S, Dinan S, Prelevic G; Royal Free Hampstead NHS Trust, London, UK

An exercise programme for patients with osteoporosis was evaluated. The 8 week programme included warm up, specific strengthening and endurance exercises and a cool down. At the completion the patients were encouraged to continue exercising in specifically formulated programmes in the Community. The following changes were observed: 12% reduction in pain as measured on a visual analogue scale: 20% increase in range of chest expansion movement, 5% decrease in kyphosis deformity, 35% improvement in range of lumbar flexion, 1% increase in range of extension, 41% improvement in timed prone back lift, 24% improvement in timed 3m up and go test, 30% improvement in right leg balance timed test.

The full abstracts of these and other studies are published in Osteoporosis International, Volume 12, Supplement 2, 2001

IsPAPOFF

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